Herbert Street, Manchester

Interim Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy

Job Number: LKC 23 1433

Date: October 2023

Client: Ace Property Cheethamhill Ltd

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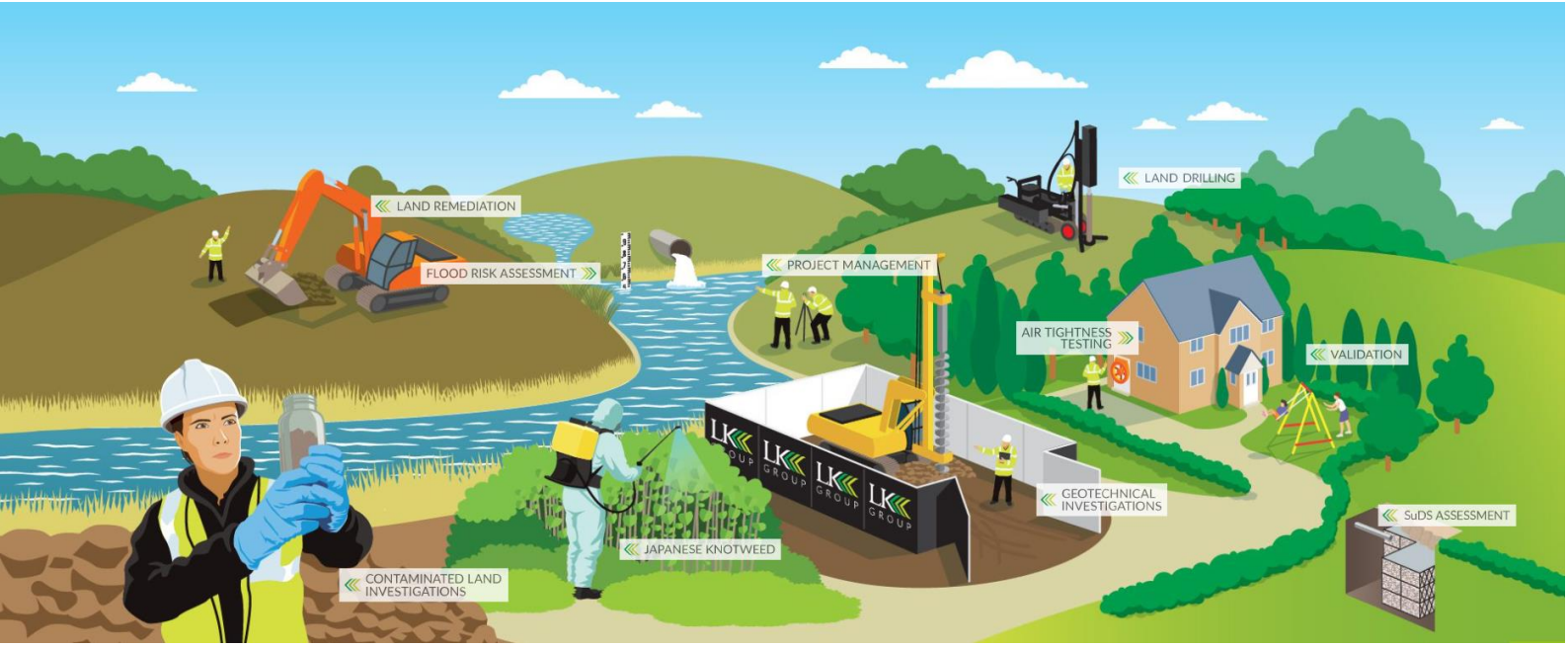

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EXECUTIVE SUMMARY

Site Details

Location	End of Herbert Street to the west, adjacent to residential housing. Centred at approximate National Grid Reference 383970E 400490N.
Area	2,600m^2
Topography	Site is approximately level.
Current Site Use	Derelict commercial building, former garages, and depot.
Proposed Development	Residential housing with gardens / soft landscaping. Demolition of existing building and construction of 14no. residential properties with gardens.

Site Setting

Main Historical Features	Onsite: residential housing, public baths, depot, commercial garages. Surrounding Area: brick works, clay pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till, Devensian, Diamicton (Secondary Undifferentiated Aquifer). Bedrock: Chester Formation, Sandstone (Principal Aquifer).
Landfills / Infilled ground	2no. recorded landfills: 145m W, 234m SE. Potentially infilled ground identified.
Site reconnaissance	1no. commercial unit with chimney present in west of site. Hardstood ground present across majority of site, with grassed verge along the southern boundary (approximately 20% of ground over). There is a car park in the northern area of the site No significant evidence of contamination identified.

Ground Investigation Work Undertaken

Date of Investigation:	1st September 2023.
Intrusive Investigation Work Undertaken:	5no. window sample boreholes. Contamination and geotechnical testing. Gas monitoring.

Ground Conditions

Made Ground	Sands and silts, comprising clinker, brick, ash, plastic, metal, concrete, coal, glass and timber.
Superficial	Firm to very stiff consistency gravelly sandy silty CLAY.
Bedrock	None encountered.
Groundwater	0.15-2.61mbgl.
Obstructions	None.

Geotechnical Assessment

Allowable Bearing Pressure	50kN/m^2 within the natural Clay, however, made ground encountered to depths of up to 5.00mbgl and no reliance should be placed on the made ground due to its highly variable nature.
Anticipated Foundation Type	Ground improvement by vibro granular columns, or similar, are considered to give the most reliable foundation solution for the site.
Other Considerations	Natural Clay has a medium volume change potential. Temporary supports of excavations will be required. Detailed design should be carried out by structural engineer. Concrete Requirements DS3-AC-3.

Contamination Risk Assessment

PL	Contaminant	Risk	Recommendations
1	Metals, PAHs, Asbestos	Moderate	Remediation required.
	Petroleum hydrocarbons, Surfactants, Other inorganic and organic contaminants (no elevations identified)	Low	No remediation required.
2	Volatile contaminants	Low	No remediation required.
3	Carbon dioxide	Moderate / Low	No remediation recommended at this stage. To be reassessed once gas monitoring completed.
4	Groundwater (mobile contaminants)	Low	No remediation required.
5	Organic contaminants	Moderate	Utility provider risk assessment to be completed. The site will likely require barrier piping.

Waste Assessment

The results show that all the samples tested are classified as non-hazardous for disposal.

Recommendations and Remedial Strategy

PL	Recommendation
1	Environmental cover system required in soft landscaping and garden areas.
2	No remediation required.
3	CS1 at this stage. To be reassessed once gas monitoring completed.
4	No remediation required.
5	Potable water pipe assessment required. Barrier pipe likely to be required.

Other Considerations
Unexpected Contamination
Grubbing Out of Inground Structures
Re-use of site generated material
Stockpile Management
Disposal
Health and Safety Considerations
Asbestos Survey
Piling in Contaminated Land
Asbestos Management Plan
Soil Validation
Site Completion Report

Further Work Requirements
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1. Introduction

1.1. Background

LK Consult Ltd (LKC) has been commissioned to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy for Herbert Street, Manchester. The investigation was undertaken in support of a planning application to develop the site for residential use.

The following work has previously been undertaken:

- Preliminary Risk Assessment undertaken by Soil Environment Services Ltd (dated July 2020, ref SES/STA/LHS/1#1)

This investigation has been undertaken to confirm the ground conditions below the site and to allow a contamination and geotechnical assessment to be undertaken.

The investigation will aim to confirm the risks of the potential pollutant linkages identified in the PRA and recommend further assessment / remediation, as required.

This is an interim report including all investigation work completed to date. A final report will be issued on completion of gas monitoring.

A post demolition investigation is also proposed once the existing buildings have been demolished. A separate report including revised remediation strategy will be produced once this has been completed.

A summary of the site details is presented in Table 1 1. Figure 1 indicates the site location and boundary plan. Figure 2 indicates the proposed development.

Location	End of Herbert Street to the west, adjacent to residential housing.
Area	Centred at approximate National Grid Reference 383970E 400490N.
Topography	2,600m^2
Current Site Use	Site is approximately level.
Proposed Development	Residential housing with gardens / soft landscaping. Demolition of existing building and construction of 14no. residential properties with gardens.

Table 1-1: Summary of site details.

2. Summary of Previous Work

2.1. Previous Phase 1 Preliminary Risk Assessment (PRA)

Pertinent information has been summarised from the PRA in Table 2-1.

Main Historical Features	Onsite: residential housing, public baths and wash house, laundry, depot, commercial garages. Surrounding Area: brick works, clay pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till, Devensian, Diamicton (Secondary Undifferentiated Aquifer). Bedrock: Chester Formation, Sandstone (Principal Aquifer).
Landfills / Infilled ground	2no. recorded landfills: 145m W, 234m SE. Potentially infilled ground identified.
Site reconnaissance	1no. commercial unit with chimney present in west of site. Hardstood ground present across majority of site, with grassed verge along the southern boundary (approximately 20% of ground over). There is a car park in the northern area of the site. No significant evidence of contamination identified.

Table 2-1: Summary of site details, historical review, environmental settings, and site reconnaissance.

Table 2-2 summarises the geotechnical constraints. This has been updated to consider the previous site investigation work.

Coal Mining	Site is not within a Development High Risk Area. No further assessment required.
Slope Stability	Site is relatively flat. No significant slope stability risk anticipated. No further assessment required.
Envirocheck Ground Stability Hazards	No to low hazard identified. No further action required.
Made Ground	Unknown depth and constituent of made ground across the site. Initial information indicates relatively deep made ground. Possible in-ground structures from previous developments.
Superficial	Glacial Till recorded on site.
Bedrock	Unknown depth to bedrock.
Groundwater	Unknown depth and variability of groundwater.
Plasticity	Clay anticipated beneath site
Sulphate	Unknown sulphate content of the made ground and natural.
Road / Pavement Design	Unknown CBR values for footpath and road design.

Table 2-2: Summary of geotechnical constraints.

2.2. Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM[1] has been summarised in Table 2-3.

Each pollutant linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552[2]. The risk matrix is provided in Appendix A.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk
1	- Heavy metals - PAHs - Petroleum hydrocarbons - Surfactants - Other inorganic and organic contaminants - ACM	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce. Windblown dust.	Future site users.	Likely	Medium	Moderate
2	Volatile contaminants: - Petroleum Hydrocarbons - VOCs - SVOCs	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Likely	Medium	Moderate
3	Hazardous / ground gas: methane, carbon dioxide (deep made ground on site, off site landfills and infilled features)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Low Likelihood	Severe	Moderate
4	Mobile contaminants: - Heavy metals - PAHs - Hydrocarbons - Volatile/mobile compounds.	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Low Likelihood	Medium	Moderate / Low
5	Organic contaminants - Petroleum hydrocarbons - Naphthalene.	Permeation of pipes. Ingestion of tainted water supply.	Future site users.	Likely	Medium	Moderate

Table 2-3: Preliminary Contamination Conceptual Model.

3. Ground Investigation

3.1. Site Investigation Design and Methodology

The investigation was carried out on 1st September 2023 and comprised the following:

- 5no. window sample boreholes drilled to 5.45 metres below ground level (mbgl) (ref. WS101 to WS105).

All site investigation locations are shown in Figure 3.

The locations were chosen to allow adequate assessment of ground conditions across the site. Table 3-1 details the site investigation locations.

Site Investigation Locations	Rationale
WS101 – WS104	General site coverage.
WS105	General coverage and former garage / depot / public wash house buildings.

Table 3-1: Summary of Sampling Locations.

Areas where buildings are still present (centre of site) could not be accessed.

The number of site investigation points corresponds to approximately one location per 23m square centres. This is considered to be a conservative sampling density and is in line with BS10175[3] for a 'detailed investigation'.

All profile logs are provided in Appendix B and are in line with BS14688-1[4] and BS5930[5].

3.2. Well Installations

3no. of the boreholes (WS102, WS104 and WS105) were installed with monitoring wells for gas and groundwater monitoring. Monitoring wells were installed in accordance with BS10175 and CIRIA C665[6] and generally comprised approximately 1m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

Well installation details are provided in Profile Logs in Appendix B.

3.3. Sampling Protocol

3.3.1. Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation[7].

Soil was collected for onsite testing for total volatile organic compounds (TVOCs) using a photoionisation detector (PID) fitted with a 10.6eV lamp and moisture trap. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested. Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665[8] to aid in screening samples for volatile analysis.

Soil samples of approximately 500g were recovered in amber jars and plastic tubs. All the samples were sent to DETS laboratory for chemical testing.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix C. Table 3-2 shows the soil testing undertaken.

Testing	No. Samples	Justification
Metals / metalloids, pH, sulphate, speciated PAHs and hardness.	3	A basic suite with a broad selection of contaminants where no significant evidence of contamination was identified (except for occasional ash, clinker, brick).
Metals / metalloids, pH, sulphate, cyanide suite, TPHCWG, BTEX, MTBE, speciated PAHs, phenol, and hardness.	2	A more detailed suite due to location of former depot and commercial garage. Although no evidence of contamination identified, detailed suite undertaken to confirm the absence of contamination and to support waste classification.
Anionic surfactants	2	Testing for anionic surfactants was undertaken given the historical site use of public washhouse and laundry.

Table 3-2: Summary of Soil Testing.

Notes:

If asbestos present during screen identification and quantification will be undertaken.

Metal/metalloids=arsenic, cadmium, chromium, (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, and boron; TPHCWG=carbon banded and aromatic/aliphatic split petroleum hydrocarbons; PAH=polycyclic aromatic hydrocarbons, BTEX=benzene, toluene, ethylbenzene, and xylenes; MTBE=Methyl tert-butyl ether, SOM=Soil Organic Matter.

3.3.2. Soil Sampling (Geotechnical)

Soil samples taken during the investigation were collected in tubs, bulk bags for in house testing and sent to DETS for geotechnical testing.

Many of the tests are UKAS accredited and further details are given in the laboratory report presented in Appendix D. Table 3-3 shows the geotechnical testing undertaken.

Testing	No. Samples
pH, water-soluble sulphate and nitrate	3
Atterberg Limits (plasticity testing)	4

Table 3-3: Summary of Geotechnical Testing Undertaken.

3.3.3. Water Sampling / Leaching Testing

Groundwater sampling / leaching testing was not carried out as part of this investigation.

A moderate / low risk was identified in the preliminary contamination conceptual model for controlled waters (Pollutant Linkage 4) and further action was only recommended if significant soil contamination was identified on site. Based on the ground conditions encountered, LKC did not consider testing to be required. This is discussed further in Section 5.4.

3.4. In-situ Testing

3.4.1. Geotechnical Testing

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. The following tests were undertaken:

- Standard Penetration Tests (SPTs) were performed in the window sample boreholes at approximately 1m intervals.
- Pocket penetrometer tests (giving undrained shear strength) were performed in the window sample boreholes within cohesive strata.

Pocket penetrometer tests were not always possible due to the friable or gravel rich nature of some of the clay deposits.

The results are provided within Appendix B.

3.5. Gas Monitoring

All the installed boreholes are currently being monitored for gas. To date, two gas monitoring visits have been undertaken. A further four visits are proposed.

Monitoring is being undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665[9] (flow rate measured first). The monitoring will aim to be undertaken over a range of weather conditions (including low and falling barometric pressure and heavy rain) to demonstrate worst-case conditions.

Due to previous industrial site uses, a photoionisation detector (PID) was used to record total volatile organic compounds (TVOCs) in all boreholes during the first visit.

The gas monitoring results (including PID results), are reproduced in full in Appendix E.

4. Ground Conditions

4.1. Geology

The ground conditions beneath the site are summarised below. Logs are provided in Appendix B.

4.1.1. Made Ground

Made ground was recorded in all boreholes to depths of 1.10-5.00mbgl. The made ground comprised horizons of gravel, sand and silt; with anthropogenic material including ash, brick, clinker, ceramic and glass (WS101, WS102, WS103 and WS105).

The only exceptions to this include: concrete fragments (WS102-WS105), plastic fragments (WS101) and timber fragments (WS104).

4.1.2. Natural Strata

Superficial strata comprised soft consistency slightly gravelly sandy silty CLAY between 1.10-3.50mbgl (WS101 and WS103).

Firm to very stiff slightly gravelly sandy silty CLAY between 2.20-5.45mbgl (WS102-WS104)

Stiff to very stiff slightly gravelly sandy silty CLAY noted in WS105 between 0.60-5.45mbgl.

4.1.3. Contamination

Except for the anthropogenic material encountered in the made ground (as described above), no further contamination was identified.

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations. The PID recorded a maximum of 0.4ppm TVOC in the samples.

4.1.4. Obstructions

No obstructions were identified within any investigation location.

4.2. Groundwater

4.2.1. Groundwater Levels

Groundwater strikes were recorded during the investigation in boreholes. This data is provided in the profile logs (Appendix B). Groundwater strikes were recorded at 2.00mbgl in WS103 and WS104. No groundwater strikes were recorded in the remainder of the boreholes.

