

KING DAVID HIGH SCHOOL, CRUMPSALL

GEO-ENVIRONMENTAL INVESTIGATION

Job Number: LKC 18 1349
Date: February 2019
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1	12.2.19	Revised geotechnical assessment due to change in development proposals.	MT

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EXECUTIVE SUMMARY

Site Details

Site Location:	Site forms part of the King David High School Campus, southwest of Eaton Road in the Crumpsall area of Manchester. National Grid Reference 383650E 402208N.
Current Land Use:	A school building with areas of soft landscaping.
Proposed Development:	Replacement school building.
Purpose of Report:	Geotechnical and Contamination Assessment.

Preliminary Risk Assessment

History:	Undeveloped until 1890 when current building located on site.
Geology / Hydrogeology:	Superficial: Glaciofluvial Sheet Deposits (sand and gravel), Secondary A Aquifer. Bedrock: Manchester Marls Formation (mudstone), Secondary B Aquifer.
Mining:	Not within Development High Risk Area.
Unexploded Bomb Risk:	Moderate Risk.

Ground Investigation Work Undertaken

Date of Investigation:	15 th and 16 th November 2018.
Intrusive Investigation Work Undertaken:	2no. Cable Percussive Boreholes (CP101 and CP102).
Soil Sampling:	5no. Samples tested for metals, speciated PAHs, pH, sulphate, asbestos and SOM.
Insitu and Laboratory Geotechnical Testing:	Shear vanes, Standard Penetration Tests, Multi stage triaxials, Atterberg Limits, Particle Size Distribution, BRE SD1 Short Suite.

Ground Conditions and Geotechnical Assessment

General Ground conditions	Anticipated Foundation Type
Maximum investigation depth 10.15mbgl. The ground conditions beneath the site comprised made ground to a maximum depth of 1.1mbgl underlain by alternating bands of sand and clay. Silt was encountered in CP101 at 8.5mbgl. No bedrock was encountered. Groundwater encountered at 1.8mbgl in CP101 and 4.5m in CP102.	A suitably designed earthworks programme to infill the existing basement may be incorporated into the foundation design as a large raft foundation, alternatively a piled foundation, utilising combination friction and end bearing piles, may be considered a suitable foundation solution. Based on BR Digest 2005- DS-1 AC1 is acceptable. This should be confirmed by the structural engineer.

Contamination and Waste Assessment

Laboratory testing has identified elevated B(a)P which poses a risk to future site users in areas of landscaping where they may come into contact with soil. Remediation or further sampling and assessment of these material is recommended.

For waste disposal, soils on site tested to date, have been classified as **NON-HAZARDOUS**.

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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned by King David High School to carry out Geo-Environmental Investigation for land at King David High School, Crumpsall. The investigation was undertaken in support of the demolition of the current building and construction of a replacement school building.

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

1.2 Site Details

A summary of the site details is presented in Table 1-1. Figures 1 and 2 indicate the site location and boundary. Figure 3 indicates the proposed development.

Location	Site forms part of the King David High School campus, southwest of Eaton Road in the Crumpsall area of Manchester. National Grid Reference 383650E 402208N.
Area	Approx. 100m ² .
Topography	Approx. 84 metres above ordnance datum (AOD).
Land Use	<u>Site</u> A school building with areas of soft landscaping. <u>Surrounding Area</u> North: landscaped area and pedestrian access as part of school grounds. East: playground (part of school grounds). South: Residential apartments. West: Access road.
Proposed Development	Replacement school building.

Table 1-1: Summary of site details.

2 Site Setting

2.1 Site History

A review of public domain historical mapping indicates that the site was undeveloped land from 1848 mapping with a possible smithy present adjacent to the southeast. The current site building was constructed by the 1890 mapping. The smithy was no longer present by this map edition.

A pond was located approximately 50m NE between the 1848 and 1890 mapping. A large electricity substation was present approximately 15m west from the 1909.

Allotment gardens were present on the northern site boundary on the 1922 mapping. A telephone exchange was present approximately 20m northwest by the 1952 mapping.

The site was annotated as a nursery school by the 1952 / 1957 mapping and became part of the high school grounds by the 1978 mapping.

2.2 Environmental Setting

The environmental setting is summarised in Table 2-1.

Categories ^(data sources)			Details
Geology	Superficial ¹		- Glaciofluvial Sheet Deposits (sand and gravel).
	Bedrock ¹		- Manchester Marls Formation (mudstone).
Hydro-geology ¹	Aquifer Designation	- Superficial	- Secondary A Aquifer.
		- Bedrock	- Secondary B Aquifer.
Hydrology ²	Nearest Surface Water		- None within 250m.
	Flooding		- No risk from rivers or sea.
Minerals & Mining	Coal Report ³		- Within coal reporting area.
	Coal Mining Development High Risk Area (DHRA) ⁴		- Not within DHRA.
	Cheshire Brine Compensation District ⁴		- N/A.
Landfill Sites ²	Known / Registered		- None within 250m.
	Potential		- Pond 50m NE potentially infilled by 1890 mapping.
Radon ⁵			- Probability of 1%-3% of homes above Action Level. No further action required.
Unexploded Bomb Risk (UXO) ⁶			- Moderate.

Table 2-1: Summary of the environmental setting.

Data Sources:

1 - BGS GeoIndex (<http://mapapps2.bgs.ac.uk/geoindex/home.html>) (Appendix A);

2 - Defra Magic Map (<https://magic.defra.gov.uk/magicmap.aspx>);

3 - Coal Authority Interactive Mapping (<http://mapapps2.bgs.ac.uk/coalauthority/home.html>);

4 -Cheshire Brine Subsidence Compensation Board Compensation District & Consultation Areas <http://www.cheshirebrine.com/wp-content/uploads/2016/11/NL08134-001-002.pdf>

5 - UKRadon Public Health England (<https://www.ukradon.org/information/ukmaps>);

6 - Zetica UXO Unexploded Bomb Risk Map (Appendix A).

3 Ground Investigation

3.1 Site Investigation Design and Methodology

In order to assess the ground conditions at the site and characterise the soil an intrusive investigation was undertaken.

The investigation was carried out on 15th and 16th November 2018 and comprised the following:

- 2no. Cable Percussive boreholes drilled to 10.10 and 10.15 metres below ground level (mbgl) (ref. CP101 to CP102).

All site investigation locations are shown in Figure 4. The boreholes were positioned in accessible areas given that the site building was present on site and in use.

All profile logs are provided in Appendix B and are in line with BS14688-1¹ and BS5930².

3.2 Sampling Protocol

3.2.1 Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation³.

Soil samples of approximately 500g were recovered in amber jars, amber vials for volatile analysis and plastic tubs. All the samples were labelled and stored in cool boxes prior to being collected by courier at the end of the day for delivery to the Chemtest laboratory in Newmarket for chemical testing. If collection was not possible the same day then samples were stored in the sample storage fridge at the LK Group offices below 4°C. Samples were tracked using appropriate Chain of Custody forms provided by Chemtest.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix D. Table 3-1 shows the soil testing undertaken.

Suites and Contaminants	No. Samples	Location & Depth	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	4	CP101 0.0-0.7m CP101 0.7-1.0m CP102 0.0-1.0m CP102 1.2-2.0m	A basic suite with a broad selection of contaminants tested on samples across the site where no significant evidence of contamination was identified.
pH, sulphate, nitrate, magnesium, chloride.	3	CP101 1.5-2.1m CP102 3.7-4.0m CP102 8.1-8.4m	To aid concrete classification.

Table 3-1: Summary of soil sample testing undertaken.

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; PAH=polycyclic aromatic hydrocarbons; SOM=Soil Organic Matter.

¹ British Standards (2002). "Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description." BS EN ISO 14688-1:2002.

² British Standard (2015). "Code of Practice for Ground Investigations." BS5930:2015.

³ EA (2000). "Technical Aspects of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.