Groundwater monitoring within the borehole wells has been undertaken on two occasions to date. This data is provided in Appendix E. Monitoring levels were recorded between 0.15mbgl and 2.16mbgl in WS101-WS105.

4.2.2. Contamination

No evidence of contamination was identified in the groundwater during investigation work or monitoring.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise residential houses with private gardens and soft landscaping, access road and car parking spaces. Details of the proposed loadings are not known and therefore a line loading of 75kN/m has been assumed for preliminary assessment purposes only.

The finished ground levels have not been provided and it is therefore anticipated that they will not vary significantly from current levels. However, should the development proposals or finished levels be altered then the comments/recommendations in this section may require revising.

The depths of any underground engineering works (sewers etc.) are unknown and therefore have not been considered in the following assessment. Any such works should be designed so as not to influence, or compromise, proposed or existing foundations or ground stability.

Given the nature of the proposed development the structure meets the criteria of Geotechnical Category 2 of Eurocode 7[10].

5.2. Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1, and typically comprises made ground to depths of between 1.10-5.00mbgl over natural cohesive superficial deposits of clay to the completion depths investigated.

5.3. Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works[11]. This should include:

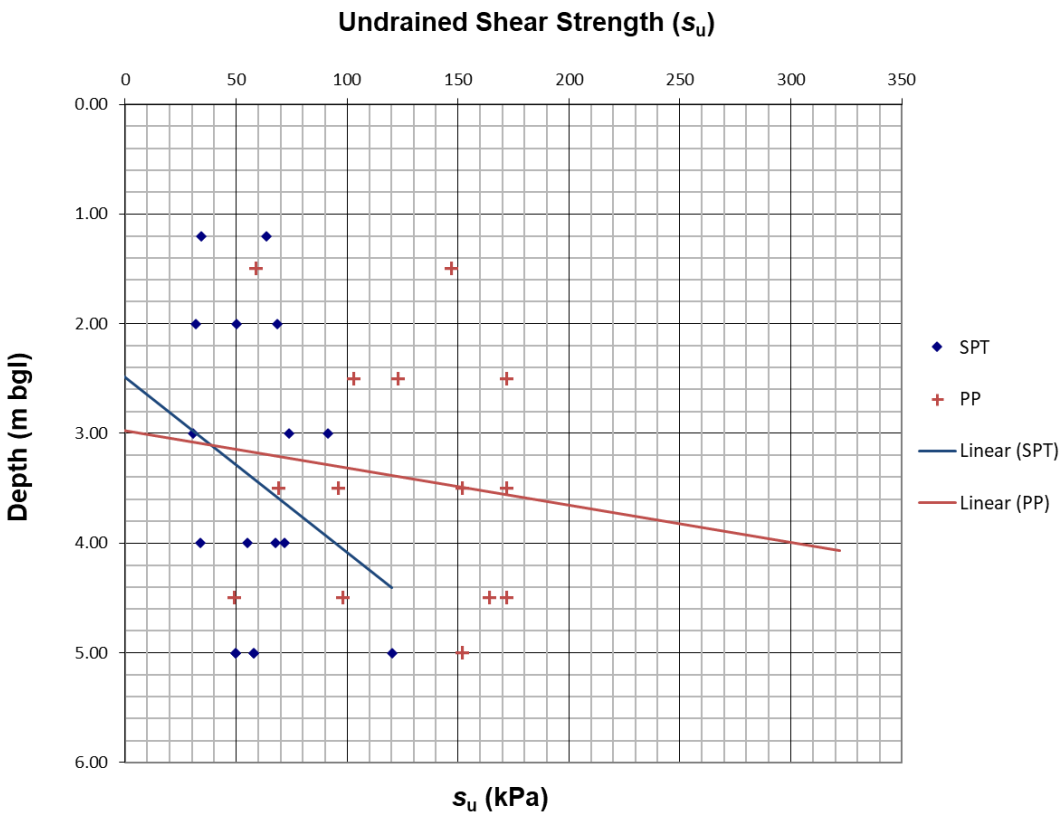
- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Buried structures and old foundations can be anticipated on site. These should be excavated from below the proposed development footprint with the resulting void backfilled.

The near surface soils may potentially be disturbed by weathering and site traffic. Precautions should be taken to avoid this, as excessive disturbance may result in more onerous floor slab design, road cap thickness and increased amount of site disposal etc. Based on site observations the near surface soils may require at least some treatment or reinforcing to allow safe movement of construction plant and labour. A working platform will be required for piling plant.

5.4. Foundation Conditions and Bearing Capacity

5.4.1. General

The natural cohesive material has been assessed using in-situ testing by SPT and PP, to obtain the undrained shear strength (s_u) of the material. The results of the testing have been plotted against depth and is shown in Graph 5-1.



Graph 5-1: Summary of S_u Vs. Depth from In-Situ SPT and PP Testing.

Graph 5-1 demonstrates that the strength of the natural cohesive deposits are varied throughout the depth range of the tests undertaken, with the results of the Pocket Penetrometer (PP) testing returning more competent shear strengths.

A conservative s_u of 50kPa is assigned to the cohesive material from a depth of *c.* 1.20mbgl for the natural superficial deposits.

5.4.2. Plasticity

Clay samples were subjected to Atterberg Limits (plasticity) and Moisture Content testing. Results are provided in Appendix D.

The clay is classified as intermediate to high plasticity.

The modified plasticity index as detailed in Chapter 4.2-D5 of the NHBC standards (modified plasticity index = plasticity index x % less than 425µm sieve / 100%) characterises the clay as having a modified PI ranging between 16% and 30%, returning a medium volume change potential.

5.4.3. Foundations Options

The made ground is not suitable for a founding material due to the inherent variability of the material. Foundation options are therefore:

- Deep strip foundations into the underlying Clay.

- Conventional strip footings on vibro granular columns.
- Mini-pile foundations.

These options are discussed in the following Sections.

5.4.4. Strip Foundations

Deep strip foundations should be constructed at least 150mm into the underlying stiff clay. An Allowable Bearing Capacity (ABC) of 86kN/m² has been calculated using a Factor of Safety of 3 and an undrained shear strength of 50kN/m² taken from Graph 5-1.

Made Ground has been recorded to a depth of 5.00mbgl (WS104), strip foundations below 2.50m require specialist structural engineer design, with 3.00m being the practical limit for depth of a strip foundation.

Atterberg Limit determinations, summarised in Section 5.4.2, show the clay to be of intermediate to high plasticity and as such the sides of the foundations may require protection using clay board or similar.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally in accordance with relevant guidance, such as that proposed by NHBC Standards for a clay of intermediate to high plasticity and a modified plasticity index of medium volume change potential. It is understood that the current site use does not include the presence of trees however it would be prudent to future proof the development against the presence of trees being planted by tenants/home owners or at neighbouring properties by taking account of the soil plasticity.

5.4.5. Ground Improvement

The use of ground improvement techniques such as vibro granular columns will allow shallow foundations to be utilised with the made ground. The vibro granular columns should provide an Allowable Bearing Capacity of around 150kN/m² but will also remove variability within the made ground. Specialist advice should be sought from a suitably experienced contractor regarding suitability of ground conditions, Allowable Bearing Capacity and settlements.

5.4.6. Piled Foundations

Consideration may be given to the use of mini-piled foundations to transfer loadings through any deep made ground / poor ground conditions and bear within the more competent natural Clay encountered at depths of between 2.20m and 5.00mbgl.

Use of mini piles will reduce the amount of spoil generated from foundation trenches requiring offsite disposal, along with the amount of concrete required for the development.

Up to 5.00m of made ground has been recorded within the exploratory holes and consideration must be given to the potential for negative skin friction to influence the piles.

Pile design should be undertaken by a specialist contractor to allow them to reduce the Factor of Safety based on their extensive pile testing data.

Should a pile foundation solution be the preferred option, then warranty providers such as the NHBC or LABC, may require further information on ground conditions to a minimum of 5.00m below the base of the pile.

5.4.7. Foundation Recommendations

Deep strip foundations below 2.50m depth are generally not economic and whilst a piling solution is viable, further deeper investigation would be required and the potential for negative skin friction would need addressing. it is considered that vibro granular columns will provide the most reliable and cost-effective option for the site.

5.5. Ground Floor Slabs

Warranty providers such as NHBC will require suspended floor slabs where Made Ground is in excess of 600mm. Due to the presence of varying thicknesses of Made Ground, up to 5.00m, it is considered that a suspended floor slab will be required for the proposed structures.

If vibro granular columns are used for the foundations, then this could be extended to the floor slab to improve formation conditions and reduce the risk of damage from settlement. However, it may be more reliable to opt for suspended floor slabs.

5.6. Pavement Construction

Untreated made ground is considered unsuitable as a sub-grade due to its potential variability and potentially low strength/high compressibility. It should be removed to a minimum depth of 0.50m below formation level and sorted to remove any unsuitable or deleterious materials. The sub formation should be rolled, and suitable excavated material can then be replaced, up to formation level, in fully compacted thin layers. Any deficit should be made up with suitable imported fill compacted as above. Following this treatment an overall design CBR of 2-5% should be available, although this will require confirmation through in-situ CBR tests.

Based on the plasticity index the soils may be frost susceptible. Frost action can cause differential heaving, surface roughness and cracking, blocked drainage, and a reduction in Bearing Capacity during thaw periods. In areas of proposed roads and car parking it may be necessary to remove the frost susceptible soils and replace with non-frost susceptible material to the expected frost depth penetration.

Following excavation, the sub formation should be proof rolled and any soft material inspected and removed.

5.7. Drainage

The presence of substantial depths of made ground across the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

The granular mature of the made ground may hold potential for soakaway drainage but the underlying natural clay is perceived to be of low permeability therefore it is not recommended that soakaways are used for disposal of surface water runoff.

5.8. Concrete Durability

Based upon the results of the chemical analyses (Appendix C) and assuming a worst case scenario of mobile groundwater through the made ground sand, subsurface concrete should be designed in accordance with Design Sulphate Class DS-3, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-23 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.9. Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant, however obstructions can be anticipated in the near surface including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced level dig for the sub structure works.

Due to the variability of the made ground all excavations should be supported or battered back in accordance with guidance contained in CIRIA R97[12]. Groundwater seepages were noted in two of the exploratory holes, evident of perched water within the made ground and glacial till Clay; however, these were minor, and that conventional sump pumping should be adequate.

5.10. Construction Activity and Inspection

The following activities and inspections should be incorporated into the site works:

- Due to the variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction.
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97[13] utilised.
- De-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
- Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results.
- The presence of potential contamination and mitigation measures should be addressed as part of the Construction Stage Health and Safety Plan and should include measures to design out the risks, reduce their impact and finally the use of Personnel Protective Equipment (PPE).

5.11. Enabling Works

It is considered that the ground will require preparation to facilitate a developable platform for the first stage of construction works.

As refenced in Section 5.3, obstacles such as foundations, floor slabs, services etc. can be anticipated on site from historical land uses and it is recommended that these are grubbed out as part of a general site turnover to remove obstacles.

The enabling works should also cover activities such as undertaking site preparation works including pre commencement surveys of the site and surrounding areas, preparation of access routes and providing suitable piling mats if required, surveying the site and producing topographical plans on completion of the earthworks, as well as installation of safety signs and security fencing.

6. Generic Risk Assessment

6.1. Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM[14]). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

6.2. Soil Risk Assessment

6.2.1. Methodology

With regards to the soil risk assessment LKC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs) [15, 16].
- LQM Suitable 4 Use Levels (S4ULs) [17, 18, 19, 20].

The proposed development is for residential houses with gardens, therefore the assessment criteria for residential with plant uptake has been used.

All criteria have been generated using the CLEA V1.06 model[21] based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

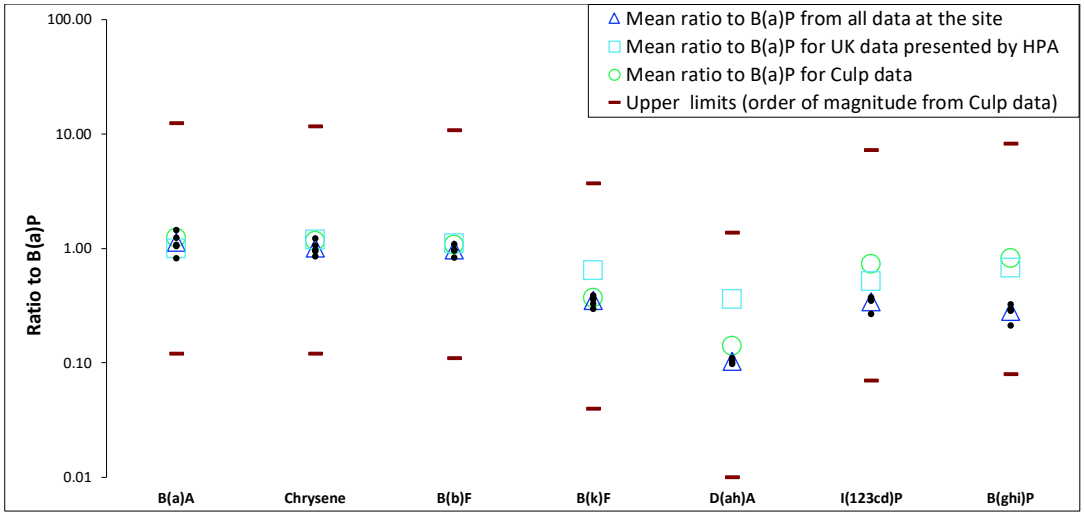
A summary of the generic assessment criteria used in this assessment is provided in Appendix F.

<u>B(a)P as Surrogate Marker</u>

LKC consider the main risk drivers for PAHs are benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P possibly being a carcinogen and most toxic of the PAHs[22,23] and naphthalene the most volatile and soluble[24]. The C4SLs indicate B(a)P as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible[25]. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)[26] and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

LKC undertook an assessment of the PAH data for the site with regards to using B(a)P as a surrogate marker for carcinogenic PAHs as per HPA and CL:AIRE guidelines. The primary toxicological study related to Culp *et.al*[27], which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two-year carcinogenicity study.

Graph 6-1 summarises the study site data with respect to how the ratios of carcinogenic PAHs relate to B(a)P, within the confidence limits provided in the HPA document.



Graph 6-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 5 samples (where values were >LOD to allow the calculation of a ratio).

Notes:

B(a)P=Benzo(a)pyrene; D(ah)A=Dibenzo(ah)anthracene; B(a)A=Benzo(a)anthracene; B(b)F=Benzo(b)fluoranthene; B(k)F=Benzo(k)fluoranthene; I(123cd)P=Indeno(123cd)pyrene; B(ghi)=Benzo(ghi)perylene.

All the data points that could be used to calculate ratios fall inside the upper or lower limits.

Based on this distribution of data LKC considers B(a)P can be used as a surrogate marker for carcinogenic PAHs and the C4SL criteria is suitable for this dataset.

6.2.2. Soil Results Comparison against Assessment Criteria

All analysis sheets are presented in Appendix C. All the data has been compared to relevant assessment criteria and elevated results are presented in Table 6-1.

Results have been compared to the relevant assessment criteria and no elevated contaminants were identified.

Sample Location / Depth (mbgl)	Contaminant	Criteria	Total No. of Samples Tested	Sample Result > Criteria
WS102 (0.8-1.0m)	Lead	200	5	442
WS103 (0.3-1.0m)				338
WS101 (0.0-0.5m)	Benzo(a)pyrene	5	5	6.11
WS103 (0.3-1.0m)				6.55

Table 6-1: Summary of Elevated Results.

Notes:

All units in mg/kg.

Only results that exceeded assessment criteria have been shown and results from all depths are noted.

Results have been compared to the nearest appropriate SOM for the assessment criteria hierarchy described in Section 6.2.

Asbestos was identified, as detailed in Table 6-2.

Sample Location	ID	Type	Total Asbestos (%)
WS102 (0.8-1.0m)	Amosite	Fibres/Clumps	<0.001

Table 6-2: Details of Asbestos Identified.

To examine the potential additivity of toxicological effects between the petroleum hydrocarbon fractions, a Hazard Index (HI) as described by the Environment Agency[28] technical report should be calculated for the samples. As no significant concentrations

of petroleum hydrocarbons were identified in any of the soil samples this has not been undertaken.

6.2.3. Direct Contact Risk – Pollutant Linkage 1

Elevated B(a)P and metals (lead) have been identified on site. Given the frequency, location of elevated samples, and the uniformity of the made ground across site, the contamination is likely to be site wide.

The source of the contamination is expected to the ash, clinker, brick and coal noted in the made ground.

At the concentrations identified, the contaminants are considered to pose a potential risk to future site users (residents) in gardens and soft landscaped areas, where made ground may be exposed. The principal pathways are the ingestion pathways (soil, dust, and homegrown produce) and dermal contact.

The probability of PAH and metal contamination affecting site users is likely. With a medium consequence, the risk is considered to be moderate, and remediation is recommended.

No elevated anionic surfactants, naphthalene or petroleum hydrocarbons were identified, therefore the probability of these contaminants posing a risk to site users in considered unlikely. With a medium consequence, the risk is considered to be moderate, and no remediation is recommended.

<u>Asbestos</u>

Asbestos (amosite) was identified in WS102. The asbestos was identified as free fibres, and the source is likely to be from demolished buildings.

Asbestos may affect site users in soft landscaping and garden areas, via the inhalation of fibres. The probability is considered to be likely. With a moderate consequence, the risk as assumed to be moderate, and localised remediation is recommended.

Additional consideration should also be given to the risk to workers and offsite receptors during groundworks and construction. This is discussed further in Section 9.3.

LKC have utilised the Joint Industry Working Group (JIWG) Decision Support Tool for receptor risk ranking of ACM onsite. This model incorporates guidance from CL:AIRE CAR-SOIL[29]and CIRIA C733[30]. The following assumptions have been incorporated into the model:

- Asbestos type, nature and concentrations as encountered during the site investigation and reported in laboratory data.
- In this model a child of school age playing in the landscaped area for 1 hour was assumed in close proximity to the source.
- Medium respirable index was assumed based on the ACM identified onsite as per RIVM[31].
- The assessment was carried out assuming 'low disturbance' based on ACM at a shallow depth.

The JIWG model output sheet is presented in Appendix G. A low risk was identified to key receptors based on general worst-case scenario, such as some ground disturbance and track back into residential properties (24-hour exposure).

Asbestos may affect site users in garden and soft landscaping areas, via the inhalation of fibres. The probability is considered to be likely given limited asbestos encountered at shallow depth. With a medium consequence the risk as assumed to be moderate remediation is recommended in private garden and soft landscaped areas.

Additional consideration should also be given to the risk to workers and offsite receptors during groundworks and construction. This is discussed further in Section 9.

6.2.4. Risk from Inhalation of Vapours – Pollutant Linkage 2

No visual / olfactory evidence of volatile contaminants was identified during the investigation. The PID did not detect any significant TVOCs. Confirmatory soil analysis did not detect elevated naphthalene or volatile fraction TPHs.

LKC therefore consider the probability of volatile contaminants affecting site users as unlikely. The consequence is expected to be medium, giving a low risk and no remediation is required.

6.3. Gas Risk Assessment

2no. gas monitoring visits have been undertaken on the study site. Gas monitoring results in full are presented in Appendix E and summarised in Table 6-3. Following guidance set out in CIRIA C665[32] and BS8485[33] peak methane and carbon dioxide concentrations have been used in the gas risk assessment. In addition, and as per guidance, flow rates were measured first.

Borehole Ref.	Visit	Peak CH4 (%v/v)	Peak CO2 (%v/v)	Min O2 (%v/v)	Flow (l/h)	Groundwater Level (mbgl)	Pressure (mb)	Prev 24hr Pressure Trend
WS102	1	0.1	4.7	15.7	<0.1	1.87	1011	Steady
	2	<0.1	6.0	11.9	<0.1	Dry	988	Rising
WS103	1	0.1	0.5	19.8	<0.1	1.12	1011	Steady
	2	0.6	3.1	19.0	2.6	0.15	989	Rising
WS105	1	<0.1	1.9	17.7	<0.1	2.61	1011	Steady
	2	<0.1	2.2	16.6	<0.1	1.94	989	Rising

Table 6-3: Gas Monitoring Assessment.

High flow was recorded in WS103 (maximum 2.6l/hr). However, from reviewing the depth of the groundwater during monitoring, high flow was only recorded when groundwater was high (i.e., above the response zone). Plate 6-1 shows how high groundwater can affect flow rate within boreholes.

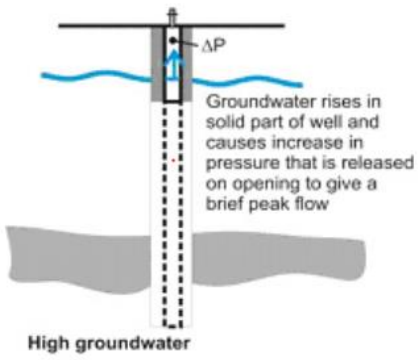


Plate 6-1: extracted from RB17[34], shows how high groundwater can affect flow rates

Where groundwater was recorded below the response zone, the flow was recorded as <0.1l/hr. It is therefore considered likely that the high flow recorded in WS103 was not representative of the site conditions and will not be included in the assessment.

The marginal elevation (6.00%v/v) of carbon dioxide was only recorded in 1 of the 6 readings. Minimal flow was also recorded (<0.1ppm) on all visits to date. In addition, no significant methane was recorded (<0.1ppm) where groundwater was recorded below the response zone.

No elevated hydrogen sulphide or carbon monoxide was recorded on any visits to date.

Gas Screening Value

In accordance with CIRIA C665[35], a Gas Screening Value (GSV) may be calculated. Assuming worst-case scenario maximum gas concentrations and flow for each borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS). The maximum GSV value for the site is 0.006l/hr (carbon dioxide), and CS1 in considered suitable at this stage.

In addition, in accordance with CIRIA C665[36], if carbon dioxide and methane are recorded above 5%v/v and 1%v/v respectively, you should consider upgrading the characteristic situation from CS1 to CS2. However this is a guideline and should only be considered if a significant source of gas has been identified.

Gas Ternary Plot

Plate 6-1 summarises the gas monitoring data using the methodology described by Wilson *et al* which is also included in the NHBC 2023[37] document. This can be used to determine the likely source of gas concentrations monitored.

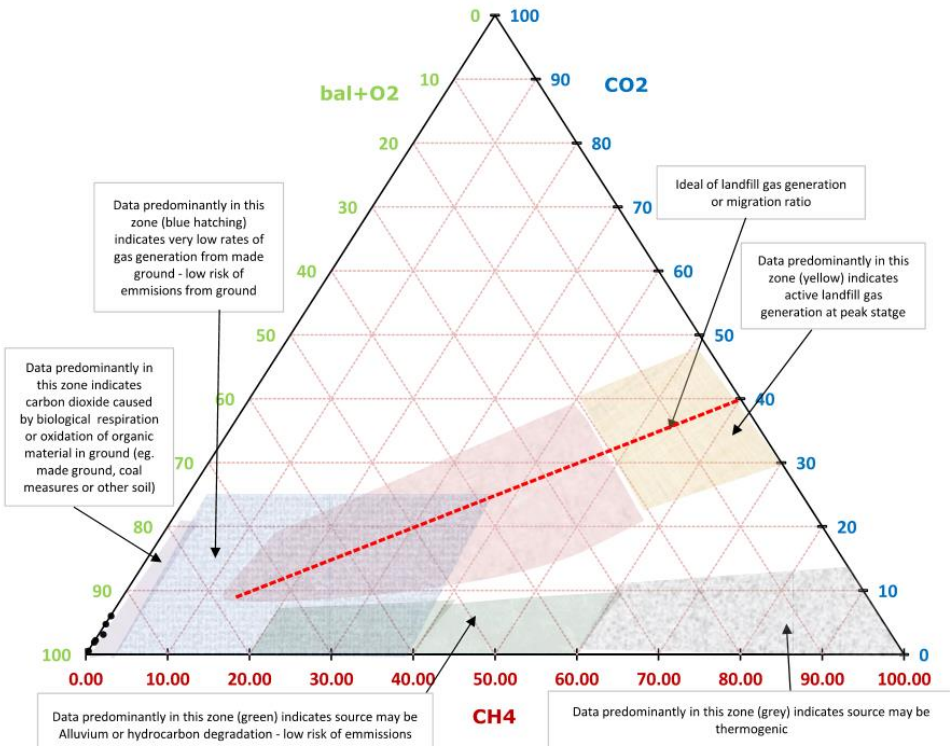


Plate 6-2: Ternary Plot Showing Rogers Geotechnical Services Ltd Gas Monitoring Data.
Note: Interpretative zones taken from NHBC 2023 and Wilson et al.
• Gas data

The monitoring data to date (see Plate 6-2) falls within the area of the ternary plot which is indicative of microbial respiration or oxidation of organic material.

This indicates the carbon dioxide is likely to be from microbial degradation of organic material in the soil rather than a landfill type source. This supports LKC's assessment that there is no evidence of a significant gas source and there is unlikely to be significant flows.

LKC consider the probability of carbon dioxide and methane gas affecting site users and buildings as unlikely. Assuming a severe consequence, there is a moderate / low risk associated with Pollutant Linkage 3 and no remediation is required at this stage (subject to the completion of gas monitoring).

6.4. Controlled Water Assessment

The PRA identified a moderate / low risk with respect to controlled waters as no significant source of mobile contamination was anticipated. Furthermore, although a Principal Aquifer is present below the site, no abstractions have been identified within influencing distance and the site is not located in a Source Protection Zone.

No evidence of significant mobile contamination was identified on the site. Metals and PAHs identified within the soils are anticipated to be associated with ash and clinker noted within the made ground. Contamination associated with ash and clinker is not anticipated to be mobile due to the residual crystalline nature of the matrix.

The site investigation did not identify any significant sources of likely mobile contamination within the soils. This confirms an unlikely probability of onsite contamination affecting controlled waters. With a medium consequence the risk is anticipated to be low, and no remediation is required.

6.5. Potable Water Supply (Pollutant Linkage 5)

Soil results were compared to United Utilities (UU) guidelines for the selection of potable water pipes in land potentially affected by contamination. Only contaminants of concern, based on the preliminary conceptual model and ground conditions encountered, were analysed.

Elevated naphthalene has been identified. Based on the ground conditions encountered, this is likely to be widespread across the site.

The probability of organic contaminants affecting potable water pipes is likely. Given the consequence is considered to be moderate, the risk (Pollutant Linkage 5) is anticipated to be moderate risk and remediation is likely to be required.

Once details of the pipeline location and depths are known a UU Water Pipe Risk Assessment in line with the utility provider should be undertaken to confirm the most appropriate pipework for potable water.

6.6. Revised Contamination Conceptual Model

The preliminary contamination conceptual model (Table 2-3) has been revised following the risk assessments undertaken in Sections 6.1-6.5. The revised contamination

conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

The revised contamination conceptual model is presented in Table 6-4.

Where a very low risk or low risk is identified no specific remediation is required.

Where there is a moderate / low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk	Recommendations
1	- Heavy metals - PAHs - ACM - (elevations identified)	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce. Windblown dust.	Future site users.	Likely	Medium	Moderate	Remediation recommended.
	- Petroleum hydrocarbons - Surfactants - Other inorganic and organic contaminants (no elevations identified)			Unlikely		Low	No remediation recommended
2	Volatile contaminants: - No elevations identified	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No remediation recommended.
3	Hazardous / ground gas: methane, carbon dioxide (deep made ground on site, off site landfills and infilled features)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Unlikely	Severe	Moderate / Low	No remediation recommended at this stage. To be reassessed once gas monitoring complete.
4	Mobile contaminants: - Heavy metals - PAHs (within ash and clinker)	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Unlikely	Medium	Low	No remediation recommended.
5	Organic contaminants - Petroleum hydrocarbons - Naphthalene	Permeation of pipes. Ingestion of tainted water supply.	Future site users.	Likely	Medium	Moderate	Remediation recommended.

Table 6-4: Revised Contamination Conceptual Model.

7. Waste Disposal Assessment

7.1. HazWaste Assessment

The soil contamination results as presented in Appendix C have been used to help determine the waste classification of material for off-site disposal.

As an initial screen the soil results were inputted into HazWasteOnline™. This is a web-based facility that allows an assessment waste as either hazardous or non-hazardous waste based on relevant guidance and legislation.

HazWasteOnline™. has been designed to cover, amongst other waste types, the List of Waste (LoW) code number 17 "Construction and Demolition Waste (Including Excavated Soil from Contaminated Sites)".

Where less than limits of detection (LOD) were recorded, the value of the LOD was inputted.

Where applicable, contaminants were selected based on observations during sampling, site history, ground conditions and likely species present in soils (e.g., metal oxides relating to an ash-based source).

The results show that all the samples tested are classified as non-hazardous for disposal. The HazWasteOnline™ output sheets are provided in Appendix H.

8. Conclusions

8.1. Ground Conditions

Ground conditions are summarised in Table 8-1 below.

Made Ground	Sands and silts, comprising clinker, brick, ash, plastic, metal, concrete, coal, glass and timber.
Superficial	Firm to very stiff consistency gravelly sandy silty CLAY.
Bedrock	None encountered.
Groundwater	0.15-2.61mbgl.
Obstructions	None encountered.

Table 8-1: Summary of Ground Conditions.

8.2. Geotechnical

Geotechnical observations and conclusions are contained in Table 8-2 below, more detailed discussions are contained within Section 5.

Allowable Bearing Pressure	50kN/m^2 within the natural superficial Clay deposits.
Anticipated Foundation Type	Due to the significant thickness of Made Ground encountered, it is considered that minipiles, although feasible, would require further deeper investigation to allow suitable design and to satisfy warranty providers. It is therefore considered that a ground improvement solution would provide the most reliable and cost effective solution.
Shallow Groundwater	Shallow groundwater was identified at two locations on the site and is considered representative of perched groundwater in the Made Ground and natural glacial till Clay.
Concrete Requirements	Based on BRE Digest 2005[38] – DS-3 AC-3 recommended.
Services	Services – consideration to the presence of services running through the site. Services may need to be re-routed.
Temporary support of excavation	Given the significant depth of made ground, along with the granular nature of some of the made ground, it is considered that temporary support of excavations will be required and should be undertaken in line with guidance contained in CIRIA R97.
Plasticity	Consideration will need to be given to the shrink / swell of the clay strata if it is to be used as founding strata, particularly where trees/hedges are present. Foundations may need to be deepened. A medium volume change potential has been calculated for the site.
Road / Pavement Design	Made ground should be excavated to a minimum of 0.50m below formation level and sorted to remove any unsuitable or deleterious materials. The sub formation should be rolled, and suitable excavated material can then be replaced, up to formation level, in fully compacted thin layers. Any deficit should be made up with suitable imported fill compacted as above. Following this treatment an overall design CBR of 2-5% should be available, although this will require confirmation through in-situ CBR tests.

Table 8-2: Geotechnical Conclusions Table.

8.3. Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 8-3 below (more detailed model provided in Section 6).

PL	Contaminant	Risk	Recommendations
1	Metals, PAHs, Asbestos	Moderate	Remediation required.
	Petroleum hydrocarbons, Surfactants, Other inorganic and organic contaminants	Low	No remediation required.
2	Volatile contaminants	Low	No remediation required.
3	Carbon dioxide, Methane	Moderate / Low	No remediation recommended at this stage. To be reassessed once gas monitoring completed.
4	Groundwater (mobile contaminants)	Low	No remediation required.
5	Organic contaminants	Moderate	Utility provider risk assessment to be completed. The site will likely require barrier piping.

Table 8-3: Summary Risk Table.
PL=Pollutant Linkage, see Table 6-4 for details.

8.4. Waste Assessment

The results show that all the samples tested are classified as non-hazardous for disposal.

9. Recommendations and Remediation Strategy

The recommendations provided below are considered appropriate for the site based on the site investigation work undertaken. LKC should stress that no remediation, enabling works or designing works should take place until Regulatory approval has been obtained.

A summary of remediation requirements is included in Table 9-1.

PL	Recommendation
1	Environmental cover system required in soft landscaping and garden areas.
2	No remediation required.
3	To be reassessed once gas monitoring completed.
4	No remediation required.
5	Potable water pipe assessment required. Barrier pipe likely to be required.

Table 9-1: Remediation Summary.

9.1. Further Work

Additional site investigation work is recommended once the existing building has been demolished. This was recommended by the local authority when the initial scope of works was agreed.

9.2. Remediation and Validation Recommendations

9.2.1. Environmental Cover System (PL1)

In gardens and soft landscaping areas, an environmental cover system will be required and should comprise 600mm depth in private back gardens and 450mm in private front gardens / soft landscaping. The environmental cover system should constructed be as shown in Plate 9-1.

<table>
<tr><th colspan="2">Either (physical break layer)</th><th colspan="2">Or (geotextile membrane)</th></tr>
<tr><td rowspan="3">600mm rear gardens.

450mm front gardens & shared landscaping

(minimum)</td><td>Chemically validated TOPSOIL[1]</td><td rowspan="3">600mm rear gardens.

450mm front gardens & shared landscaping

(minimum)</td><td>Chemically validated TOPSOIL[1]</td></tr>
<tr><td>Chemically validated SUBSOIL</td><td rowspan="2">Chemically validated SUBSOIL

GEOTEXTILE MEMBRANE (at base of subsoil)</td></tr>
<tr><td>100mm (minimum) PHYSICAL BREAK LAYER[2]</td></tr>
<tr><td colspan="4">Existing MADE GROUND</td></tr>
</table>

Plate 9-1: Typical Environmental Cover System Construction.

Notes:

Hardstood Areas – No Remediation Required.

[1]NHBC recommend 100mm minimum topsoil depth.

[2]Gravel break layer, minimal fines.