3.3 Geotechnical Testing

3.3.1 *In-situ Onsite 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 boreholes at approximately 1m intervals, within the natural strata.
- » Shear Vane (SV) tests were performed in the boreholes (to a maximum depth of 1.75mbgl) within the natural clay strata.

SPT and SV results are provided within the profile logs in Appendix B.

3.3.2 *Laboratory Geotechnical Testing*

Soil samples taken during the investigation were collected in tubs, bulk bags and sealed tubes and sent to Murray Rix for geotechnical testing.

Many of the tests are UKAS accredited and further details are given in the laboratory report presented in Appendix D. Table 3-2 shows the geotechnical testing undertaken.

Suites and Contaminants	No. Samples	Location	Justification
BRE SD1 Short Suite	2	CP101 0.0-0.7m CP101 1.5-2.1m	To aid in concrete classification. pH and water-soluble sulphate are also included in contamination testing.
Multi Stage Triaxial	2	CP102 2.2-2.65m CP102 8.4-8.85m	To aid in foundation design.
Atterberg Limits (plasticity testing)	1	CP101 2.2-2.5m	Clay sample to assess the shrinkability potential associated with current trees.
Particle Size Distribution (PSD)	1	CP102 3.7-4.0m	To confirm the material type.

Table 3-2: Summary of geotechnical testing undertaken.

4 Ground Conditions

4.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground to a maximum depth of 1.1mbgl underlain by alternating bands of sand and clay. Silt was encountered in CP101 at 8.5mbgl. A summary section of the logs is provided in Plate 4-1, with additional comments below.

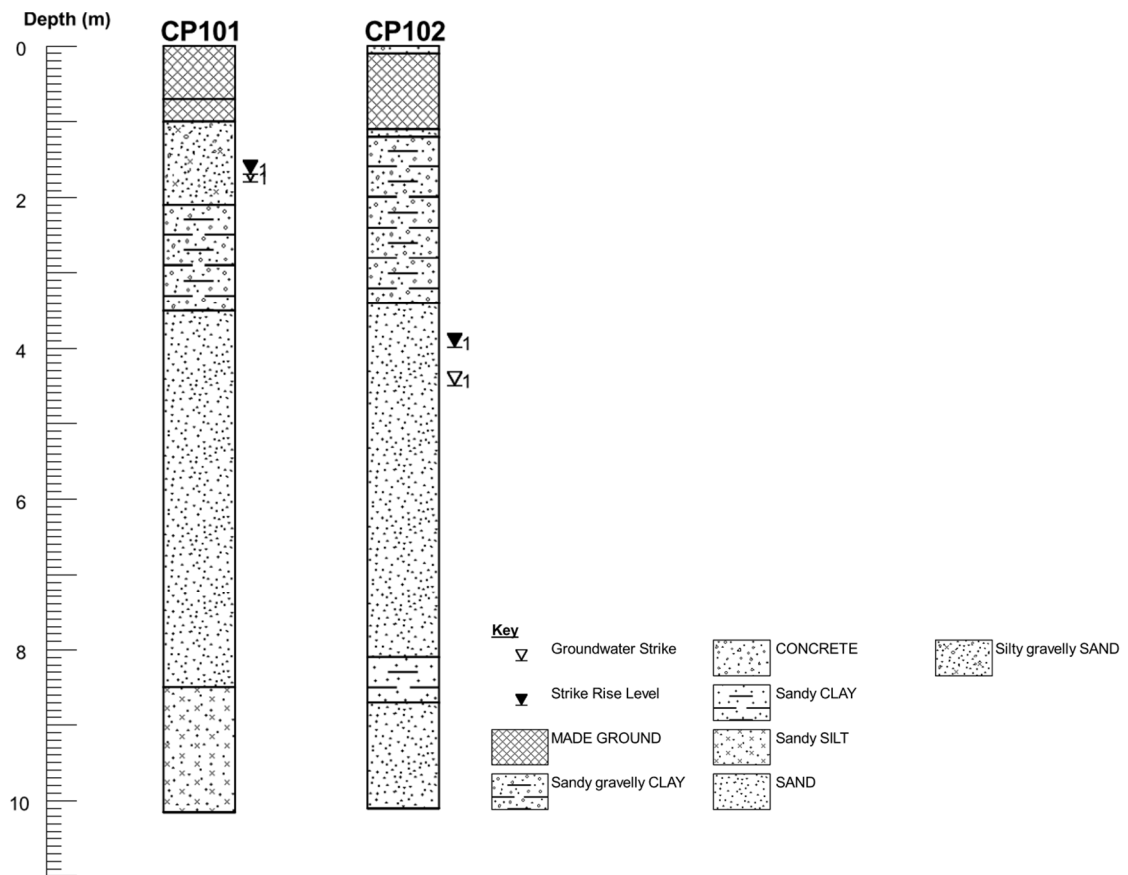


Plate 4-1: Summary of ground conditions.

4.2 Groundwater

Groundwater strikes were recorded in both boreholes during the drilling works. In CP101 groundwater was encountered at 1.8m in CP101 (rising to 1.7 within 5 minutes) and in CP102 at 4.5m (rising to 4.0m in 20 minutes).

4.3 In-Situ Geotechnical Testing

4.3.1 Shear Vanes

Hand shear vane readings, recording undrained shear strength (USS), were taken within the clay strata. The results are summarised in Table 4-1 and provided within the profile logs in Appendix B.

Approximate Depth (mbgl)	Average Undrained Shear Strength (kPa)	
	CP101	CP102
2.0-2.1	42	68
3.0	-	70
GW Level	1.7m	4.5m

Table 4-1: Summary of average hand shear vane readings.

Notes:

Groundwater level based on strikes during investigation.

Shear vane readings can be influenced by coarse material including coarse silt.

4.3.2 Standard Penetration Tests

In-situ standard penetration tests (SPTs) were undertaken, in the natural ground. The results are summarised in Table 4-2 and provided within the profile logs in Appendix B.

Approximate Depth (mbgl)	SPT 'N' Values	
	CP101	CP102
1.2	30 (S)	17 (C)
2.1	11 (C)	-
3.1 – 3.4	13 (C)	18 (S)
4.2 - 4.3	13 (S)	12 (S)
5.4	13 (S)	16 (S)
6.8 - 7.0	14 (S)	50 for 250mm
8.5 – 9.2	32 (ST)	24 (S)
9.65 - 9.7	36 (ST)	32 (S)
GW Level	1.7m	4.5m

Table 4-2: Summary of SPT (N) values.

Notes:

S=Sand; C=Clay; St=Silt.

Groundwater level based on strikes during investigation.

4.4 Geotechnical Laboratory Testing

4.4.1 Multi Stage Triaxial Test

Multi stage triaxial testing has been undertaken on two samples of the natural clay strata. The results are presented in Appendix D and summarised in Table 4-3.

Location	Depth (mbgl)	Material Description	Undrained Shear strength (kPa)
CP102	2.2-2.65	Stiff brown silty sandy CLAY with rare gravel	93, 95, 98
CP102	8.4-8.85	Soft brown silty sandy CLAY with rare gravel	12, 15, 17

Table 4-3: Summary of multi stage triaxial results.

4.4.2 Particle Size Distribution

Particle size distribution (PSDs) tests were carried out on granular strata to confirm the material type. Full results are presented in Appendix D and summarised below in Table 4-4.

Location	Depth (mbgl)	Material	Percent passing through sieve		
			63mm	2mm	0.063mm
CP102	3.7-4.0m	Brown silty fine to medium sand	100%	100%	7%

Table 4-4: Summary of particle size distribution results.

Notes:

% passing: 63mm = cobble / gravel boundary; 2mm = gravel / sand boundary; 0.063mm = sand / silt boundary

4.4.3 Atterberg Limits

Representative samples of natural clay were subjected to Atterberg Limits (plasticity) and Moisture Content testing. Results are presented in Appendix D and summarised in Table 4-5.

Table 4-5 also includes 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%).

Location	Depth (mbgl)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)	Modified Plasticity Index (%)
CP101	2.2-2.5	18	34	13	21	CL	88	18.48

Table 4-5: Summary of plasticity index testing.