Where there are TPO's in influencing distance of environmental cover systems it is likely the arboriculture officer may only allow a 100mm clean cover system over a geotextile membrane.

Validation of environmental cover soils will be required and should include measuring depth using a staff and providing photographic evidence. Photographic evidence of the granular physical break or geotextile layer should also be collected.

Chemical validation of imported soils is required, details are included in Section 9.3.

9.2.2. Potable Water Pipe Remediation (PL5)

It is recommended that a Water Pipeline Assessment[39] is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required.

Validation of pipeline installation should include delivery notes of pipe materials, photographs of installed pipe and confirmation of connections.

9.3. Other Considerations

9.3.1. Unexpected Contamination

The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required.

Impacted soils should be placed on an impermeable surface to await further assessment, treatment, or removal from site (this may be subject to chemical testing to confirm suitable waste facility). The work should be done under the supervision and instruction of an environmental consultant.

To determine that significantly impacted soils have been removed, verification samples will be collected from the base and sides of the excavation. If all impacted ground cannot be removed and contamination remains on the ground, further remediation may need to be considered.

Validation requirements should include a log of work undertaken, including photographs and details of any sampling undertaken and validation of any potential additional remedial work.

9.3.2. Grubbing Out of In-ground Structures

Surface hard standing and relict features including former foundations and current foundation can be expected across the site wide. It is recommended that in-ground structures are grubbed out as part of the groundworks.

Hard materials can be used to generate suitable aggregates for re-use on site as part of engineered made ground and/ or construction platforms (subject to geo-environmental testing and client design specifications). Suitable materials derived from grubbing-up should be stored in a location on site, to be agreed with the Engineer, prior to crushing. Any unsuitable materials should be removed to a suitably licensed landfill site.

9.3.3. Re-use of Site Generated Material

To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used[40]):

- 5,000 tonnes (c. 2,500m^3) treatment of crushed concrete / stone.
- 1,000 tonnes (c. 500m^3) use of non-hazardous soil.
- 5,000 tonnes (c. 2,500m^3) use of clays, sand, gravel, brick, concrete, stone etc.
- 50,000 tonnes (c. 25,000m^3) use of bituminous material to be used in roadways.

A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice[41] may be required if volumes exceed exemption limits. This must be registered before material movement starts onsite.

If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'.

For all the above material will need to be tested at the rate and analytical suites presented in Table 9-2.

9.3.4. Stockpile Management

Stockpiled material should be suitably managed. Material should be segregated by type and source. For example, construction / demolition arisings, site won subsoil. Stockpiles may also require covering to minimise the generation of vapours, fibres, dust, and possible nuisance to adjacent receptors, and to prevent rainwater ingress. The source of each stockpile should be recorded and appropriate validation testing for re-use or potential offsite disposal should be undertaken as required.

9.3.5. Disposal

Material required to be removed from site should be undertaken under an appropriate duty of care and the results of chemical analysis should be provided to a licensed landfill for confirmation of waste classification.

Waste records such as disposal tickets and waste carrier licences should be provided in the Site Completion Report. Photographic evidence of removal and waste removal tickets should be retained and included in the validation report.

9.3.6. Health and Safety Considerations

In working with, removing, or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance[42]) should be adopted by all workers involved with site enabling and construction works.

9.3.7. Asbestos Survey

Due to the age of the current onsite buildings a pre demolitions and major refurbishments survey is recommended prior to any demolition works.

9.3.8. Piling in Contaminated Land

If a piled foundation is being considered this may provide a preferential pathway for contaminants to the underlying aquifer. A piling risk assessment may be required. Good practice for the drilling of piles on contaminated sites should be adhered to, such as guidance provided by the Environment Agency[43].

9.3.9. Asbestos in Soils Management Plan

Due to the presence of asbestos containing material, it is recommended that additional precautions are taken during site clearance, earthworks, and construction in the area of concern. The presence of asbestos in the made ground at the site presents a potential risk of generation of airborne fibres if this material is disturbed, such as for excavations to construct new foundations.

LKC recommend that an appropriate 'Asbestos Management Strategy' is developed in line with CIRIA C733[44].

9.4. Validation of Imported / Site Won Soils

Chemical validation of all imported and site-won soils to be used on site in gardens and soft landscaping areas should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements is presented in Table 9-3, based on MCC 'Guidelines to Developer' (2021) [45]. LKC consider no testing, but proof of provenance is sufficient for natural, virgin, quarried material.

Ideally, the material should be sampled at source to prevent double handling if soil fails, with confirmatory sampling undertaken on importation to site. Where this is not possible then material imported should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens / soft landscaping to ensure suitability for use.

Material Type	Source	Suite of Analysis	Sampling Rate (min. 3 per source)		
			Garden	Landscape	Other *
Topsoil / subsoil / Fill material	Greenfield	Suite A	200m^3	200m^3	200m^3
	Remediated / Site-won	Suite A / B dependent upon original SI	100m^3	150m^3	200m^3
	Brownfield / Unknown	Suite B	50m^3	150m^3	200m^3
Quarried Fill	First Generation i.e., quarried sand (subsoil) or stone (break layer)	No testing is required.	Certification of material provenance is required.		

Table 9-2: Sampling Requirements for Imported and Site Won Soils.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

*Other assumed to be stone / 6F2 / mass fill etc.

Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882[46]). LKC advise this information is provided by the supplier before material is imported onto site.

Imported material to be used in gardens will be compared against residential with plant uptake criteria (as used in the contamination risk assessment in Section 6).

9.5. Site Completion Report

All remediation and validation work should be documented in a Site Completion Report. The Site Completion Report will allow discharge of relevant planning conditions.

Figures

Client: Ace Property Cheethamhill Ltd				Title: Site Location & Boundary Plan	LK CONSULT
Site: Herbert Street, Manchester				Scale (see scale bar): 1:25,000 & 1:1250 @ A4	Figure: 1 / Revision:
Job No.: LKC 23 1433	Drawn By: LD	Checked By: CC	Drawn: August 2023		

KEY

Site Boundary

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

LK CONSULT LIMITED

Client: Ace Property Cheethamhill Ltd

Site: Herbert Street, Manchester

Title: Proposed Development Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 23 1433	See Scale Bar	2	

Drawn By:	Checked By:	Drawn:
AC	LD	Sep 2023

0 5 10 15

SCALE (Metres)

Extract From: Studio Tashkeel Architecture LTD
Drawing Ref: Proposed Plan, No.1907110_SK_002

Extract From: © Google Maps
Drawing Ref: Herbert Street, Manchester

KEY

Site Boundary

Window Sample Borehole (WS)

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

LK CONSULT LIMITED

Client:	Ace Property Cheethamhill Ltd
Site:	Herbert Street, Manchester
Title:	Sampling Location Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 23 1433	See Scale Bar	3	

Drawn By:	Checked By:	Drawn:
AC	LD	Sep 2023

Appendix A – Risk Matrix

RISK EVALUATION

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552[47]. It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring (Table A).
- Magnitude if the probability (likelihood) of the risk occurring (Table B).

Consequence (Severity)		
Classification	**Definition**	**Example**
Severe	Short term (acute) risk to human health likely to results in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note: water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/properties. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High Concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled waters. Explosion, causing building collapse (can also equate to short term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ('significant harm' as defined in DETR, 2000). Pollution of sensitive water resources (note Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentrations of a contaminant from site exceed generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer (Principal and Secondary). Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures, and services ('significant harm' as defined in DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable damage to buildings, structures, and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

Table A. Classification of Consequence

Probability (Likelihood)	
Classification	**Definition**
High Likelihood	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term.
Unlikely	There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur in the very long term.

Table B. Classification of Probability.

These classifications are then compared to indicate the risk presented by each pollutant linkage (Table C). It is important that this classification is only applied where there is a possibility (which can range from high likelihood to unlikely) of a pollutant linkage existing.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	**Very High Risk**	**High Risk**	Moderate Risk	Moderate / Low Risk
	Likely	**High Risk**	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table C. Comparison of Consequence against Probability

Once the risk has been determined the corresponding action can be assessed (Table D).

Risk	Action Required
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR there is evidence that sever harm to a designated receptor is currently happening. This risk, if realised, is likely to results in a substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table D. Description of the Classification and Likely Action Required.

Where a very low risk is identified no specific remediation is required.

Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where there is a moderate/low risk is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

Appendix B – Profile Logs

LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Herbert Street, Manchester	Number **WS101**
Excavation Method Hand excavated trial pit to 1.20mbgl with follow on windowless sampling to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)**	**Client** Ace Property Cheethamhill Ltd	**Job Number** LKC 23 1433
	Location (Observed measurements)	**Dates** 01/09/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50 0.00-0.50 0.50-1.00 1.20-1.65	D ES PID: 0.2ppm D PID: 0.3ppm SPT N=4		1,0/1,1,1,1		(1.50)	MADE GROUND: Dark brown gravelly sandy SILT with frequent rootlets, occasional brick, clinker, coal fragments, rare glass, plastic, metal and ceramic fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.		
1.50-2.00 1.50-2.00 2.00-2.45 3.00-3.45	D ES PID: 0.2ppm SPT N=19 SPT N=4		3,3/5,5,5,4 1,2/1,1,1,1		1.50 (2.00)	MADE GROUND: Dark brown very gravelly silty SAND with occasional brick, clinker, coal fragments, rare metal, glass and ceramic fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.		
3.50 3.50-4.00 3.50-4.00 4.00-4.45 4.50 4.50-5.00 5.00-5.45	PP 68.8kPa D ES PID: 0.1ppm SPT N=8 PP 49kPa D SPT N=14		74, 74, 74, 61, 61/Av. 68.80 1,1/2,2,2,2 49, 49, 49, 49, 49/Av. 49.00 2,2/3,3,3,5		3.50 (1.95) 5.45	Firm to soft consistency medium strength brown slightly gravelly sandy silty CLAY with rare coal fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone and sandstone. Clay becomes soft at 4.00mbgl. Complete at 5.45m		

Remarks
Borehole dry and stable.
No recovery from sampler at 3.00mbgl to 4.00mbgl.

Scale (approx)	Logged By
1:50	LD

Figure No.
LKC 23 1433.WS101

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LK GROUP	**LK CONSULT LTD** Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Herbert Street, Manchester	**Number** **WS102**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Hand excavated trial pit to 1.20mbgl with follow on windowless sampling to 5.45mbgl.			Ace Property Cheethamhill Ltd	LKC 23 1433
	Location (Observed measurements)	**Dates** 01/09/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.40 0.00-0.40 0.40-0.80 0.40-0.80 0.80-1.00 0.80-1.00 1.00-2.00 1.20-1.65	D ES PID: 0.2ppm D ES PID: 0.2ppm D ES PID: 0.1ppm D PID: 0.3ppm SPT N=11		1,2/2,3,3,3		(2.20)	MADE GROUND: Dark brown and dark grey gravelly sandy SAND with frequent bands of silt and medium brick cobble content, frequent rootlets, occasional brick, coal, clinker and rare glass fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone. 400mm band of reddish orange slightly gravelly silty sand noted at 0.40mbgl. Rare glass fragments noted at 1.00mbgl.			
2.00-2.45 2.20-3.00 2.20-3.00 2.50 3.00-3.45 3.50 3.50-4.00 4.00-4.45 4.50-5.00 4.50 5.00-5.45	SPT N=7 D ES PID: 0.1ppm PP 102.8kPa SPT N=7 PP 95.6kPa D SPT N=16 D PP 164.2kPa SPT N=29		1,1/2,3,1,1 98, 98, 98, 110, 110/Av. 102.80 1,1/1,2,2,2 98, 98, 98, 98, 86/Av. 95.60 2,2/3,4,4,5 172, 172, 159, 159, 159/Av. 164.20 4,5/6,7,8,8		2.20 (3.25) 5.45	Frequent concrete fragments noted between 1.00-2.20mbgl. Stiff to very stiff consistency high strength brown slightly gravelly sandy silty CLAY with rare coal fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone. Clay becomes stiff at 4.00mbgl. Complete at 5.45m			

Remarks
30% recovery from sampler at 1.00mbgl to 2.00mbgl.
No recovery from SPT at 1.20mbgl & 2.00mbgl.

Scale (approx)	**Logged By**
1:50	LD

Figure No.
LKC 23 1433.WS102

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LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site
Herbert Street, Manchester

Number
WS103

Excavation Method
Broke out tarmacadam, hand excavated trial pit to 1.20mbgl with follow on windowless sampling to 5.45mbgl.

Dimensions

Ground Level (mOD)

Client
Ace Property Cheethamhill Ltd

Job Number
LKC 23 1433

Location (Observed measurements)

Dates
01/09/2023

Engineer
LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.03-0.30 0.03-0.30 0.30-1.00 0.30-1.00	D ES PID: 0.2ppm D ES PID: 0.2ppm				0.03 (0.27) 0.30 (0.80)	MADE GROUND: TARMACADAM. MADE GROUND: Dark brown very gravelly SAND with frequent bands of silt with occasional coal, concrete fragments, rare glass. Sand is fine to coarse, Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
1.00-1.50 1.00-1.50 1.20-1.65 1.50	D ES PID: 0.2ppm SPT N=7 PP 59kPa		1,1/1,2,2,2 49, 49, 49, 74, 74/Av. 59.00		1.10	MADE GROUND: Soft consistency dark grey slightly gravelly sandy SILT with occasional brick and concrete fragments, rare glass and timber. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.			
2.00-2.50 2.00-2.45 2.50 3.00-3.45	D SPT N=11 PP 123kPa SPT N=21		slow(1) at 2.00m. 2,2/2,3,3,3 123, 123, 123, 123, 123/Av. 123.00 3,4/5,5,5,6		(4.35)	Soft to stiff consistency medium to high strength brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone. Clay becomes firm at 1.50mbgl. Clay becomes Firm at 2.80mbgl.		▽1	
3.50-4.00 3.50 4.00-4.45 4.50 4.50-5.00 5.00-5.45	D PP 172kPa SPT N=17 PP 98kPa D SPT N=12		172, 172, 172, 172, 172/Av. 172.00 3,3/4,4,4,5 98, 98, 98, 98, 98/Av. 98.00 2,2/2,3,3,4		5.45	Clay becomes stiff at 3.50mbgl. Clay becomes firm at 4.00mbgl. Complete at 5.45m			

Remarks
Borehole stable.
Water strike at 2.00mbgl.

Scale (approx)
1:50

Logged By
LD

Figure No.
LKC 23 1433.WS103

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Herbert Street, Manchester	Number **WS104**
Excavation Method Broke out tarmacadam, hand excavated trial pit to 1.20mbgl with follow on windownless sapling to 5.45mbgl.	**Dimensions** **Ground Level (mOD)**	**Client** Ace Property Cheethamhill Ltd	**Job Number** LKC 23 1433
	Location (Observed measurements) **Dates** 01/09/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.03-0.50	ES PID: 0.4ppm				0.03	MADE GROUND: TARMACADAM.		
0.30-0.50	D					MADE GROUND: Brown to orange very gravelly SAND with frequent brick fragments, occasional concrete and coal fragments, rare ceramic and timber. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.		
1.00-2.00	D PID: 0.2ppm							
1.20-1.65	SPT N=8		2,2/3,2,2,1					
2.00-2.50	D PID: 0.0ppm		Slow(1) at 2.00m.					∇1
2.00-2.45	SPT N=41		8,9/9,10,10,12					
					(4.97)			
3.00-3.45	SPT N=42		12,12/10,10,10,12					
3.50-4.00	D PID: 0.0ppm							
4.00-4.45	SPT N=28		5,6/6,6,7,9					
4.50-5.00	D PiD: 0.0ppm							
					5.00	Stiff consistency high strength slightly gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone.		
5.00	PP 151.8kPa		147, 147, 147, 159, 159/Av. 151.80		(0.45)			
5.00-5.45	SPT N=12		6,3/2,3,3,4		5.45	Complete at 5.45m		

Remarks
Water strike at 2.00mbgl.
Borehole collapased at 4.00mbgl.
Cotinous SPT from 4.00mbgl to 5.45mbgl due to borehole collapsing at 4.00mbgl.