The modified plasticity characterises the clay as having a low volume change potential.

4.4.4 Sulphate and pH

Water soluble sulphate and pH tests were carried out on soil samples. Full results are presented in Appendix C and summarised in Table 4-6.

Strata	pH	Sulphate (g/l)	Magnesium (g/l)	Chloride (g/l)	Nitrate (g/l)
Made Ground	7.6 - 8.2	<0.010	<0.010	<0.010	<0.010
Natural	7.3 - 8.4	<0.010 – 0.025	<0.010	0.013	<0.010

Table 4-6: Summary of sulphate testing results.

5 Geotechnical Assessment

5.1 Proposed Development

It is understood that the proposed development is to comprise the demolition of the existing structure and replacing with a school building. At the time of compiling this report a detailed development plan showing the size of the structure, the number of storeys or proposed loadings of the structure has not been provided to LKC.

Given the nature of the proposed development it is considered that the structure meets the criteria of Geotechnical Category 2 of Euro Code 7.

5.2 Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1 and essentially comprise Made Ground consisting of variably clayey gravelly sand containing brick, tarmac and concrete to depths of 1.00m (CP101) and 1.10mbgl (CP102). Underlying natural deposits typically comprise granular deposits of medium dense SANDs. A horizon of firm slightly gravelly sandy CLAY is encountered within CP101 between 2.10m and 3.50mbgl and within CP102 between 1.20m and 3.40mbgl. Within CP101 a very stiff sandy SILT is encountered from 8.50m to the completion depth of the borehole of 10.15mbgl. Within CP102 a 0.60m thick lens of CLAY is encountered between 8.10m and 8.70mbgl and is underlain by medium dense to dense SAND to the completion depth of 10.10mbgl.

5.3 Site Preparation

It is understood that the existing structure includes a basement area which will not be retained by the proposed structure. Post demolition of the existing structure, 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. This should include:

- The existing building contains a basement, post demolition this will require infilling with suitably compacted engineered fill.
- 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 foot print with the resulting void backfilled.

5.4 Foundation Conditions and Bearing Capacity

5.4.1 General

The existing structure includes a basement structure. For the purpose of assessment, it is assumed that the basement is at c. 3m below ground level and will be suitably infilled with an engineered fill to an end product specification.

The undrained shear strength (C_u) of the cohesive material beneath the basement depth has been obtained from *in-situ* testing comprising SPTs and hand shear vanes along with *ex-situ* laboratory triaxial testing. Combining this information gives an average C_u value of 62kPa.

The cohesive strata extends to 3.40m to 3.50mbgl with the bulb of pressure exerted by the proposed structure extending into the granular material beneath. Underlying the CLAY is medium dense granular SAND, with SPT values ranging between N12 and N50 for 250mm, discarding the one high result of N50, the average N value of the SAND is N14.3, relating to an angle of internal friction (ϕ) of 31.4°.

A conservative Allowable Bearing Capacity (ABC) of 127kN/m² for the cohesive CLAY at 3.0mbgl can be anticipated. Beneath the CLAY, the medium dense SAND will offer an ABC of c. 143kN/m², however, consideration will need to be given to the potential presence of groundwater which can reduce the ABC by as much as 50%.

5.4.2 Groundwater

Groundwater was encountered within the SANDs at a depth of 1.80m, rising to 1.70mbgl within CP101 and at 4.50m, rising to 4.00mbgl within CP102. It is considered that the water strike in CP101 is likely perched water sitting on top of the CLAY horizon. Consideration must be given to dewatering any excavations to allow an engineered infill of the basement structure prior to construction of the proposed structure. Continuous sheet piling going into the CLAY strata encountered at depths of between 1.10-3.50mbgl may provide suitable cut off allowing sump pumping to remove any groundwater.

5.4.3 Foundations

A suitably designed earthworks programme to infill the basement may be incorporated into the foundation design as a large raft foundation, alternatively a piled foundation, utilising combination friction and end bearing piles, may be considered a suitable foundation solution.

Foundation design should be undertaken by suitably experienced structural or foundation engineers. 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 for their piling system.

5.5 Ground Floor Slabs

It is considered that the infilled basement structure will provide a suitably compacted platform to support a ground bearing floor slab.

The Atterberg Limits determinations, undertaken in the CLAY at a depth of 2.2-2.5mbgl returned a low plasticity with a modified Plasticity Index of 18.5%, indicating a low volume change potential. It is not considered likely that the structure will be subject to heave or swell due to changes in the moisture content from trees or seasonal effects.

5.6 Drainage

The application of a Sustainable Urban Drainage System (SuDS) may not be feasible due to the presence of CLAY of perceived low permeability at shallow depths which may inhibit the application of soakaways. Should soakaway drainage be considered for this development it is recommended that further assessment of the potential for soakaway drainage should be undertaken in accordance with BRE 365.

5.7 Concrete Durability

Based upon the results of the chemical analyses summarised in Section 4.4.4, it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification

(ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.8 Excavations

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

Groundwater was recorded within both exploratory holes. It is considered that excavations will be supported or battered back in accordance with guidance contained in CIRIA RR97.

5.9 Further Works

The following further works are considered required to allow the development to progress:

- The site is located within an area at moderate risk of unexploded ordnance being present therefore a UXO risk assessment should be undertaken prior to construction.
- BRE 365 Soakaways to assess the potential suitability for the application of SuDS.

5.10 Construction Activity and Inspection

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

- 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 utilised;
- It is considered that 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).

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 (CLR11⁴).

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).
- LQM Suitable 4 Use Levels (S4ULs).
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs).

C4SLs were published in 2013^{5,6}. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))⁷ used to generate Soil Guideline Values (SGVs) to 'low' (referred to as Lowest Level of Toxicological Concern (LLTCs)). The policy companion document and supporting letter by Defra, dated 3rd September 2014, states that C4SLs *'could be used under the planning regime, as well as within Part 2A'*. Based on these comments LKC considers the justifications and assumptions used to generate 'low' risk are suitable for the planning regime.

Where no C4SLs have been generated LKC will use the LQM S4ULs⁸. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on 'minimal risk' as per previous guidelines and assumptions^{9,10,11,12}.

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs¹³. These follow the 'minimal' risk principle and more stringent exposure parameters and will be conservative.

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

⁴ EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.

⁵ Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."

⁶ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

⁷ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

⁸ LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."

⁹ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

¹⁰ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

¹¹ EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.

¹² EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

¹³ CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

PAHs^{14,15} and naphthalene the most volatile and soluble¹⁶. The new 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 negligible¹⁷. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)¹⁸ and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

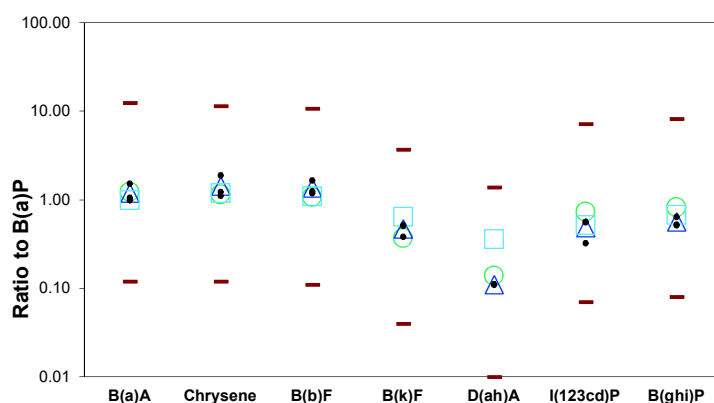
The proposed development is for a school building therefore the assessment criteria for residential without plant uptake has been used as a conservative initial screen.

All criteria have been generated using the CLEA V1.06 model¹⁹ based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM. Assessment Criteria are displayed in Appendix E.

B(a)P as Surrogate Marker

Based on the above assumption for PAHs, LKC undertook an assessment of the 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.*²⁰, 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 3 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)P = Benzo(ghi)perylene.