Scale (approx)	Logged By
1:50	LD

Figure No.
LKC 23 1433.WS104

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Herbert Street, Manchester	Number **WS105**
Excavation Method Broke out tarmacadam, hand excavated trial pit to 1.20mbgl with follow on windowless sampling to 5.45mbgl.	**Dimensions** **Ground Level (mOD)**	**Client** Ace Property Cheethamhill Ltd	**Job Number** LKC 23 1433
	Location (Observed measurements) **Dates** 01/09/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.02-0.50 0.02-0.50	D ES PID: 0.2ppm				0.02	MADE GROUND: TARMACADAM.			
					(0.58)	MADE GROUND: Grey very gravelly SAND with frequent brick, concrete fragments, occasional coal and clinker fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
0.60-1.00 0.60-1.00	D ES PID: 0.1ppm				0.60	Stiff to very stiff consistency high strength light brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone Clay becomes very stiff at 1.20mbgl.			
1.20-1.65	SPT N=13		2,2/3,3,3,4						
1.50-2.00 1.50	D PP 147kPa		147, 147, 147, 147, 147/Av. 147.00						
2.00-2.45	SPT N=15		2,3/3,4,4,4						
2.50-3.00 2.50	D PP 172kPa		172, 172, 172, 172, 172/Av. 172.00						
3.00-3.45	SPT N=17		2,3/3,4,5,5		(4.85)				
3.50-4.00 3.50	D PP 151.8kPa		147, 147, 147, 159, 159/Av. 151.80			Clay becomes stiff at 3.80mbgl.			
4.00-4.45	SPT N=13		2,2/2,3,4,4						
4.50-5.00 4.50	D PP 172kPa		172, 172, 172, 172, 172/Av. 172.00						
5.00-5.45	SPT N=14		2,3/3,3,4,4						
					5.45	Complete at 5.45m			

Remarks
Borhehole dry and stable.
Clay too stiff at 4.00mbgl to 5.00mbgl, smallest sampler was used to drill to 5.45mbgl.
Well istallation unable to be installed passed 4.00mbgl due to smallest sampler being used from 4.00mbgl to 5.00bgl.

Scale (approx)	Logged By
1:50	LD

Figure No.
LKC 23 1433.WS105

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Appendix C – Certificates of Analysis (Soil)

Beth Ryder
LK Consult Limited
Unit 29 Eton Business Park
Eton Hill Road
Manchester
M26 2ZS

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

DETS Report No: 23-11476

Site Reference:	Herbert Street, Manchester
Project / Job Ref:	LKC 23 1433
Order No:	LKC231433-BRH
Sample Receipt Date:	12/09/2023
Sample Scheduled Date:	12/09/2023
Report Issue Number:	1
Reporting Date:	21/09/2023

Authorised by:

Kevin Old
Operations Director

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

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

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

Soil Analysis Certificate						
DETS Report No: 23-11476	**Date Sampled**	01/09/23	01/09/23	01/09/23	01/09/23	01/09/23
LK Consult Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Herbert Street, Manchester	**TP / BH No**	WS101	WS102	WS103	WS104	WS105
Project / Job Ref: LKC 23 1433	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: LKC231433-BRH	**Depth (m)**	0.00 - 0.50	0.80 - 1.00	0.30 - 1.00	0.03 - 0.50	0.02 - 0.50
Reporting Date: 21/09/2023	**DETS Sample No**	674357	674358	674359	674360	674361

Determinand	**Unit**	**RL**	**Accreditation**		(n)		(n)	
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Detected	Not Detected	Not Detected	Not Detected
Sample Matrix (S)	Material Type	N/a	NONE		Amosite present as fibre bundles			
Asbestos Type (S)	PLM Result	N/a	**ISO17025**		Amosite			
Asbestos Quantification (S)	%	< 0.001	**ISO17025**		< 0.001			
pH	pH Units	N/a	**MCERTS**	7.8	8.2	7.5	8.2	8.5
Total Cyanide	mg/kg	< 1	NONE			< 1	< 1	
Free Cyanide	mg/kg	< 1	NONE			< 1	< 1	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	1080	225	59	25	54
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	1.08	0.23	0.06	0.03	0.05
Organic Matter (SOM)	%	< 0.1	**MCERTS**	1.7	1.6	5.6	6	1.6
Arsenic (As)	mg/kg	< 2	**MCERTS**	12	13	24	12	2
W/S Boron	mg/kg	< 1	NONE			1.1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.4	0.5	0.5	0.3	0.7
Chromium (Cr)	mg/kg	< 2	**MCERTS**	28	22	17	10	7
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	47	69	80	56	10
Lead (Pb)	mg/kg	< 3	**MCERTS**	173	442	338	194	19
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1	1.3	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	14	17	20	12	8
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	**MCERTS**	20	22	29	18	7
Zinc (Zn)	mg/kg	< 3	**MCERTS**	162	161	139	83	29
Total Phenols (monohydric)	mg/kg	< 2	NONE			< 2	< 2	
Anionic Detergents	mg/kg	< 1	NONE			< 1	< 1	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-11476	**Date Sampled**	01/09/23	01/09/23	01/09/23	01/09/23	01/09/23
LK Consult Limited	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Herbert Street, Manchester	**TP / BH No**	WS101	WS102	WS103	WS104	WS105
Project / Job Ref: LKC 23 1433	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: LKC231433-BRH	**Depth (m)**	0.00 - 0.50	0.80 - 1.00	0.30 - 1.00	0.03 - 0.50	0.02 - 0.50
Reporting Date: 21/09/2023	**DETS Sample No**	674357	674358	674359	674360	674361

Determinand	**Unit**	**RL**	**Accreditation**		(n)		(n)	
Naphthalene	mg/kg	< 0.1	**MCERTS**	1.36	0.55	0.92	0.57	< 0.1
Acenaphthylene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	0.15	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	**MCERTS**	2.12	2.97	2.16	0.97	< 0.1
Fluorene	mg/kg	< 0.1	**MCERTS**	1.31	1.78	1.58	0.53	< 0.1
Phenanthrene	mg/kg	< 0.1	**MCERTS**	10.60	24.10	13.50	8.79	0.10
Anthracene	mg/kg	< 0.1	**MCERTS**	2.82	5.24	3.05	1.87	< 0.1
Fluoranthene	mg/kg	< 0.1	**MCERTS**	11.80	19.30	17.90	9.09	0.71
Pyrene	mg/kg	< 0.1	**MCERTS**	11.10	16.60	15.90	8.96	0.79
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	6.62	6.81	8.16	4.06	0.43
Chrysene	mg/kg	< 0.1	**MCERTS**	5.20	5.75	6.95	3.77	0.49
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	5.86	4.55	6.36	3.24	0.57
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	1.82	1.70	2.56	1.28	0.19
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	6.11	4.69	6.55	3.89	0.52
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	2.19	1.65	2.46	1.37	0.14
Dibenz(a,h)anthracene	mg/kg	< 0.1	**MCERTS**	0.60	0.49	0.72	0.39	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	**MCERTS**	1.74	1.36	2.13	1.14	0.11
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	71.2	97.6	91	49.9	4.1

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

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

Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-11476	**Date Sampled**	01/09/23	01/09/23			
LK Consult Limited	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Herbert Street, Manchester	**TP / BH No**	WS103	WS104			
Project / Job Ref: LKC 23 1433	**Additional Refs**	None Supplied	None Supplied			
Order No: LKC231433-BRH	**Depth (m)**	0.30 - 1.00	0.03 - 0.50			
Reporting Date: 21/09/2023	**DETS Sample No**	674359	674360			

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	**MCERTS**	< 2	< 2			
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	**MCERTS**	3	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	**MCERTS**	10	7			
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	**MCERTS**	23	23			
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	**MCERTS**	40	160			
Aliphatic >C34 - C44	mg/kg	< 10	NONE	< 10	56			
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	76	246			
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**	< 2	< 2			
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**	< 2	< 2			
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**	13	5			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	**MCERTS**	76	27			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	**MCERTS**	111	93			
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	11			
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	200	135			
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	276	381			

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

DETS Ltd
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Rose Lane
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Tel : 01622 850410

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-11476	**Date Sampled**	01/09/23	01/09/23			
LK Consult Limited	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Herbert Street, Manchester	**TP / BH No**	WS103	WS104			
Project / Job Ref: LKC 23 1433	**Additional Refs**	None Supplied	None Supplied			
Order No: LKC231433-BRH	**Depth (m)**	0.30 - 1.00	0.03 - 0.50			
Reporting Date: 21/09/2023	**DETS Sample No**	674359	674360			

Determinand	**Unit**	**RL**	**Accreditation**		(n)			
Benzene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2			
Toluene : HS_1D_MS	ug/kg	< 5	**MCERTS**	< 5	< 5			
Ethylbenzene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2			
p & m-xylene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2			
o-xylene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2			
MTBE : HS_1D_MS	ug/kg	< 5	**MCERTS**	< 5	< 5			

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

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

Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-11476	
LK Consult Limited	
Site Reference: Herbert Street, Manchester	
Project / Job Ref: LKC 23 1433	
Order No: LKC231433-BRH	
Reporting Date: 21/09/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 674357	WS101	None Supplied	0.00 - 0.50	14.7	Brown sandy clay with stones and concrete
$ 674358	WS102	None Supplied	0.80 - 1.00	12.4	Brown sandy gravel with stones and concrete
$ 674359	WS103	None Supplied	0.30 - 1.00	20.3	Black sandy clay with stones and vegetation
$ 674360	WS104	None Supplied	0.03 - 0.50	9.4	Brown sandy gravel with stones and concrete
$ 674361	WS105	None Supplied	0.02 - 0.50	2.4	Brown gravelly sand with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

$ samples exceeded recommended holding times

DETS Ltd
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Lenham Heath
Maidstone
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Tel : 01622 850410

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-11476
LK Consult Limited
Site Reference: Herbert Street, Manchester
Project / Job Ref: LKC 23 1433
Order No: LKC231433-BRH
Reporting Date: 21/09/2023

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

D Dried
AR As Received

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List of HWOL Acronyms and Operators
DETS Report No: 23-11476
LK Consult Limited
Site Reference: Herbert Street, Manchester
Project / Job Ref: LKC 23 1433
Order No: LKC231433-BRH
Reporting Date: 21/09/2023

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
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Appendix D – Certificates of Analysis (Geotechnical)

LK GROUP
Unit 29 Eton Business Park
Eton Hill Road, Radcliffe
Manchester, M26 2ZS

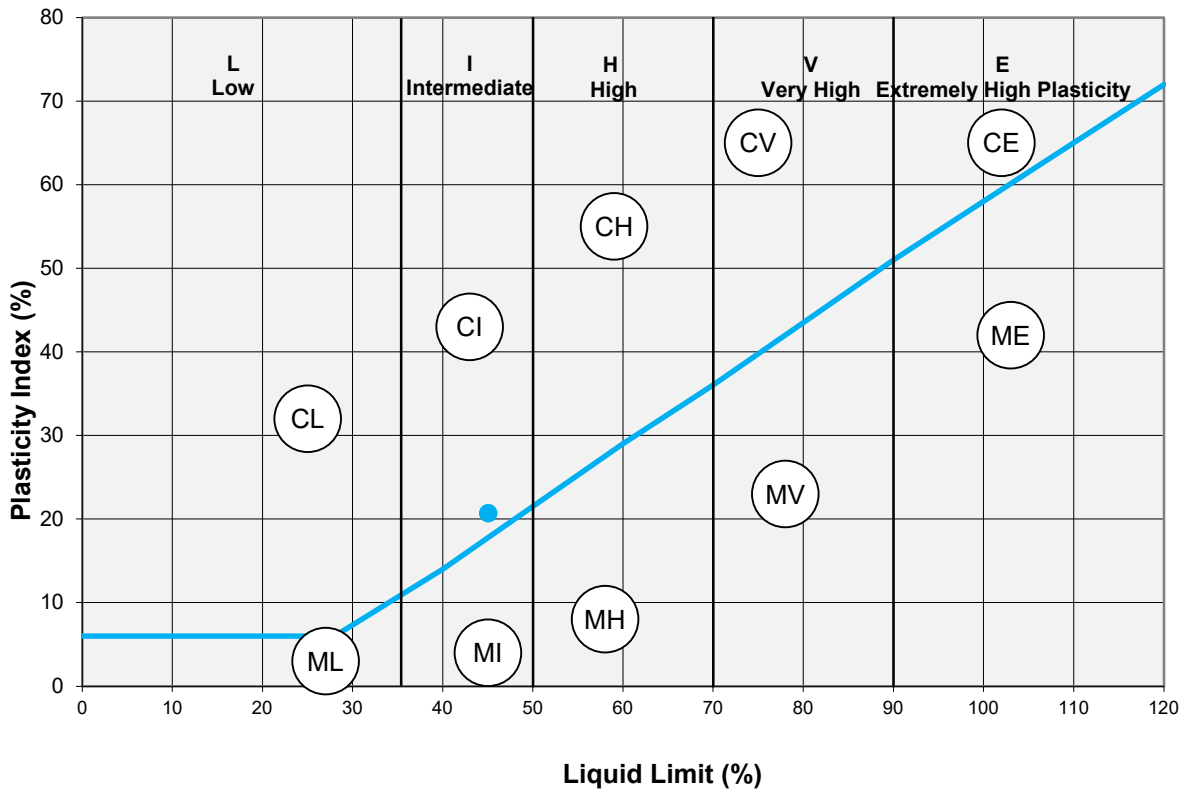
LK CONSULT LIMITED

Location: Herbert Street **Sample :** WS101 3.50-4.00m

Contract No. LKC 23 1433

Sample Description	Firm brown CLAY.

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)
42.4	45	24	21	CI	93



Tested By: CW **Checked By:**

Date: 20/09/2023 **Date:**

LK GROUP
Unit 29 Eton Business Park
Eton Hill Road, Radcliffe
Manchester, M26 2ZS

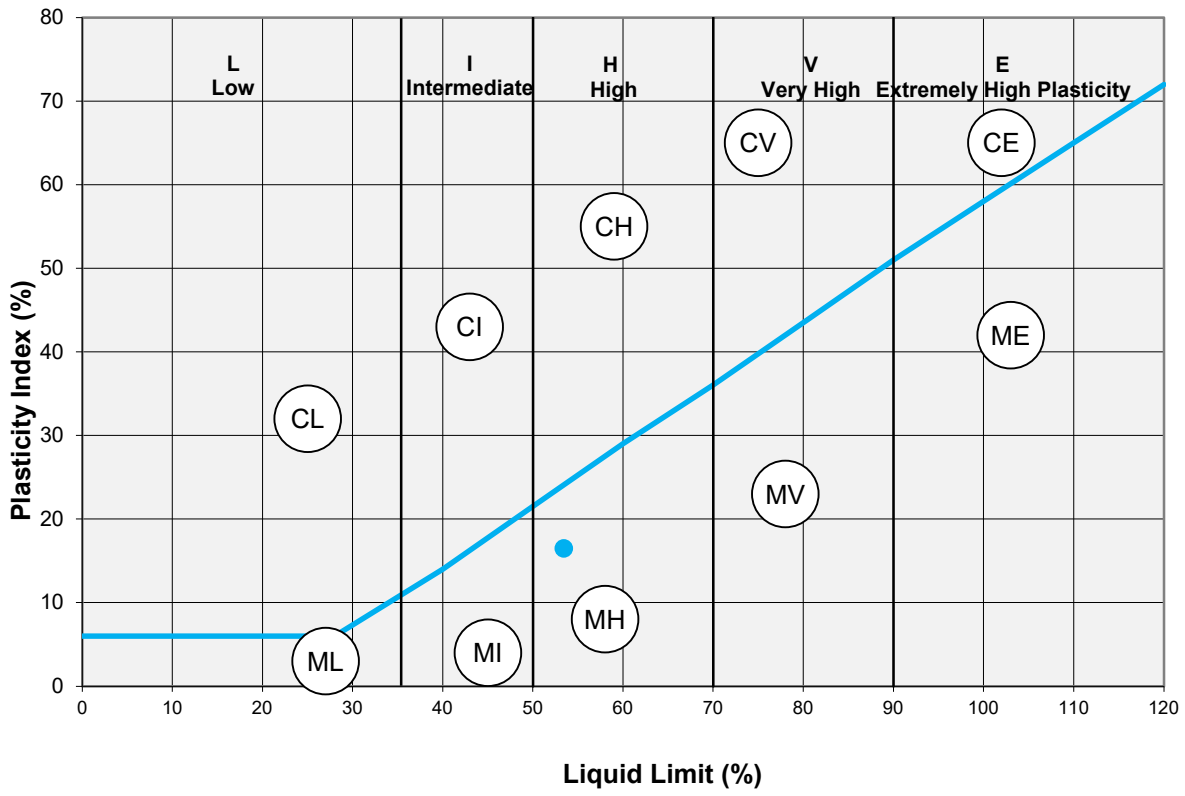
LK CONSULT LIMITED

Location: Herbert Street **Sample :** WS102 3.50-4.00m

Contract No. LKC 23 1433

Sample Description	Firm brown CLAY.