● = Ratio to B(a)P for all data. ○ = Mean ratio to B(a)P for Culp data. △ = Mean ratio to B(a)P from all data at the site. □ = Mean ratio to B(a)P for UK data presented by HPA. — = Upper and Lower limits (order of magnitude from Culp data).

¹⁴ EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

¹⁵ USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

¹⁶ EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5- 079/TR1.

¹⁷ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

¹⁸ HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

¹⁹ EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.

²⁰ Culp, S; Gaylor, D; Sheldon, W; Goldstein, L and Beland, F (1998). "A Comparison of Tumours Induced by Coal Tar and Benzo-a-pyrene in a 2-Year Bioassay." Carcinogenesis. Vol 19, no. 1, pp. 117-124.

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. Elevated and pertinent results are presented in Table 6-1.

Contaminant	Units	No. of samples	Elevated Results	Sample Location	Criteria	Source of Criteria
PAHs						
Benzo(a)pyrene	mg/kg	4	16	CP101 (0.0-0.7m)	5.3	C4SL
			6.6	CP102 (0.0-1.0m)		
GENERAL						
pH	pH	4	Range 7.3 to 8.2			
SOM	%	4	Range 2.8 to 7.9			
Asbestos	N/A	4	None detected.			

Table 6-1: Summary of elevated and pertinent analytical results.

Notes:

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.

6.2.3 Direct Contact Risk

Elevated B(a)P has been identified in the samples of the made ground.

The source of the contamination is likely to be clinker mortar associated with the brick rubble identified in the made ground.

At the concentrations identified, the contaminants are considered to pose a potential risk to future site users in any soft landscaping areas. The principal pathways are the ingestion pathways (soil and dust) and dermal contact. Remediation or further testing and assessment of proposed landscaping areas is recommended.

7 Waste Disposal Assessment

The soil contamination results as presented in Appendix C have been used to help determine the disposal route should any material be earmarked 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 of contaminant soils and classifies the soils as either hazardous or non-hazardous waste.

It is understood that '**HazWasteOnline**' has been designed to cover the European Waste Catalogue code number 17 05 03 "soil and stones containing dangerous substances" and follows current guidance^{21,22,23,24,25}.

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

The output sheet is presented in Appendix F.

Soils from the site, tested to date, have been classified as **NON-HAZARDOUS** waste.

LKC recommend that this information is given to the landfill operator to enable them to designate a suitable treatment or disposal route for the waste. Further testing such as Waste Acceptance Criteria testing may be requested prior to disposal.

²¹ EA (2013). "Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Waste." Technical Guidance WM3. 1st Edition 2015.

²² The Hazardous Waste Directive, (HWD, Council Directive 91/689/EC).

²³ European Waste Catalogue, 2002 (EWC 2002, Commission Decision 2000/532/EC) as amended by Commission Decision 2001/118/EC, 2001/119/EC and Council Decision 2001/573/E.

²⁴ List of Wastes (England) Regulations 2005.

²⁵ Approved Supply List (Eighth Edition), 2002. ISBN: 0 7176 2368 8.

8 Summary and Conclusions

Ground investigation work has been undertaken to identify the ground conditions below the site to allow a geotechnical and contamination assessment of the site to be undertaken.

Two cable percussive boreholes were drilled, from which samples were collected and in-situ geotechnical tests were undertaken.

The ground conditions beneath the site comprised made ground to a maximum depth of 1.1mbgl underlain by alternating bands of sand and clay. Silt was encountered in CP101 at 8.5mbgl.

Groundwater strikes were recorded at depths of 1.80m and 4.50mbgl with the granular deposits.

Piled foundations are considered the most feasible foundation solution for the development, alternatively the infilling of the current basement structure could be designed to form part of a raft foundation.

When contrasted to guidance given in BRE Digest 2005, the test results classify the concrete requirements as DS-1 AC-1. This should be confirmed by the structural engineer.

It would be prudent to undertake a detailed UXO risk assessment will be required prior to undertaking earthworks at the site.

Further advice on foundation design should be sought from the appointed structural engineer.

Laboratory testing has identified elevated B(a)P which poses a risk to future site users in areas of landscaping where they may come into contact with soil. Remediation or further sampling and assessment of these areas is recommended.

For waste disposal, soils on site tested to date, have been classified as **NON-HAZARDOUS**.