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)
33.9	53	37	16	MH	96



Tested By: CW **Checked By:**

Date: 20/09/2023 **Date:**

BS 1377-2:4-5 and BS EN ISO 17892-12 **LIQUID AND PLASTIC LIMIT**

LK GROUP
Unit 29 Eton Business Park
Eton Hill Road, Radcliffe
Manchester, M26 2ZS

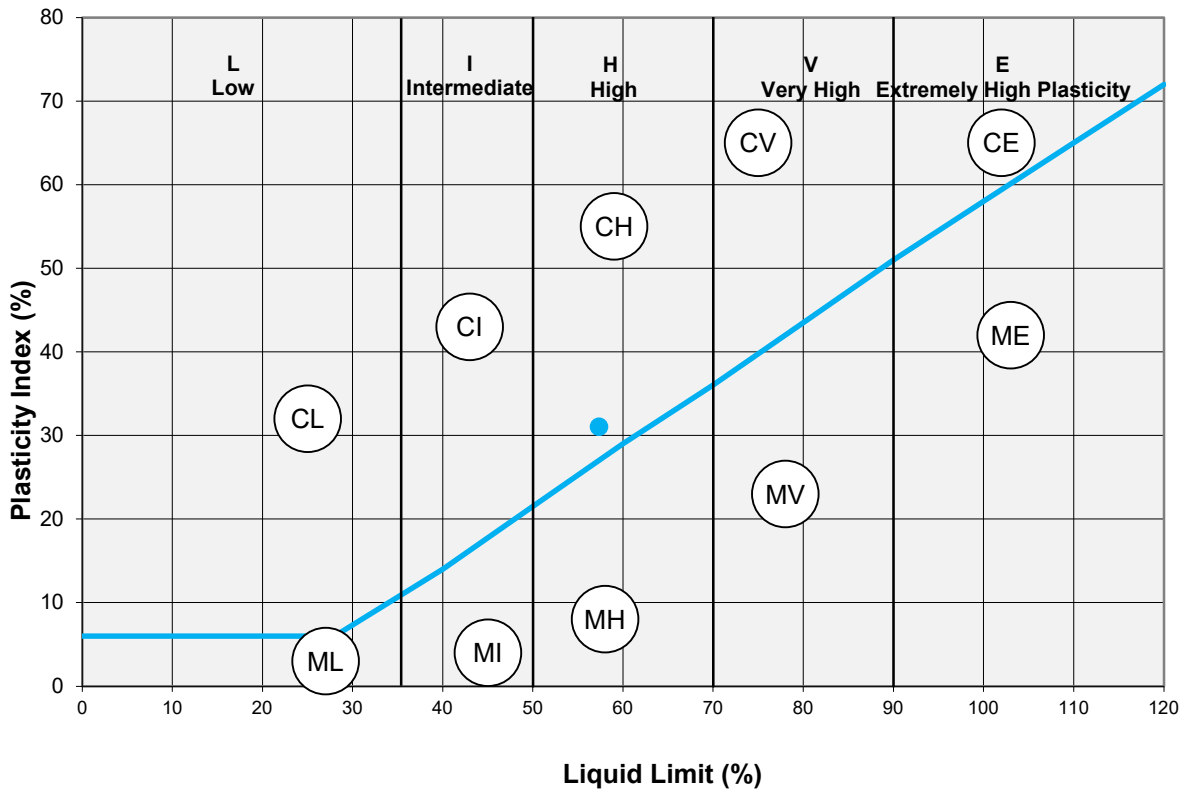
LK CONSULT LIMITED

Location: Herbert Street **Sample :** WS103 2.00-2.50m

Contract No. LKC 23 1433

Sample Description	Firm grey brown CLAY, bedded with dustings of silt on bedding surfaces.

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)
23.2	57	26	31	CH	96



Tested By: CW **Checked By:**

Date: 20/09/2023 **Date:**

BS 1377-2:4-5 and BS EN ISO 17892-12 **LIQUID AND PLASTIC LIMIT**

LK GROUP
Unit 29 Eton Business Park
Eton Hill Road, Radcliffe
Manchester, M26 2ZS

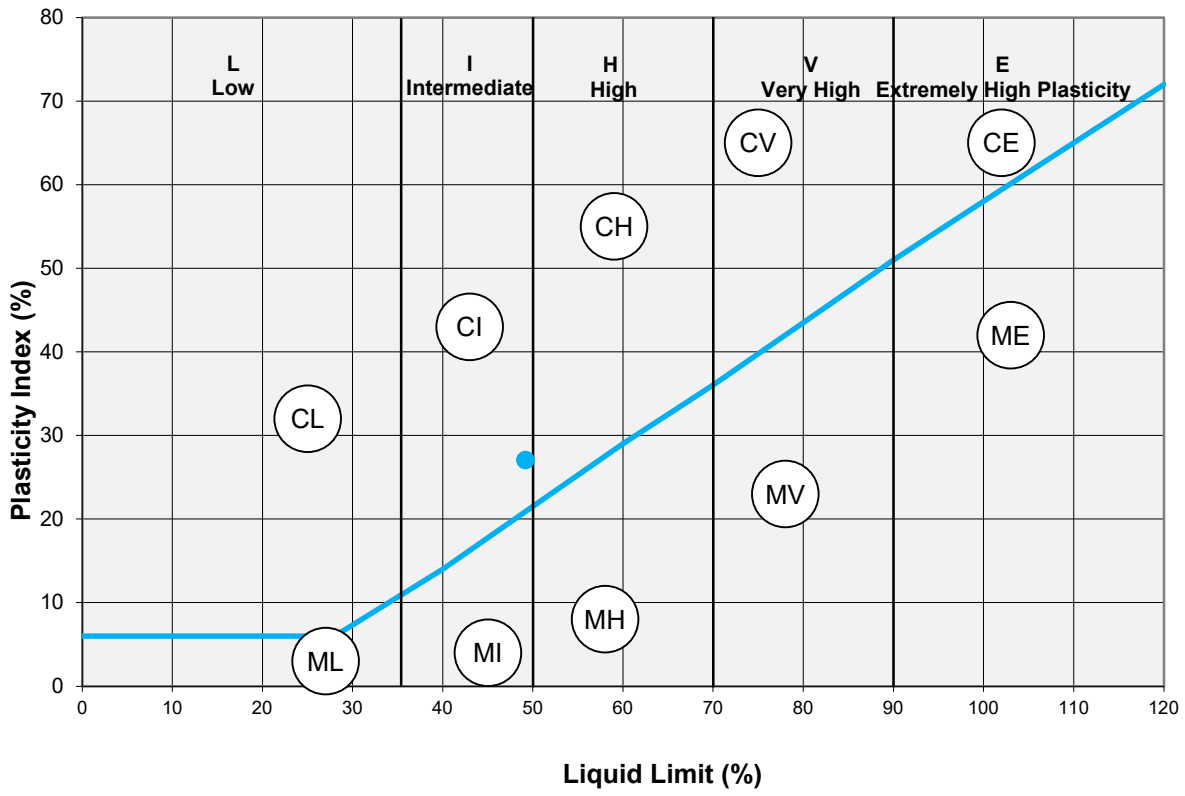
LK CONSULT LIMITED

Location: Herbert Street **Sample :** WS105 4.50-5.00m

Contract No. LKC 23 1433

Sample Description	Firm brown CLAY.

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)
22.4	49	22	27	CI	100



Tested By: CW **Checked By:**

Date: 20/09/2023 **Date:**

BS 1377-2:4-5 and BS EN ISO 17892-12 **LIQUID AND PLASTIC LIMIT**

Appendix E – Gas Monitoring Results

LK CONSULT LTD

GAS MONITORING RECORD

Site	Herbert Street, Manchester
Job Number	LKC 23 1433
Date	08/09/2023
Engineer	LD
Visit	1 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
HydroTechnik	HT-02	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Steady
Atmospheric pressure (prev 24hrs)	Steady
Weather Conditions	Slightly overcast,
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS102	08/09/2023 12:22	0.1	4.7	15.7	0.1	4.7	15.7	2	24	0	79.5	1011	0	0.9	1.87	1.96	Steady flow 0.0 l/hr, Steady CO 0ppm
WS103	08/09/2023 12:34	0.1	0.1	20	0.1	0.5	19.8	2	17	1	79.8	1011	0	1.8	1.12	4.95	Steady flow 0.0 l/hr, Steady CO 1ppm
WS105	08/09/2023 12:46	0	1.9	17.7	0	1.9	17.7	0	14	0	80.4	1011	0	1.2	2.61	3.98	Steady flow 0.0 l/hr, Steady CO 0ppm

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1]Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2]CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3]Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Herbert Street, Cheetham Hill
Job Number	LKC 23 1433
Date	21/09/2023
Engineer	CD
Visit	2 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-02	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Rising
Weather Conditions	Sunny, Clear, Slight breeze
Ground Conditions	Damp

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS102	21/09/2023 09:06	0	6	15.9	0	6	11.9	0	8	0	78.1	988	0	0.5	Dry	1.97	Steady CO=0ppm.
WS103	21/09/2023 09:21	0	0.1	21.3	0.6	3.1	19	0	18	0	78.6	989	-0.5	0.7	0.15	4.95	Steady CO=0ppm. Flow for 2 minutes, peak flow = -2.6
WS105	21/09/2023 09:35	0	2.2	16.6	0	2.2	16.6	0	3	0	81.2	989	0	0.4	1.94	3.90	Steady CO=0ppm.

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1]Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2]CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3]Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

Appendix F – Generic Assessment Criteria Values

CATEGORY 4 SCREENING LEVELS

Substance	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	170 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5.0 mg/kg	5.3 mg/kg	5.7 mg/kg	77 mg/kg	10 mg/kg	21 mg/kg
Cadmium	22 mg/kg	150 mg/kg	3.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	21 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2300 mg/kg	630 mg/kg	1300 mg/kg
Tetrachlorethene (PCE) – 1% SOM	0.31 mg/kg	0.32 mg/kg	2.0 mg/kg	24 mg/kg	3,200 mg/kg	1,400 mg/kg
Tetrachlorethene (PCE) – 2.5% SOM	0.70 mg/kg	0.71 mg/kg	4.8 mg/kg	55 mg/kg	3,300 mg/kg	1,900 mg/kg
Tetrachlorethene (PCE) – 6% SOM	1.6 mg/kg	1.6 mg/kg	11 mg/kg	130 mg/kg	3,400 mg/kg	2,500 mg/kg
Trichlorethene (TCE) – 1% SOM	0.0093 mg/kg	0.0097 mg/kg	0.032 mg/kg	0.73 mg/kg	76 mg/kg	41 mg/kg
Trichlorethene (TCE) – 2.5% SOM	0.020 mg/kg	0.020 mg/kg	0.072 mg/kg	1.5 mg/kg	78 mg/kg	54 mg/kg
Trichlorethene (TCE) – 6% SOM	0.043 mg/kg	0.045 mg/kg	0.16 mg/kg	3.4 mg/kg	79 mg/kg	69 mg/kg
Vinyl Chloride (VC) – 1%SOM	0.0064 mg/kg	0.015 mg/kg	0.0017 mg/kg	1.1 mg/kg	7.8 mg/kg	18 mg/kg
Vinyl Chloride (VC) – 2.5%SOM	0.010 mg/kg	0.019 mg/kg	0.0031 mg/kg	1.4 mg/kg	7.8 mg/kg	19 mg/kg
Vinyl Chloride (VC) – 6%SOM	0.017 mg/kg	0.029 mg/kg	0.0058 mg/kg	2.2 mg/kg	7.8 mg/kg	19 mg/kg

Summary Table for the Generic Assessment Criteria for Human Health Risk Assessment Land Quality Management (LQM) S4ULs.

All GAC are based on sandy loam soils with a pH 7.

	Contaminant	SOM	LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
			Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) [vap]	16	30 (25.8) [vap]
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel (update 2015)	6%	126	181	53	983	231	804
	Selenium	6%	250	430	88	12,000	1,100	1,800
	Vanadium	6%	410	1,200	91	9,000	2,000	5,000
	Zinc	6%	3,700	40,000	620	730,000	81,000	170,000
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90
		2.5%	0.17	0.70	0.034	47	72	100
		6%	0.37	1.4	0.075	90	73	110
	Toluene	1%	130	880 (869) [vap]	22	56,000 (869) [vap]	56,000	87,000 (869) [vap]
		2.5%	290	1,900	51	110,000 (1,920) [vap]	56,000	95,000 (1,920) [vap]
		6%	660	3,900	120	180,000 (4,360) [vap]	56,000	100,000 (4,360) [vap]
	Ethylbenzene	1%	47	83	16	5,700 (518) [vap]	24,000	17,000 (518) [vap]
		2.5%	110	190	39	13,000 (1,220) [vap]	24,000	22,000 (1,220) [vap]
		6%	260	440	91	27,000 (2,840) [vap]	25,000	27,000 (2,840) [vap]
	o-xylene	1%	60	88	28	6,600 (478) [sol]	41,000	17,000 (478) [sol]
		2.5%	140	210	67	15,000 (1,120) [sol]	42,000	24,000 (1,120) [sol]
		6%	330	480	160	33,000 (2,620) [sol]	43,000	33,000 (2,620) [sol]
	m-xylene	1%	59	82	31	6,200 (625) [vap]	41,000	17,000 (625) [vap]
		2.5%	140	190	74	14,000 (1,470) [vap]	42,000	24,000 (1,470) [vap]
		6%	320	450	170	31,000 (3,460) [vap]	43,000	32,000 (3,460) [vap]
	p-xylene	1%	56	79	29	5,900 (576) [sol]	41,000	17,000 (576) [sol]
		2.5%	130	180	69	14,000 (1,350) [sol]	42,000	23,000 (1,350) [sol]
		6%	310	430	160	30,000 (3,170) [sol]	43,000	31,000 (3,170) [sol]

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

	Contaminant	SOM	LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
			Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) [sol]	34	84,000 (57.0) [sol]	15,000	29,000
		2.5%	510	4,700 (141) [sol]	85	97,000 (141) [sol]	15,000	30,000
		6%	1,100	6,000 (336) [sol]	200	100,000	15,000	30,000
	Acenaphthylene	1%	170	2,900 (86.1) [sol]	28	83,000 (86.1) [sol]	15,000	29,000
		2.5%	420	4,600 (212) [sol]	69	97,000 (212) [sol]	15,000	30,000
		6%	920	6,000 (506) [sol]	160	100,000	15,000	30,000
	Anthracene	1%	2,400	31,000 (1.17) [vap]	380	520,000	74,000	150,000
		2.5%	5,400	35,000	950	540,000	74,000	150,000
		6%	11,000	37,000	2,200	540,000	74,000	150,000
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49
		2.5%	11	14	6.5	170	29	56
		6%	13	15	13	180	29	62
	Benzo(a)pyrene (only)	1%	2.2	3.2	0.97	35	5.7	11
		2.5%	2.7	3.2	2.0	35	5.7	12
		6%	3.0	3.2	3.5	36	5.7	13
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13
		2.5%	3.3	4.0	2.1	44	7.2	15
		6%	3.7	4.0	3.9	45	7.2	16
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400
		2.5%	340	360	470	4,000	640	1,500
		6%	350	360	640	4,000	640	1,600
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370
		2.5%	93	110	75	1,200	190	410
		6%	100	110	130	1,200	190	440
	Chrysene	1%	15	30	4.1	350	57	93
		2.5%	22	31	9.4	350	57	110
		6%	27	32	19	350	57	120
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3
		6%	0.3	0.32	0.43	3.6	0.58	1.4
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300
		2.5%	560	1,600	130	23,000	3,100	6,300
		6%	890	1,600	290	23,000	3,100	6,400
	Fluorene	1%	170	2,800 (36.0) [sol]	27	63,000 (30.9) [sol]	9,900	20,000
		2.5%	400	3,800 (76.5) [sol]	67	68,000	9,900	20,000
		6%	860	4,500 (183) [sol]	160	71,000	9,900	20,000
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150
		2.5%	36	46	21	510	82	170
		6%	41	46	39	510	82	180
	Naphthalene	1%	2.3 [f]	2.3 [f]	4.1 [f]	190 [f] (76.4) [sol]	4,900 [f]	1,200 [f] (76.4) [sol]
		2.5%	5.6 [f]	5.6 [f]	10 [f]	460 [f] (183) [sol]	4,900 [f]	1,900 [f] (183) [sol]
		6%	13 [f]	13 [f]	24 [f]	1,100 [f] (432) [sol]	4,900 [f]	3,000
	Phenanthrene	1%	95	1,300 (36.0) [sol]	15	22,000	3,100	6,200
		2.5%	220	1,500	38	22,000	3,100	6,200
		6%	440	1,500	90	22,000	3,100	6,300
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000
		2.5%	1,200	3,800	270	54,000	7,400	15,000
		6%	2,000	3,800	620	54,000	7,400	15,000
	Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4
		2.5%	0.98	1.2	0.67	15	2.2	4.7
		6%	1.1	1.2	1.2	15	2.2	4.8

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = naphthalene is based on comparison of inhalation exposure with TDI_{inhal} for localised effect.

All GAC are based on sandy loam soils with a pH 7.