Figures

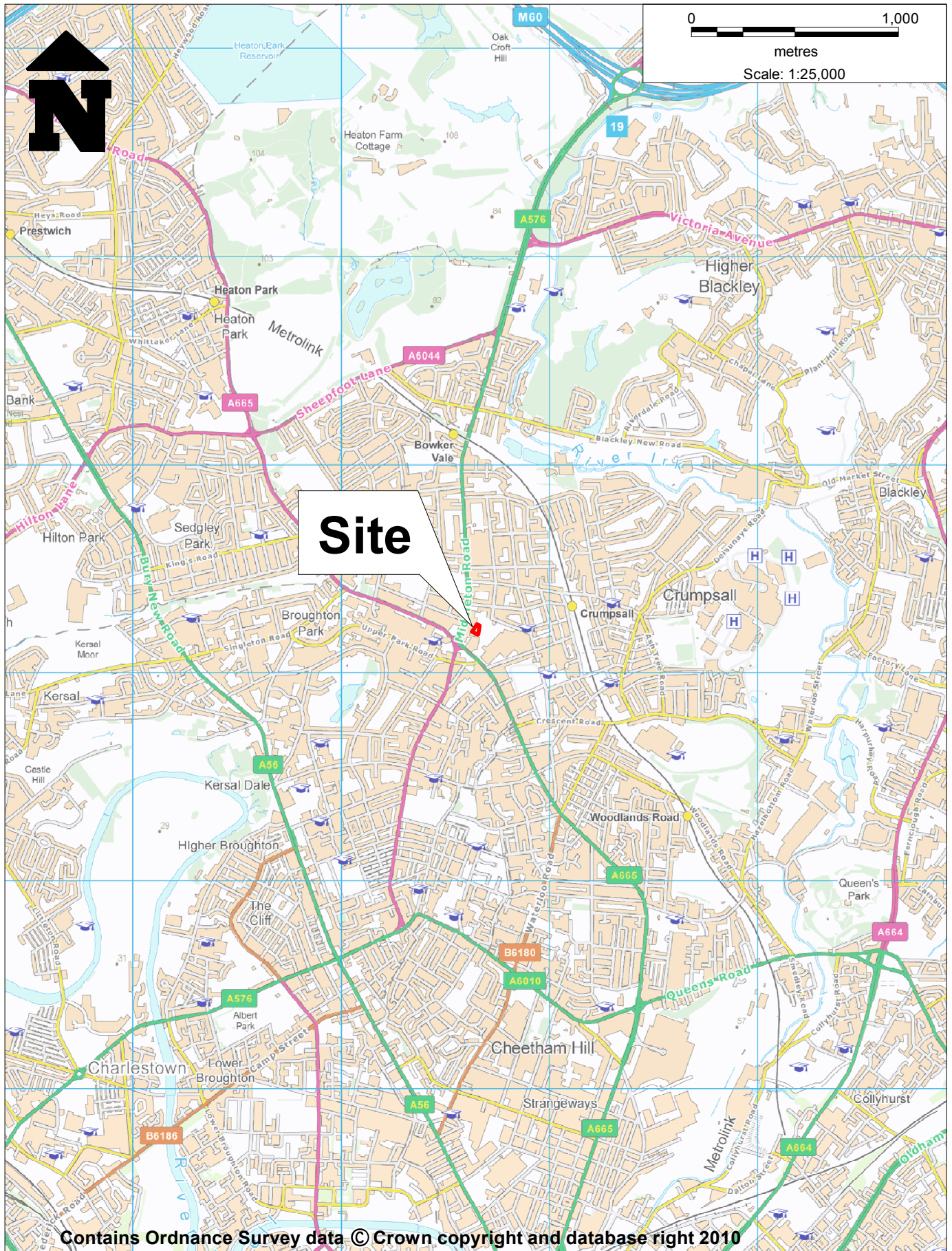
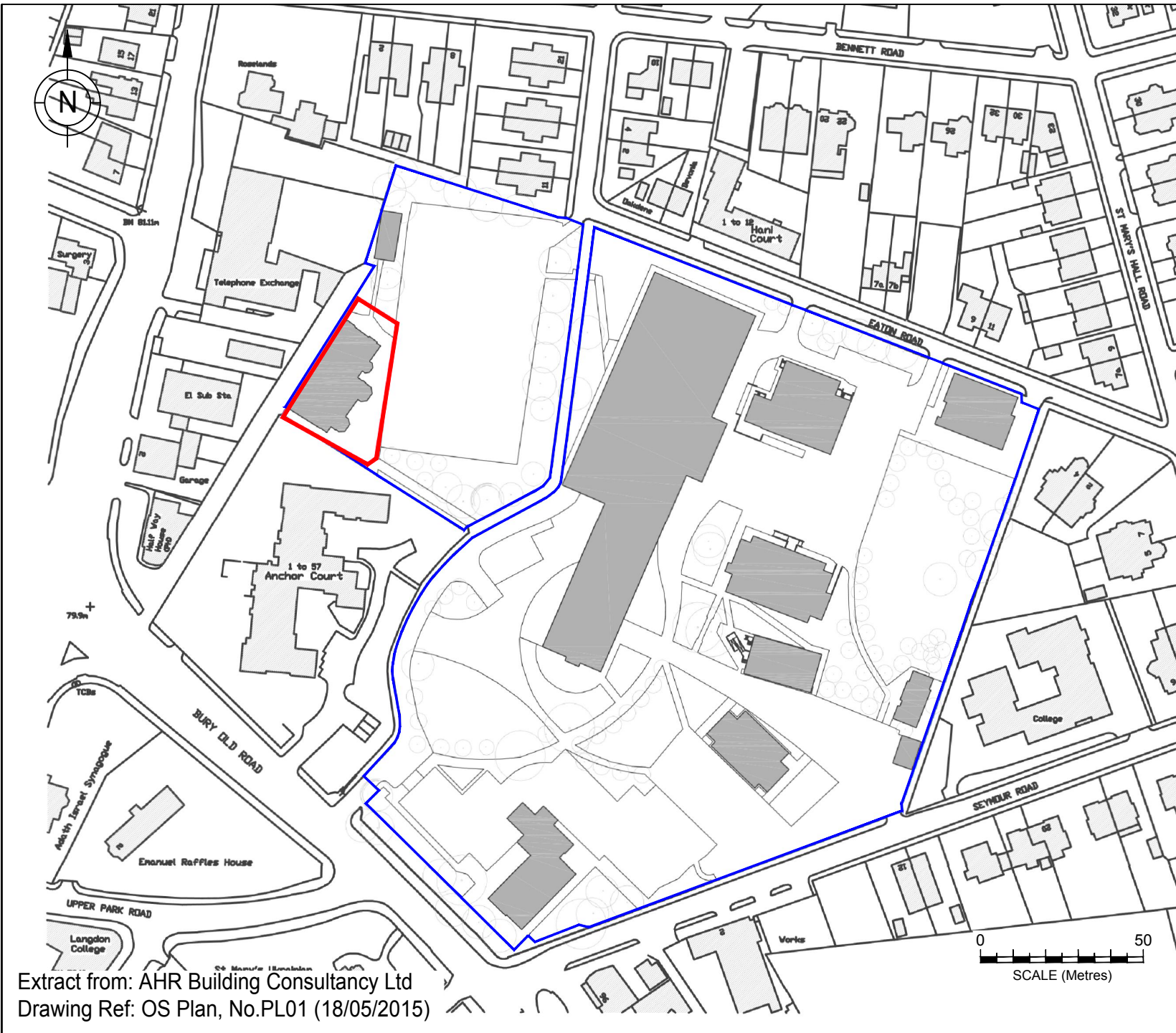


Figure 1: Site Location Plan, King David High School, Crumpsall

Drawn: November 2018 Scale: 1:25,000 @ A4 (see scale bar)



KEY

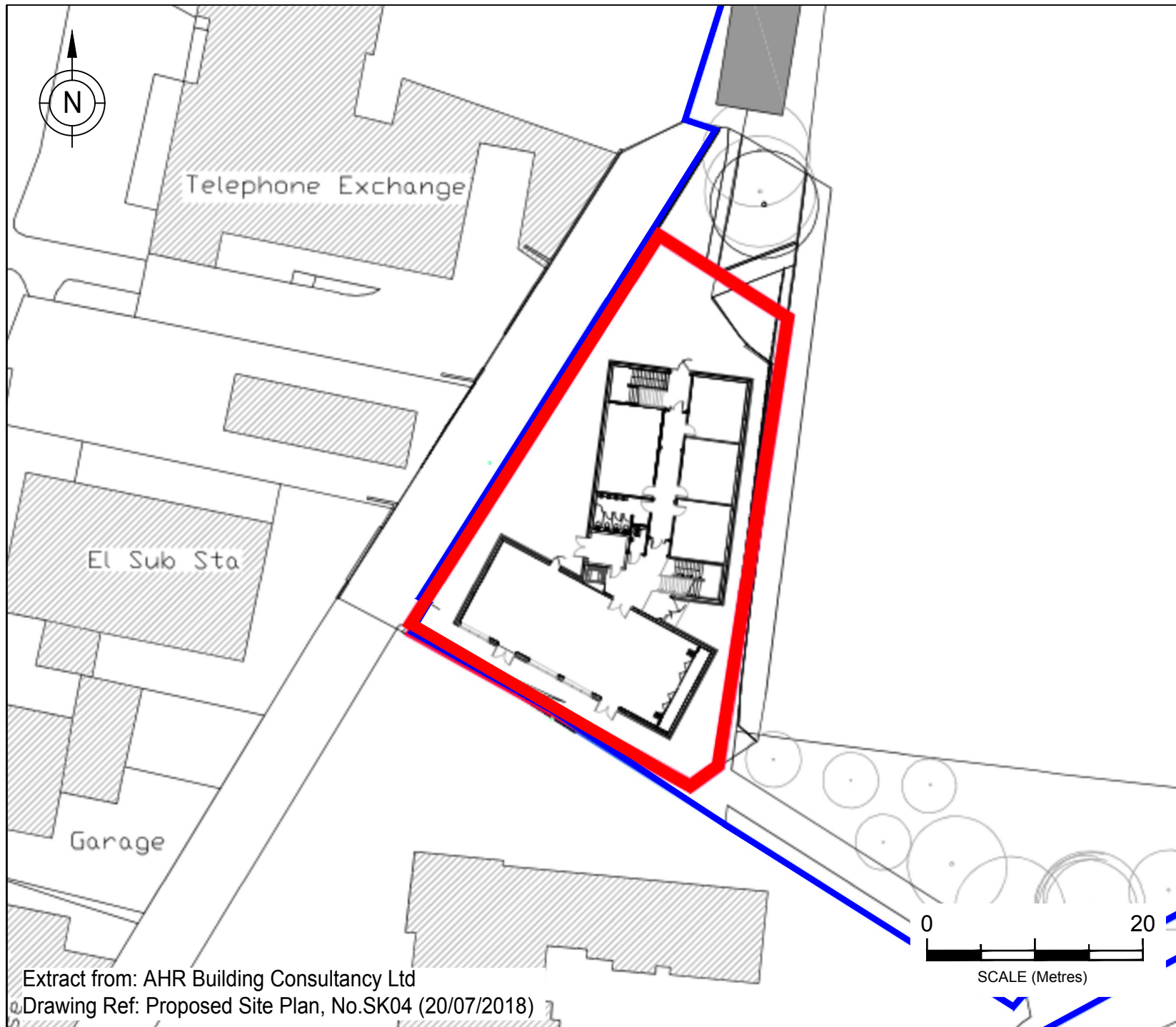
- Site Boundary
- School Boundary

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.