	Contaminant	SOM	Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Petroleum Hydrocarbons	**Aliphatic**							
	EC 5-6	1%	42	42	730	3,200 (304) [sol]	570,000(304)[sol]	95,000 (304) [sol]
	EC>6-8	1%	100	100	2,300	7,800 (144) [sol]	600,000	150,000 (144) [sol]
	EC>8-10	1%	27	27	320	2,000 (78) [sol]	13,000	14,000 (78) [vap]
	EC>10-12	1%	130 (48) [vap]	130 (48) [vap]	2,200	9,700 (48) [sol]	13,000	21,000 (48) [vap]
	EC>12-16	1%	1,100 (24) [sol]	1,100 (24) [sol]	11,000	59,000 (24) [sol]	13,000	25,000 (24) [sol]
	EC>16-35	1%	65,000 (8.48) [f,sol]	65,000 (8.48) [f,sol]	260,000 [f]	160,000 [f]	250,000 [f]	450,000 [f]
	EC>35-44	1%	65,000 (8.48) [f,sol]	65,000 (8.48) [f,sol]	260,000 [f]	160,000 [f]	250,000 [f]	450,000 [f]
	Aliphatic							
	EC 5-6	2.5%	78	78	1,700	5,900 (558) [sol]	590,000	130,000 (558) [sol]
	EC>6-8	2.5%	230	230	5,600	17,000 (322) [sol]	610,000	220,000 (322) [sol]
	EC>8-10	2.5%	65	65	770	4,800 (190) [vap]	13,000	18,000 (190) [vap]
	EC>10-12	2.5%	330 (118) [vap]	330 (118) [vap]	4,400	23,000 (118) [vap]	13,000	23,000 (118) [vap]
	EC>12-16	2.5%	2,400 (59) [sol]	2,400 (59) [sol]	13,000	82,000 (59) [sol]	13,000	25,000 (59) [sol]
	EC>16-35	2.5%	92,000 (21) [f,sol]	92,000 (21) [f,sol]	270,000 [f]	1,700,000 [f]	250,000 [f]	480,000 [f]
	EC>35-44	2.5%	92,000 (21) [f,sol]	92,000 (21) [f,sol]	270,000 [f]	1,700,000 [f]	250,000 [f]	480,000 [f]
	Aliphatic							
	EC 5-6	6%	160	160	3,900	12,000 (1,150) [sol]	600,000	180,000 (1,150) [sol]
	EC>6-8	6%	530	530	13,000	40,000 (736) [sol]	620,000	320,000 (736) [sol]
	EC>8-10	6%	150	150	1,700	11,000 (451) [vap]	13,000	21,000 (451) [vap]
	EC>10-12	6%	760 (283) [vap]	760 (283) [vap]	7,300	47,000 (283) [vap]	13,000	24,000 (283) [vap]
	EC>12-16	6%	4,300 (142) [sol]	4,400 (142) [sol]	13,000	90,000 (142) [sol]	13,000	26,000 (142) [sol]
	EC>16-35	6%	110,000[f]	110,000[f]	270,000 [f]	1,800,000[f]	250,000 [f]	490,000 [f]
	EC>35-44	6%	110,000[f]	110,000[f]	270,000 [f]	1,800,000[f]	250,000 [f]	490,000 [f]
	Aromatic							
	EC5-7(benzene as non-threshold)	1%	70	370	13	26,000 (1,220) [sol]	56,000	76,000 (1,220) [sol]
	EC>7-8(toluene)	1%	130	860	22	56,000 (869) [vap]	56,000	87,000 (869) [vap]
	EC>8-10	1%	34	47	8.6	3,500 (613) [vap]	5,000	7,200 (613) [vap]
	EC>10-12	1%	74	250	13	16,000 (364) [sol]	5,000	9,200 (364) [sol]
	EC>12-16	1%	140	1,800	23	36,000 (169)[sol]	5,100	10,000
	EC>16-21	1%	260 [f]	1,900 [f]	46 [f]	28,000 [f]	3,800 [f]	7,600 [f]
	EC>21-35	1%	1,100 [f]	1,900 [f]	370 [f]	28,000 [f]	3,800 [f]	7,800 [f]
	EC>35-44	1%	1,100 [f]	1,900 [f]	370[f]	28,000 [f]	3,800 [f]	7,800 [f]
	Aromatic							
	EC5-7(benzene as non-threshold)	2.5%	140	690	27	46,000 (2,260) [sol]	56,000	84,000 (2,260) [sol]
	EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) [sol]	56,000	95,000 (1,920) [sol]
	EC>8-10	2.5%	83	110	21	8,100 (1,500) [vap]	5,000	8,500 (1,500) [vap]
	EC>10-12	2.5%	180	590	31	28,000 (899) [sol]	5,000	9,700 (899) [sol]
	EC>12-16	2.5%	330	2,300 (419) [sol]	57	37,000	5,100	10,000
	EC>16-21	2.5%	540 [f]	1,900 [f]	110 [f]	28,000 [f]	3,800 [f]	7,700 [f]
	EC>21-35	2.5%	1,500 [f]	1,900 [f]	820 [f]	28,000 [f]	3,800 [f]	7,800 [f]
	EC>35-44	2.5%	1,500 [f]	1,900 [f]	820 [f]	28,000 [f]	3,800 [f]	7,800 [f]
	Aromatic							
	EC5-7(benzene as non-threshold)	6%	300	1,400	57	86,000 (4,710) [sol]	56,000	92,000 (4,710) [sol]
	EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) [vap]	56,000	100,000 (4,360) [vap]
	EC>8-10	6%	190	270	51	17,000 (3,580) [vap]	5,000	9,300 (3,580) [vap]
	EC>10-12	6%	380	1,200	74	34,000 (2,150) [sol]	5,000	10,000
	EC>12-16	6%	660	2,500	130	38,000	5,100	10,000
	EC>16-21	6%	930[f]	1,900 [f]	260 [f]	28,000 [f]	3,800 [f]	7,800 [f]
	EC>21-35	6%	1,700 [f]	1,900 [f]	1,600 [f]	28,000 [f]	3,800 [f]	7,900 [f]
	EC>35-44	6%	1,700 [f]	1,900 [f]	1,600 [f]	28,000 [f]	3,800 [f]	7,900 [f]
	Aliphatic +Aromatic >EC44	1%	1,600 [f]	1,900 [f]	1,200 [f]	28,000 [f]	3,800 [f]	7,800 [f]
		2.5%	1,800 [f]	1,900 [f]	2,100 [f]	28,000 [f]	3,800 [f]	7,800 [f]
		6%	1,900 [f]	1,900 [f]	3,000 [f]	28,000 [f]	3,800 [f]	7,900 [f]

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

	Contaminant	SOM	LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
			Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
Chloalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	7.1E-03	9.2E-03	4.6E-03	0.67	29	21
		2.5%	1.1E-02	1.3E-02	8.3E-03	0.97	29	24
		6%	1.9E-02	2.3E-02	1.6E-02	1.7	29	28
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425) [vap]
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) [vap]
		6%	39	40	240	3,000	140,000	100,000 (6,392) [vap]
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800
		2.5%	3.4	8.0	0.89	550	1,400	2,100
		6%	7.5	17	2.0	1,100	1,400	2,300
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500
		2.5%	2.8	3.5	1.9	250	1,400	1,800
		6%	6.4	8.2	4.4	560	1,400	2,100
	Tetrachloroethene (PCE)	1%	0.18	0.18	0.65	19	1,400	810 (424) [sol]
		2.5%	0.39	0.40	1.5	42	1,400	1,100 (951) [sol]
		6%	0.90	0.92	3.6	95	1,400	1,500
	Tetrachloromethane (carbon tetrachloride)	1%	2.6E-02	2.6E-02	0.45	2.9	890	190
		2.5%	5.6E-02	5.6E-02	1.0	6.3	920	270
		6%	0.13	0.13	2.4	14	950	400
	Trichloroethene (TCE)	1%	1.6E-02	1.7E-02	4.1E-02	1.2	120	70
		2.5%	3.4E-02	3.6E-02	9.1E-02	2.6	120	91
		6%	7.5E-02	8.0E-02	0.21	5.7	120	120
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600
		2.5%	1.7	2.1	0.83	170	2,500	2,800
		6%	3.4	4.2	1.7	350	2,500	3,100
	Chloroethene (vinyl chloride)	1%	6.4E-04	7.7E-04	5.5E-04	5.9E-02	3.5	4.8
		2.5%	8.7E-04	1.0E-03	1.0E-03	7.7E-02	3.5	5.0
		6%	1.4E-03	1.5E-03	1.8E-03	0.12	3.5	5.4
	2,4,6-Trinitritoluene (TNT)	1%	1.6	65	0.24	1,000	130	260
		2.5%	3.7	66	0.58	1,000	130	270
		6%	8.1	66	1.4	1,000	130	270
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) [sol]
		2.5%	250	13,000	38	210,000	26,000	51,000
		6%	540	13,000	85	210,000	27,000	53,000
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) [vap]
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) [vap]
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) [vap]
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30
		2.5%	6.6	7.4	6.1	170	18	31
		6%	7.1	7.5	9.8	170	18	31
	Dieldrin	1%	0.97	7.0	0.17	170	18	30
		2.5%	2.0	7.3	0.41	170	18	30
		6%	3.5	7.4	0.96	170	18	31
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300
		2.5%	7.8	620	1.2	9,400	1,200	2,400
		6%	17.4	620	2.7	9,400	1,200	2,400
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26
		6%	0.14	6.6	2.2E-02	140	16	27
	Endosulfanns (2 isomers)	1%	7.4	160 (3.0E-03) [vap]	1.2	5,600 (3.0E-03) [vap]	1,200	2,300
		2.5%	18	280 (7.0E-03) [vap]	2.9	7,400 (7.0E-03) [vap]	1,200	2,400
		6%	41	410 (1.6E-02) [vap]	6.8	8,400 (1.6E-02) [vap]	1,200	2,500
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15
		2.5%	0.2	3.8	3.2E-02	65	8.1	15
		6%	0.46	3.8	7.7E-02	65	8.1	16

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

All GAC are based on sandy loam soils with a pH 7.

	Contaminant	SOM	LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
			Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) [sol]
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) [sol]
		6%	2.4	2.4	32	290	14,000	2,900
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) [sol]	90,000	24,000 (571) [sol]
		2.5%	55	57	230	4,800 (1,370) [sol]	95,000	36,000 (1,370) [sol]
		6%	130	130	540	11,000 (3,240) [sol]	98,000	51,000 (3,270) [sol]
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) [vap]
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) [vap]
		6%	15	15	320	1,300	19,000	4,000 (1,880) [vap]
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) [vap]	78	110 (39) [vap]
		2.5%	1.6	1.9	0.90	120 (98.1) [vap]	79	120
		6%	3.7	4.3	2.2	240 (235) [vap]	79	130
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) [sol]	100	190
		2.5%	12	30	3.1	770 (107) [sol]	100	190
		6%	22	38	7.0	830	100	190
	Hexachlorobenzene	1%	1.8 (0.20) [vap]	4.1 (0.20) [vap]	0.47	110 (0.20) [vap]	16	30
		2.5%	3.3 (0.50) [vap]	5.7 (0.50) [vap]	1.1	120	16	30
		6%	4.9	6.7 (1.2) [vap]	2.5	120	16	30
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 [g]	94	0.13 [g]	3,500	620	1,100
		2.5%	2.0	150	0.30	4,000	620	1,100
		6%	4.5	210	0.70	4,300	620	1,100
	Pentachlorophenol	1%	0.22	27 (16.4) [vap]	3.0E-02	400	60	110
		2.5%	0.52	29	8.0E-02	400	60	120
		6%	1.2	31	0.19	400	60	120
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300
		2.5%	0.29	0.29	10	22	11,000	1,900
		6%	0.62	0.62	23	47	11,000	2,700
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48
		2.5%	0.7	0.78	0.61	66	25	50
		6%	1.6	1.8	1.4	120	25	51
	Phenol	1%	280	750	66	760 [dir] (31,000)	760 [dir] (11,000)	760 [dir] (8,600)
		2.5%	550	1,300	140	1,500 [dir] (35,000)	1,500 [dir] (11,000)	1,500 [dir] (9,700)
		6%	1,100	2,300	280	3,200 [dir] (37,000)	3,200 [dir] (11,000)	3,200 [dir] (11,000)

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

[dir] = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

[g] = derived based on 2,3,4,6-tetrachlorophenol.

Appendix G – JIWG Assessment

Decision Support Tool for Receptor Risk Ranking

Stage 1
Hazard Identification

		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Loose fibrous asbestos debris	3
Extent of degradation of ACMs	Degraded (Significant degradation in ACM; material has lost its basic integrity)	3
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not firmly linked in a matrix	2
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Mainly amosite (and possible trace tremolite/anthophyllite) with/without chrysotile (no crocidolite)	3
Sub-total		**11**
Hazard ranking		**Medium**

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Stage 2

Emission Factors		Score
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Trace quantities - <0.0001 to <0.001 %wt/wt	0
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Low disturbance, minimal deterioration expected	2
Best description of primary host material matrix	Made Ground - Recycled Aggregate, Track Ballast	4
Sub-total		9
Exposure ranking		Low

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Stage 3

Pathway and Receptor Sensitivity		Score	
Receptor category	Residential	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	>> 10 hours per day (e.g. 24 hour residential exposure)	4	
Receptor ranking		8	High
Combined hazard, exposure and receptor ranking			Medium
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at shallow depth, potential to be disturbed by excavation	C	
Pathway ranking		4C	Low
Overall ranking			Low

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Project Reference	LKC 23 1433

Site Name	Herbert Street, Manchester
Client	Ace Property Cheethamhill Ltd

Run by	BRH
Date	27-Sep-23
Reviewed by	PD

Characterisation of scenario being evaluated	Proposed: residential with private gardens and landscaping.

Interpretation of scenario ranking by DST	

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JIWG

Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Project Reference	LKC 23 1433
Site Name	Herbet Street, Manchester
Client	Ace Properties Cheethamhill Ltd
Run by	BRH
Date	27th September 2023
Scenario details	Risk during earthworks

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Loose fibrous asbestos debris	3
Extent of degradation of ACMs at outset of work	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Trace quantities - <0.0001 to 0.001 %wt/wt	0
Sub-total		**0**

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking **Negligible**

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Stage 2

Exposure Factors

		Score
Anticipated airborne fibre concentration - Control Limit or SALI?	<0.001 fibres/ml	0
Anticipated duration of exposure to asbestos	> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)	4
Activity type and effect on deterioration of ACMs during work	Sampling, manual or mechanical (significant deterioration expected)	2
Best description of primary host material matrix (soil/made ground)	Made Ground - Recycled Aggregate, Track Ballast	4
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Sub-total		**13**
Exposure ranking		Medium
Combined hazard and exposure ranking	**13**	Low

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Stage 3

Risk Assessment Outputs

Probable Licensing Status	CAR do not apply
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.
**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)
***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

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Appendix H – HasWaste Online Output Sheets

HazWasteOnline™

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:

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

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

3PQI1-K90OZ-MC8YC

Job name

LKC 23 1433

Description/Comments

Project

LKC 23 1433

Site

Herbert Street, Manchester

Classified by

Name:
Peter Dunn
Company:
LK Group
Date:
29 Sep 2023 07:08 GMT
Telephone:
0161 763 7200

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	Date
Hazardous Waste Classification	26 Mar 2015 *
Most recent 3 year Refresher	02 Aug 2022

Next 3 year Refresher due by Aug 2025
* training course booked

Purpose of classification

2 - Material Characterisation

Address of the waste

Herbert Street, Manchester **Post Code** M8 0DG

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Development of brownfield land

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

Construction

Description of the waste

made ground and soil

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS101-0.00 - 0.50-01/09/2023	0.00 - 0.50	Non Hazardous		3
2	WS102-0.80 - 1.00-01/09/2023	0.80 - 1.00	Non Hazardous		5
3	WS103-0.30 - 1.00-01/09/2023	0.30 - 1.00	Non Hazardous		7
4	WS104-0.03 - 0.50-01/09/2023	0.03 - 0.50	Non Hazardous		10
5	WS105-0.02 - 0.50-01/09/2023	0.02 - 0.50	Non Hazardous		13

Related documents

#	Name	Description
1	23-11476.1.hwol	DETS South .hwol file used to populate the Job
2	LK SUITE 1 - 5	waste stream template used to create this Job

Report

Created by: Peter Dunn

Created date: 29 Sep 2023 07:08 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	15
Appendix B: Rationale for selection of metal species	16
Appendix C: Version	17

Classification of sample: WS101-0.00 - 0.50-01/09/2023

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

Sample details

Sample name:
WS101-0.00 - 0.50-01/09/2023
Sample Depth:
0.00 - 0.50 m
Moisture content:
14.7%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 14.7% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	13.515	mg/kg	0.00135 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.4	mg/kg	1.142	0.39	mg/kg	0.000039 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28	mg/kg	1.462	34.908	mg/kg	0.00349 %	✓	
4		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		47	mg/kg	1.126	45.138	mg/kg	0.00451 %	✓	
5		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		**<LOD**
6		nickel { nickel(II) oxide (nickel monoxide) }	028-003-00-2	215-215-7 [1] 234-323-5 [2] - [3]	1313-99-1 [1] 11099-02-8 [2] 34492-97-2 [3]		14	mg/kg	1.273	15.197	mg/kg	0.00152 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	173	mg/kg		147.569	mg/kg	0.0148 %	✓	
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<2	mg/kg	1.405	<2.81	mg/kg	<0.000281 %		**<LOD**
9		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		20	mg/kg	1.785	30.455	mg/kg	0.00305 %	✓	
10		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		162	mg/kg	1.245	172.002	mg/kg	0.0172 %	✓	
11		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		**<LOD**
12		pH			PH		7.8	pH		7.8	pH	7.8 pH		
13		naphthalene	601-052-00-2	202-049-5	91-20-3		1.36	mg/kg		1.16	mg/kg	0.000116 %	✓	