Client:				King David High School	
Site:				King David High School, Crumpsall	
Title:				Site Boundary Plan	
Job No.:	LKC 18 1349	Scale (See Scale Bar):	See Scale Bar	Figure:	Revision:
Drawn By:	AC	Checked By:	HM	Nov 2018	2

Extract from: AHR Building Consultancy Ltd
Drawing Ref: OS Plan, No.PL01 (18/05/2015)



KEY



Site Boundary



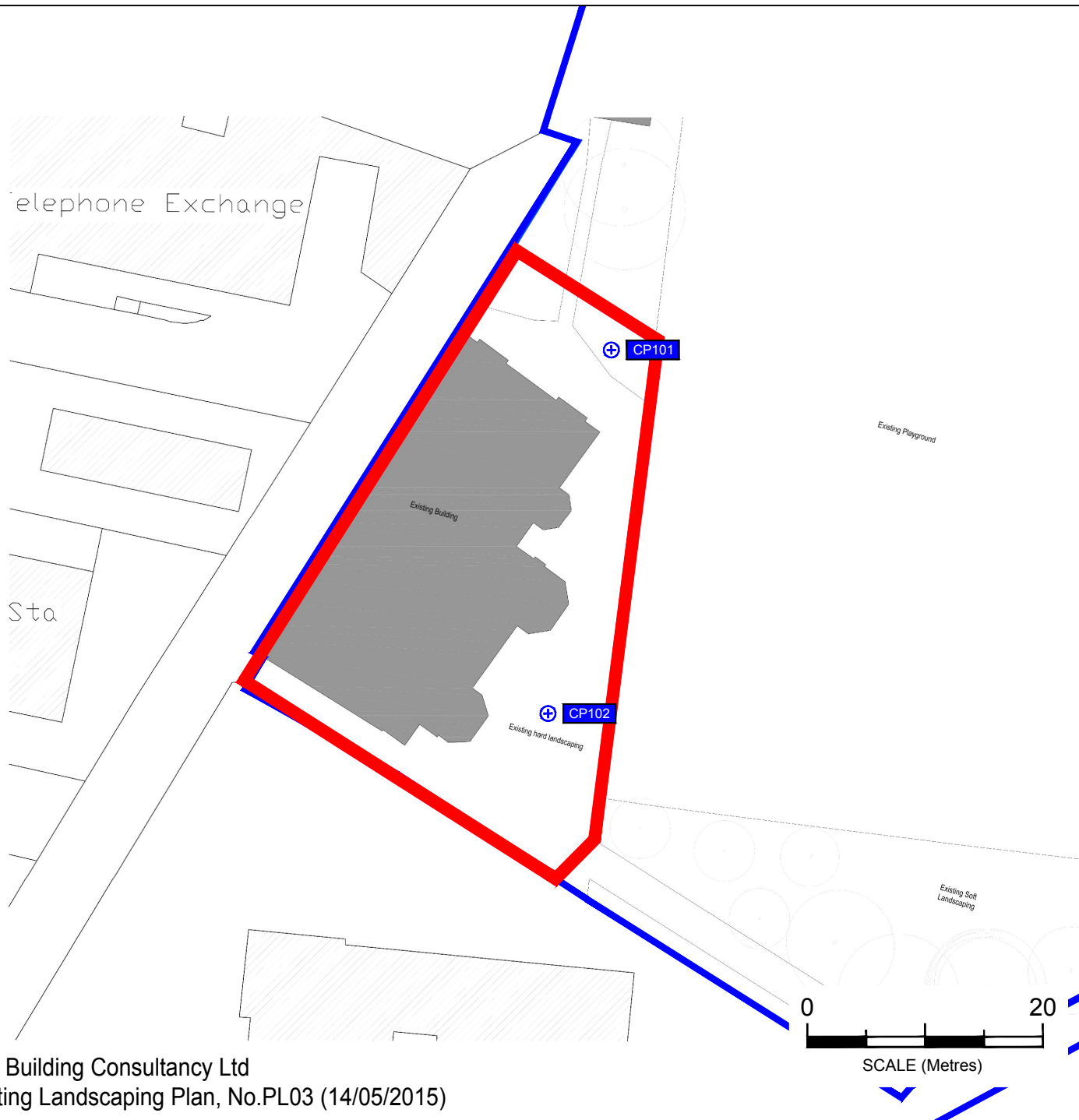
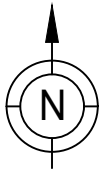
School Boundary

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.



Client:				King David High School			
Site:				King David High School, Crumpsall			
Title:				Proposed Site Use			
Job No.:	LKC 18 1349	Scale (See Scale Bar):	1:500 @ A4	Figure:	3		
Drawn By:	AC	Checked By:	MT	Drawn:			
			Dec 2018				

Extract from: AHR Building Consultancy Ltd
Drawing Ref: Proposed Site Plan, No.SK04 (20/07/2018)



KEY



Site Boundary



School Boundary



Cable Percussive
Borehole (CP)

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.



Client:				King David High School			
Site:				King David High School, Crumpsall			
Title:				Sampling Location Plan			
Job No.:	LKC 18 1349	Scale (See Scale Bar):	1:500 @ A4	Figure:	4		
Drawn By:	AC	Checked By:	MT	Drawn:			
				Dec 2018			

Extract from: AHR Building Consultancy Ltd
Drawing Ref: Existing Landscaping Plan, No.PL03 (14/05/2015)

Appendix A

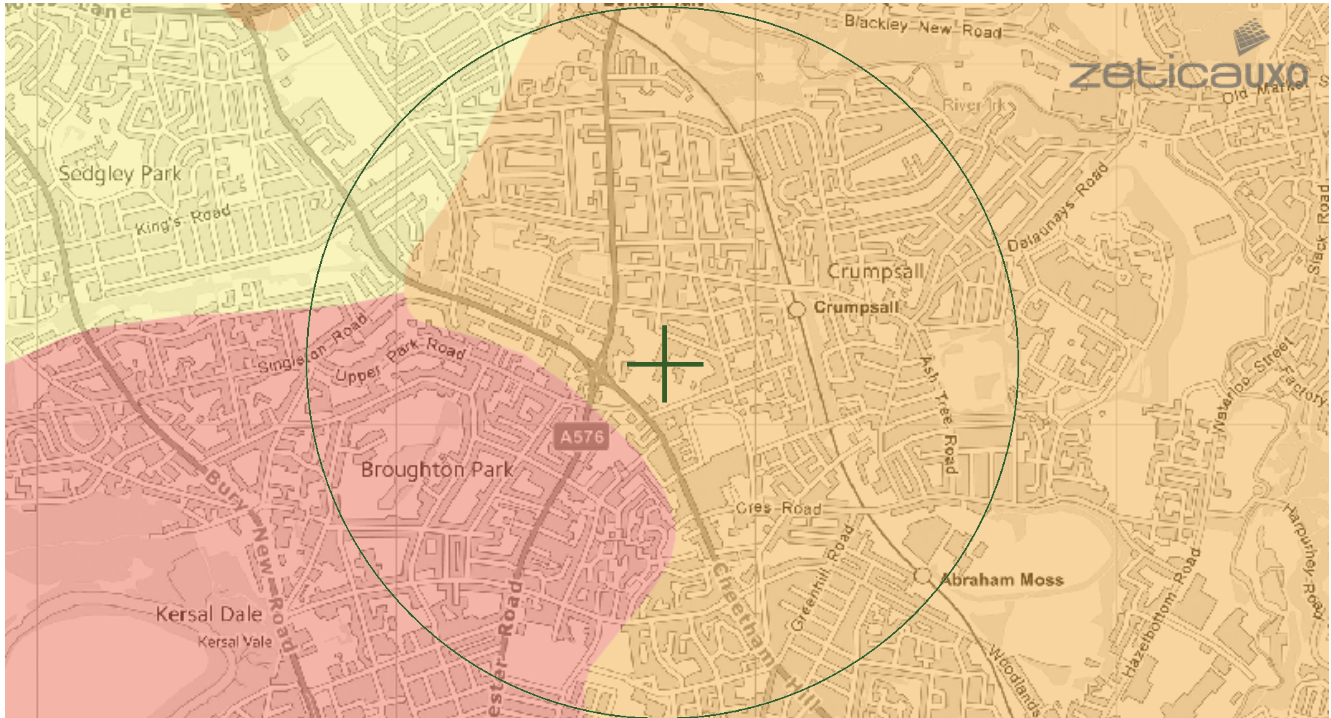
Zetica UXO Map

UNEXPLODED BOMB RISK MAP



SITE LOCATION

Map Centre: 383752,402172



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- other

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: +44 (0) 1993 886682

email: uxo@zetica.com

web: www.zeticauxo.com

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: (<https://zeticauxo.com/downloads-and-resources/risk-maps/>)

Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgment. The copyright remains with Zetica Ltd.

It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

Appendix B

Profile Logs

Boring Method

Cable Percussion

Casing Diameter
Ground Level (mOD)

85.00

Client

King David High School

**Job
Number**
LKC 18 1349

Location

383661 E 402226 N

Dates

15/11/2018-
16/11/2018

Project Contractor

D&I

Sheet

1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.70	D1 PID=<0.1ppm					(0.70)	MADE GROUND: Grass over dark brown slightly gravelly clayey SAND with occasional glass, rare brick fragments and concrete. Sand is fine to medium. Gravel is fine to medium and subangular to subrounded comprising sandstone and mudstone.		
0.70-1.00	D2 PID=<0.1ppm				84.30	0.70 (0.30)	MADE GROUND: Light brown silty SAND with rare brick fragments. Sand is fine to medium.		
1.00-2.10	D3 PID=<0.1ppm				84.00	1.00	Medium dense brown gravelly silty SAND with rare rootlets. Sand is fine to medium. Gravel is fine to medium and subangular comprising mudstone. Very wet strata from 1.00-2.10mbgl.		
1.20-1.65	SPT N=30			4,6/7,7,8,8					
1.50-1.80	B4					(1.10)			
2.10	SV 42kPa			Fast(1) at 1.80m, rose to 1.70m in 5 mins.	82.90	2.10	Firm consistency medium strength greyish brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium and subrounded to subangular comprising mudstone. Becoming very gravelly with depth.		
2.10-2.55	SPT N=11			2,2/3,2,3,3		(1.40)			
2.20-2.50	B6								
3.10-3.55	SPT N=13			1,2/3,4,3,3		3.50	Medium dense brown fine to medium SAND.		
3.70	D8				81.50				
4.20-4.65	SPT N=13			3,4/4,3,3,3					
5.40-5.85	SPT N=13			1,1/1,3,4,5		(5.00)			
5.50-5.80	B11								
7.00-7.45	SPT N=14			3,3/3,4,3,4			Bands of clay from 7.00-8.50mbgl.		
7.50	D13								

Remarks

Water at 1.80mbgl.
Location accurate to 3.0-5.0m.
Elevation estimated using www.freemaptools.com/elevation-finder.htm.

**Scale
(approx)**

1:40

**Logged
By**

HM

Figure No.

LKC 18 1349.CP101

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

King David High School, Crumpsall

**Borehole
Number****CP101****Boring Method**

Cable Percussion

Casing Diameter**Ground Level (mOD)**

85.00

Client

King David High School

**Job
Number**

LKC 18 1349

Location

383661 E 402226 N

Dates15/11/2018-
16/11/2018**Project Contractor**

D&I

Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
8.50-8.95	SPT N=32			5,7/7,8,8,9	76.50	8.50	Brown sandy SILT. Sand is fine to medium.		
9.00-9.30	B15					(1.65)	Very wet strata from 9.00-10.15mbgl.		
9.70-10.15	SPT N=36			7,8/9,9,9,9	74.85	10.15	Complete at 10.15m		

RemarksWater at 1.80mbgl.
Location accurate to 3.0-5.0m.
Elevation estimated using www.freemaptools.com/elevation-finder.htm.**Scale
(approx)**

1:40

**Logged
By**

HM

Figure No.

LKC 18 1349.CP101

Boring Method

Cable Percussion

Casing Diameter
Ground Level (mOD)

85.00

Client

King David High School

**Job
Number**

LKC 18 1349

Location

383655 E 402188 N

Dates

15/11/2018-
16/11/2018

Project Contractor

D&I

Sheet

1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1 PID=0.1ppm				84.90	(0.10)	MADE GROUND: Tarmacadam.		
						(1.00)	MADE GROUND: Dark brown gravelly clayey SAND with occasional tarmac fragments, rare brick fragments. Sand is fine to medium. Gravel is fine to medium and subangular to subrounded comprising sandstone and mudstone.		
1.20-1.65	SPT N=17			1,1/3,4,5,5	83.90	(0.10)	Light brown fine to medium SAND		
1.20-2.00	D2 PID=<0.1ppm				83.80	(0.20)	Firm consistency medium strength light brown grey mottled slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium and subangular to subrounded comprising mudstone.		
1.70-2.00	B4								
2.00	SV 68kPa								
2.20-2.65	U5					(2.20)			
2.70	D6								
3.00	SV 70kPa								
3.40-3.85	SPT N=18			3,3/4,4,5,5	81.60	3.40	Medium dense to dense brown fine to medium SAND with rare coal fragments.		
3.70-4.00	B8								
4.30-4.75	SPT N=12			2,2/3,3,3,3					
4.60	D10			Fast(1) at 4.50m, rose to 4.00m in 20 mins.					
5.40-5.85	SPT N=16			3,3/3,4,4,5					
5.80-6.10	B12					(4.70)			
6.80-7.20	SPT 50/250			10,10/12,14,12,12					

Remarks

Water at 4.50mbgl.
Location accurate to 3.0-5.0m.
Elevation estimated using www.freemaptools.com/elevation-finder.htm.

**Scale
(approx)**

1:40

**Logged
By**

HM

Figure No.

LKC 18 1349.CP102

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

King David High School, Crumpsall

**Borehole
Number****CP102****Boring Method**

Cable Percussion

Casing Diameter**Ground Level (mOD)**

85.00

Client

King David High School

**Job
Number**

LKC 18 1349

Location

383655 E 402188 N

Dates15/11/2018-
16/11/2018**Project Contractor**

D&I

Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
8.10-8.40	B14				76.90	8.10	Firm consistency brown sandy CLAY. Sand is fine to medium.		
8.40-8.85	U15					(0.60)			
					76.30	8.70	Medium dense to dense brown fine to medium SAND.		
8.90	D16								
9.20-9.65	SPT N=24			4,5/6,6,6,6		(1.40)			
9.65-10.10	SPT N=32			6,7/8,8,8,8					
					74.90	10.10	Complete at 10.10m		

RemarksWater at 4.50mbgl.
Location accurate to 3.0-5.0m.
Elevation estimated using www.freemaptools.com/elevation-finder.htm.**Scale
(approx)**

1:40

**Logged
By**

HM

Figure No.