#		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				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-917-1	208-96-8									
15	•	acenaphthene				2.12	mg/kg		1.808	mg/kg	0.000181 %	✓	
			201-469-6	83-32-9									
16	•	fluorene				1.31	mg/kg		1.117	mg/kg	0.000112 %	✓	
			201-695-5	86-73-7									
17	•	phenanthrene				10.6	mg/kg		9.042	mg/kg	0.000904 %	✓	
			201-581-5	85-01-8									
18	•	anthracene				2.82	mg/kg		2.405	mg/kg	0.000241 %	✓	
			204-371-1	120-12-7									
19	•	fluoranthene				11.8	mg/kg		10.065	mg/kg	0.00101 %	✓	
			205-912-4	206-44-0									
20	•	pyrene				11.1	mg/kg		9.468	mg/kg	0.000947 %	✓	
			204-927-3	129-00-0									
21		benzo[a]anthracene				6.62	mg/kg		5.647	mg/kg	0.000565 %	✓	
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				5.2	mg/kg		4.436	mg/kg	0.000444 %	✓	
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				5.86	mg/kg		4.999	mg/kg	0.0005 %	✓	
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				1.82	mg/kg		1.552	mg/kg	0.000155 %	✓	
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				6.11	mg/kg		5.212	mg/kg	0.000521 %	✓	
		601-032-00-3	200-028-5	50-32-8									
26	•	indeno[123-cd]pyrene				2.19	mg/kg		1.868	mg/kg	0.000187 %	✓	
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				0.6	mg/kg		0.512	mg/kg	0.0000512 %	✓	
		601-041-00-2	200-181-8	53-70-3									
28	•	benzo[ghi]perylene				1.74	mg/kg		1.484	mg/kg	0.000148 %	✓	
			205-883-8	191-24-2									
										Total:	0.0528 %		

Key

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

Classification of sample: WS102-0.80 - 1.00-01/09/2023

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

Sample details

Sample name:
WS102-0.80 - 1.00-01/09/2023
Sample Depth:
0.80 - 1.00 m
Moisture content:
12.4%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 12.4% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		13	mg/kg	1.32	15.036	mg/kg	0.0015 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5	mg/kg	1.142	0.5	mg/kg	0.00005 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		22	mg/kg	1.462	28.167	mg/kg	0.00282 %	✓	
4		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		69	mg/kg	1.126	68.053	mg/kg	0.00681 %	✓	
5		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.3	mg/kg	1.353	1.541	mg/kg	0.000154 %	✓	
6		nickel { nickel(II) oxide (nickel monoxide) }	028-003-00-2	215-215-7 [1] 234-323-5 [2] - [3]	1313-99-1 [1] 11099-02-8 [2] 34492-97-2 [3]		17	mg/kg	1.273	18.951	mg/kg	0.0019 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	442	mg/kg		387.192	mg/kg	0.0387 %	✓	
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<2	mg/kg	1.405	<2.81	mg/kg	<0.000281 %		**<LOD**
9		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		22	mg/kg	1.785	34.404	mg/kg	0.00344 %	✓	
10		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		161	mg/kg	1.245	175.549	mg/kg	0.0176 %	✓	
11		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		**<LOD**
12		pH			PH		8.2	pH		8.2	pH	8.2 pH		
13		naphthalene	601-052-00-2	202-049-5	91-20-3		0.55	mg/kg		0.482	mg/kg	0.0000482 %	✓	

#		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				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-917-1	208-96-8									
15	•	acenaphthene				2.97	mg/kg		2.602	mg/kg	0.00026 %	✓	
			201-469-6	83-32-9									
16	•	fluorene				1.78	mg/kg		1.559	mg/kg	0.000156 %	✓	
			201-695-5	86-73-7									
17	•	phenanthrene				24.1	mg/kg		21.112	mg/kg	0.00211 %	✓	
			201-581-5	85-01-8									
18	•	anthracene				5.24	mg/kg		4.59	mg/kg	0.000459 %	✓	
			204-371-1	120-12-7									
19	•	fluoranthene				19.3	mg/kg		16.907	mg/kg	0.00169 %	✓	
			205-912-4	206-44-0									
20	•	pyrene				16.6	mg/kg		14.542	mg/kg	0.00145 %	✓	
			204-927-3	129-00-0									
21		benzo[a]anthracene				6.81	mg/kg		5.966	mg/kg	0.000597 %	✓	
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				5.75	mg/kg		5.037	mg/kg	0.000504 %	✓	
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				4.55	mg/kg		3.986	mg/kg	0.000399 %	✓	
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				1.7	mg/kg		1.489	mg/kg	0.000149 %	✓	
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				4.69	mg/kg		4.108	mg/kg	0.000411 %	✓	
		601-032-00-3	200-028-5	50-32-8									
26	•	indeno[123-cd]pyrene				1.65	mg/kg		1.445	mg/kg	0.000145 %	✓	
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				0.49	mg/kg		0.429	mg/kg	0.0000429 %	✓	
		601-041-00-2	200-181-8	53-70-3									
28	•	benzo[ghi]perylene				1.36	mg/kg		1.191	mg/kg	0.000119 %	✓	
			205-883-8	191-24-2									
29		asbestos				<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
		650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5									
										Total:	0.0832 %		

Key

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

Classification of sample: WS103-0.30 - 1.00-01/09/2023

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

Sample details

Sample name:
WS103-0.30 - 1.00-01/09/2023
Sample Depth:
0.30 - 1.00 m
Moisture content:
20.3%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 20.3% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		24 mg/kg	1.32	25.255 mg/kg	0.00253 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5 mg/kg	1.142	0.455 mg/kg	0.0000455 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	19.803 mg/kg	0.00198 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		80 mg/kg	1.126	71.787 mg/kg	0.00718 %	✓	
5	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		**<LOD**
6	nickel { nickel(II) oxide (nickel monoxide) }	028-003-00-2	215-215-7 [1] 234-323-5 [2] - [3]	1313-99-1 [1] 11099-02-8 [2] 34492-97-2 [3]		20 mg/kg	1.273	20.285 mg/kg	0.00203 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	338 mg/kg		269.386 mg/kg	0.0269 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<2 mg/kg	1.405	<2.81 mg/kg	<0.000281 %		**<LOD**
9	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		29 mg/kg	1.785	41.261 mg/kg	0.00413 %	✓	
10	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		139 mg/kg	1.245	137.893 mg/kg	0.0138 %	✓	
11	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2 mg/kg	1.923	<3.846 mg/kg	<0.000385 %		**<LOD**
12	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		1.1 mg/kg	3.22	2.823 mg/kg	0.000282 %	✓	
13	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
15		toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
16		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
17		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
19		pH			PH		7.5	pH		7.5	pH	7.5 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		0.92	mg/kg		0.733	mg/kg	0.0000733 %	✓	
21		acenaphthylene		205-917-1	208-96-8		0.15	mg/kg		0.12	mg/kg	0.000012 %	✓	
22		acenaphthene		201-469-6	83-32-9		2.16	mg/kg		1.722	mg/kg	0.000172 %	✓	
23		fluorene		201-695-5	86-73-7		1.58	mg/kg		1.259	mg/kg	0.000126 %	✓	
24		phenanthrene		201-581-5	85-01-8		13.5	mg/kg		10.76	mg/kg	0.00108 %	✓	
25		anthracene		204-371-1	120-12-7		3.05	mg/kg		2.431	mg/kg	0.000243 %	✓	
26		fluoranthene		205-912-4	206-44-0		17.9	mg/kg		14.266	mg/kg	0.00143 %	✓	
27		pyrene		204-927-3	129-00-0		15.9	mg/kg		12.672	mg/kg	0.00127 %	✓	
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		8.16	mg/kg		6.504	mg/kg	0.00065 %	✓	
29		chrysene	601-048-00-0	205-923-4	218-01-9		6.95	mg/kg		5.539	mg/kg	0.000554 %	✓	
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		6.36	mg/kg		5.069	mg/kg	0.000507 %	✓	
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.56	mg/kg		2.04	mg/kg	0.000204 %	✓	
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		6.55	mg/kg		5.22	mg/kg	0.000522 %	✓	
33		indeno[123-cd]pyrene		205-893-2	193-39-5		2.46	mg/kg		1.961	mg/kg	0.000196 %	✓	
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.72	mg/kg		0.574	mg/kg	0.0000574 %	✓	
35		benzo[ghi]perylene		205-883-8	191-24-2		2.13	mg/kg		1.698	mg/kg	0.00017 %	✓	
36		monohydric phenols			P1186		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
											Total:	0.0673 %		

Key

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

Classification of sample: WS104-0.03 - 0.50-01/09/2023

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

Sample details

Sample name:
WS104-0.03 - 0.50-01/09/2023
Sample Depth:
0.03 - 0.50 m
Moisture content:
9.4%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 9.4% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	14.355	mg/kg	0.00144 %	✓	
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.3	mg/kg	1.142	0.31	mg/kg	0.000031 %	✓	
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		10	mg/kg	1.462	13.242	mg/kg	0.00132 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		56	mg/kg	1.126	57.123	mg/kg	0.00571 %	✓	
5	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		**<LOD**
6	nickel { nickel(II) oxide (nickel monoxide) }	028-003-00-2	215-215-7 [1] 234-323-5 [2] - [3]	1313-99-1 [1] 11099-02-8 [2] 34492-97-2 [3]		12	mg/kg	1.273	13.836	mg/kg	0.00138 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	194	mg/kg		175.764	mg/kg	0.0176 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<2	mg/kg	1.405	<2.81	mg/kg	<0.000281 %		**<LOD**
9	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		18	mg/kg	1.785	29.113	mg/kg	0.00291 %	✓	
10	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		83	mg/kg	1.245	93.6	mg/kg	0.00936 %	✓	
11	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		**<LOD**
12	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1	mg/kg	3.22	<3.22	mg/kg	<0.000322 %		**<LOD**
13	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
15		toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
16		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
17		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
19		pH			PH		8.2	pH		8.2	pH	8.2 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		0.57	mg/kg		0.516	mg/kg	0.0000516 %	✓	
21		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
22		acenaphthene		201-469-6	83-32-9		0.97	mg/kg		0.879	mg/kg	0.0000879 %	✓	
23		fluorene		201-695-5	86-73-7		0.53	mg/kg		0.48	mg/kg	0.000048 %	✓	
24		phenanthrene		201-581-5	85-01-8		8.79	mg/kg		7.964	mg/kg	0.000796 %	✓	
25		anthracene		204-371-1	120-12-7		1.87	mg/kg		1.694	mg/kg	0.000169 %	✓	
26		fluoranthene		205-912-4	206-44-0		9.09	mg/kg		8.236	mg/kg	0.000824 %	✓	
27		pyrene		204-927-3	129-00-0		8.96	mg/kg		8.118	mg/kg	0.000812 %	✓	
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.06	mg/kg		3.678	mg/kg	0.000368 %	✓	
29		chrysene	601-048-00-0	205-923-4	218-01-9		3.77	mg/kg		3.416	mg/kg	0.000342 %	✓	
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		3.24	mg/kg		2.935	mg/kg	0.000294 %	✓	
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.28	mg/kg		1.16	mg/kg	0.000116 %	✓	
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.89	mg/kg		3.524	mg/kg	0.000352 %	✓	
33		indeno[123-cd]pyrene		205-893-2	193-39-5		1.37	mg/kg		1.241	mg/kg	0.000124 %	✓	
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.39	mg/kg		0.353	mg/kg	0.0000353 %	✓	
35		benzo[ghi]perylene		205-883-8	191-24-2		1.14	mg/kg		1.033	mg/kg	0.000103 %	✓	
36		monohydric phenols			P1186		<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
											Total:	0.0458 %		

Key

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

Classification of sample: WS105-0.02 - 0.50-01/09/2023

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

Sample details

Sample name:
WS105-0.02 - 0.50-01/09/2023
Sample Depth:
0.02 - 0.50 m
Moisture content:
2.4%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 2.4% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		2	mg/kg	1.32	2.577	mg/kg	0.000258 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.7	mg/kg	1.142	0.78	mg/kg	0.000078 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		7	mg/kg	1.462	9.985	mg/kg	0.000999 %	✓	
4		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		10	mg/kg	1.126	10.989	mg/kg	0.0011 %	✓	
5		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1	mg/kg	1.353	<1.353	mg/kg	<0.000135 %		**<LOD**
6		nickel { nickel(II) oxide (nickel monoxide) }	028-003-00-2	215-215-7 [1] 234-323-5 [2] - [3]	1313-99-1 [1] 11099-02-8 [2] 34492-97-2 [3]		8	mg/kg	1.273	9.936	mg/kg	0.000994 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	19	mg/kg		18.544	mg/kg	0.00185 %	✓	
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<2	mg/kg	1.405	<2.81	mg/kg	<0.000281 %		**<LOD**
9		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		7	mg/kg	1.785	12.196	mg/kg	0.00122 %	✓	
10		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		29	mg/kg	1.245	35.23	mg/kg	0.00352 %	✓	
11		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<2	mg/kg	1.923	<3.846	mg/kg	<0.000385 %		**<LOD**
12		pH			PH		8.5	pH		8.5	pH	8.5 pH		
13		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**

#		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				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-917-1	208-96-8									
15	•	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-469-6	83-32-9									
16	•	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-695-5	86-73-7									
17	•	phenanthrene				0.1	mg/kg		0.0976	mg/kg	0.00000976 %	✓	
			201-581-5	85-01-8									
18	•	anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			204-371-1	120-12-7									
19	•	fluoranthene				0.71	mg/kg		0.693	mg/kg	0.0000693 %	✓	
			205-912-4	206-44-0									
20	•	pyrene				0.79	mg/kg		0.771	mg/kg	0.0000771 %	✓	
			204-927-3	129-00-0									
21		benzo[a]anthracene				0.43	mg/kg		0.42	mg/kg	0.000042 %	✓	
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				0.49	mg/kg		0.478	mg/kg	0.0000478 %	✓	
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				0.57	mg/kg		0.556	mg/kg	0.0000556 %	✓	
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				0.19	mg/kg		0.185	mg/kg	0.0000185 %	✓	
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				0.52	mg/kg		0.508	mg/kg	0.0000508 %	✓	
		601-032-00-3	200-028-5	50-32-8									
26	•	indeno[123-cd]pyrene				0.14	mg/kg		0.137	mg/kg	0.0000137 %	✓	
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
28	•	benzo[ghi]perylene				0.11	mg/kg		0.107	mg/kg	0.0000107 %	✓	
			205-883-8	191-24-2									
										Total:	0.0113 %		

Key

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

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

divanadium pentaoxide; vanadium pentoxide (EC Number: 215-239-8, CAS Number: 1314-62-1)

GB MCL index number: 023-001-00-8
Description/Comments: Hazard statements H301, H330, H350 added by HazWasteOnline due to ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be Carc. 1B; H350. The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
Additional Hazard Statement(s): Carc. 1B; H350 , Acute Tox. 3; H301 , Acute Tox. 2; H330
Reason for additional Hazards Statement(s):
20 Sep 2022 - Carc. 1B; H350 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be Carc. 1B; H350. The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
28 Sep 2022 - Acute Tox. 3; H301 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be "Acute tox 3; H301". The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
28 Sep 2022 - Acute Tox. 2; H330 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be "Acute tox 2; H330". The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
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 2B (77) 2000

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.

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

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

- **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

- **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

- **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

- **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

- **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

- **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

- **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

- **monohydric phenols** (CAS Number: P1186)

Description/Comments: Combined hazards statements from harmonised entries in CLP for phenol, cresols and xylenols (604-001-00-2, 604-004-00-9, 604-006-00-X)
Data source: CLP combined data
Data source date: 26 Mar 2019
Hazard Statements: Muta. 2; H341 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301 , STOT RE 2; H373 , Skin Corr. 1B; H314 , Skin Corr. 1B; H314 >= 3 % , Skin Irrit. 2; H315 1 £ conc. < 3 % , Eye Irrit. 2; H319 1 £ conc. < 3 % , Aquatic Chronic 2; H411

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides.

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

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

nickel {nickel(II) oxide (nickel monoxide)}

Worst case compound based on absence of CrVI and assumed metal oxides from a combustion, ash based source.

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

Worst case compound based on absence of CrVI and assumed metal oxides from a combustion, ash based source.

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

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

vanadium {divanadium pentaoxide; vanadium pentoxide}

Most conservative species.

zinc {zinc oxide}

Worst case compound based on absence of CrVI and assumed metal oxides from a combustion, ash based source.

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass.

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}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide]

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2023.271.5764.10641 (28 Sep 2023)
HazWasteOnline Database: 2023.270.5761.10634 (27 Sep 2023)

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
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