LKC 18 1349.CP102

Appendix C

Certificates of Analysis - Soil



Final Report

Report No.: 18-36164-1

Initial Date of Issue: 23-Nov-2018

Client LK Consult

Client Address: Unit 29 Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Contaminated Land
Michelle Thorniley

Project LKC 18 1349 King David's School,
Crumpsall

Quotation No.:

Order No.: 736531

No. of Samples: 5

Turnaround (Wkdays): 5

Date Approved: 23-Nov-2018

Date Received: 19-Nov-2018

Date Instructed: 19-Nov-2018

Results Due: 23-Nov-2018

Approved By:

Details: Martin Dyer, Laboratory Manager

Results - Soil

Client: LK Consult	Chemtest Job No.:				18-36164	18-36164	18-36164	18-36164	18-36164
Quotation No.:	Chemtest Sample ID.:				726885	726886	726887	726888	726889
	Client Sample ID.:				CP101	CP101	CP101	CP102	CP102
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.00	0.70	1.50	0.00	1.20
	Bottom Depth (m):				0.70	1.00	2.10	1.00	2.00
	Date Sampled:				15-Nov-2018	15-Nov-2018	15-Nov-2018	16-Nov-2018	16-Nov-2018
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
ACM Type	U	2192		N/A	-	-		-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	16	13	13	10	16
Soil Colour	N	2040		N/A	Black	Brown	Brown	Brown	Brown,
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones,	Stones,
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Clay
pH	M	2010		N/A	7.8	7.6	8.4	8.2	7.3
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010		< 0.010		
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.025
Chloride (Water Soluble)	M	2220	g/l	0.010	< 0.010		0.013		
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010		< 0.010		
Arsenic	M	2450	mg/kg	1.0	23	6.7		24	8.9
Cadmium	M	2450	mg/kg	0.10	0.22	< 0.10		0.23	0.10
Chromium	M	2450	mg/kg	1.0	15	8.1		17	17
Copper	M	2450	mg/kg	0.50	68	21		28	17
Mercury	M	2450	mg/kg	0.10	0.44	< 0.10		0.14	< 0.10
Nickel	M	2450	mg/kg	0.50	23	8.8		24	23
Lead	M	2450	mg/kg	0.50	230	21		49	12
Selenium	M	2450	mg/kg	0.20	0.51	0.26		0.39	0.27
Vanadium	U	2450	mg/kg	5.0	29	14		32	22
Zinc	M	2450	mg/kg	0.50	92	26		43	44
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	7.9	2.8		7.9	3.6
Naphthalene	M	2800	mg/kg	0.10	0.67	< 0.10		0.41	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	0.38	< 0.10		0.17	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	1.9	< 0.10		1.6	< 0.10
Fluorene	M	2800	mg/kg	0.10	1.6	< 0.10		1.4	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	20	1.0		12	< 0.10
Anthracene	M	2800	mg/kg	0.10	5.3	0.20		3.6	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	41	1.9		21	< 0.10
Pyrene	M	2800	mg/kg	0.10	35	1.9		17	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	16	0.52		7.0	< 0.10
Chrysene	M	2800	mg/kg	0.10	18	0.65		8.2	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	20	0.57		7.9	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	8.2	0.13		3.4	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	16	0.34		6.6	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	9.0	0.11		3.7	< 0.10

Results - Soil

Project: LKC 18 1349 King David's School, Crumpsall

Client: LK Consult	Chemtest Job No.:					18-36164	18-36164	18-36164	18-36164	18-36164
Quotation No.:	Chemtest Sample ID.:					726885	726886	726887	726888	726889
	Client Sample ID.:					CP101	CP101	CP101	CP102	CP102
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.00	0.70	1.50	0.00	1.20
	Bottom Depth (m):					0.70	1.00	2.10	1.00	2.00
	Date Sampled:					15-Nov-2018	15-Nov-2018	15-Nov-2018	16-Nov-2018	16-Nov-2018
	Asbestos Lab:					COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD						
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	1.8	< 0.10			0.72	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	8.3	0.22			3.5	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	200	7.5			98	< 2.0

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

Appendix D

Certificates of Analysis - Geotechnical



TEST REPORT

Client LK Consult Ltd

Address Unit 29 Eton Business
Eton Hill Road
Radcliffe
Greater Manchester
M26 2ZS

Contract LKC 18 1349 -
King David's School,
Crumpsall

Job Number MRN 3383/81
Date of Issue 05 December 2018
Page 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted. This does not, however, guarantee the balance of the materials from which the tested samples have been taken to be of equal quality.



33C, Vauxhall Industrial Estate, Greg Street, Reddish, Stockport SK5 7BR Tel: 0161 475 0870 Fax: 0161 475 0871

Email: steve@mtt-uk.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

MURRAY RIX

33C VAUXHALL INDUSTRIAL ESTATE, GREG STREET
REDDISH, STOCKPORT SK5 7BR
TEL 0161 475 0870 FAX 161 475N 0871

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
BS 1377: PART 7: 1990:CLAUSE 9 MULTI STAGE

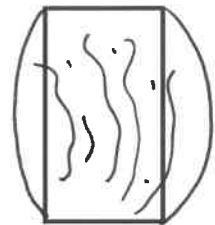
CLIENT	LK Consult Ltd
SITE	LKC 18 1349 – King David's School, Crumpsall
JOB NUMBER	MRN 3383/81

SAMPLE LABEL	CP102/U5 2.2-2.65m	DATE SAMPLED	19 November 2018
LAB SAMPLE No	80303	DATE RECEIVED	21 November 2018
DATE TESTED	23 November 2018	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	102	mm
MOISTURE CONTENT OF SAMPLE	16	%
BULK DENSITY	2.15	Mg/m ³
DRY DENSITY	1.86	Mg/m ³
DEPTH OF TOP OF SPECIMEN	2.25	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT
FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
30	16	2.0	185.8	93
60	18	2.0	190.3	95
120	20	2.0	195.9	98

REMARKS

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 05 December 2018

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

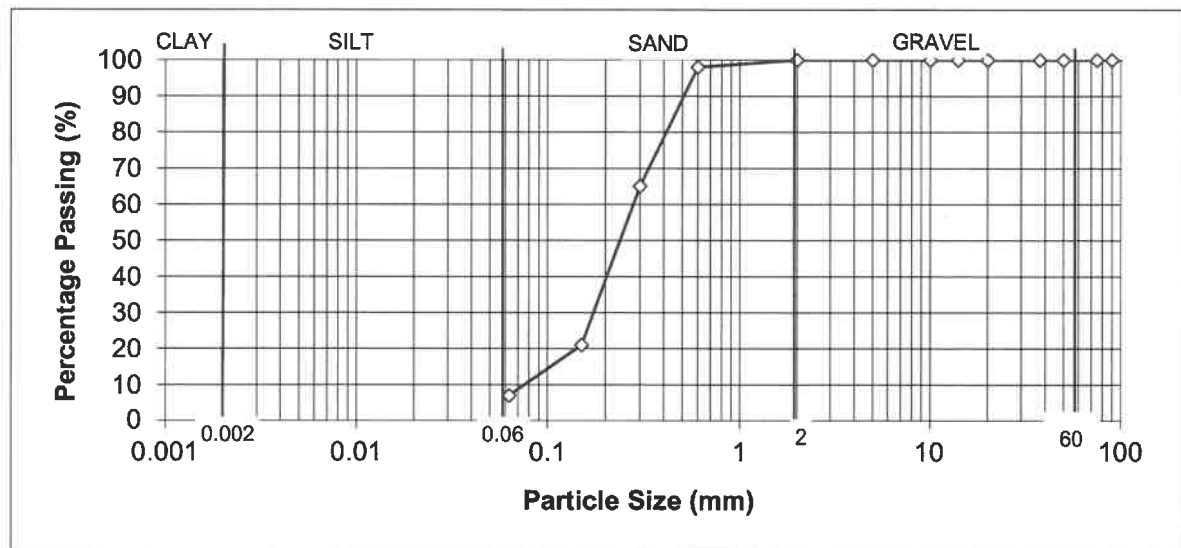
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 18 1349 - King David's School, Crumpsall
JOB NUMBER	MRN 3383/81

SAMPLE LABEL	CP102 / B8 3.7-4.0m	DATE SAMPLED	19-Nov-18
LAB SAMPLE No	80304	DATE RECEIVED	21-Nov-18
DATE TESTED	23-Nov-18	SAMPLED BY	Client

MATERIAL	Brown silty fine to medium SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	100	
90	100		5	100	
75	100		2	100	
50	100		0.6	98	
37.5	100		0.3	65	
20	100		0.15	21	
14	100		0.063	7	



REMARKS

As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 05-Dec-18

MURRAY RIX

33C VAUXHALL INDUSTRIAL ESTATE, GREG STREET
REDDISH, STOCKPORT SK5 7BR
TEL 0161 475 0870 FAX 161 475N 0871

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
BS 1377: PART 7: 1990:CLAUSE 9 MULTI STAGE

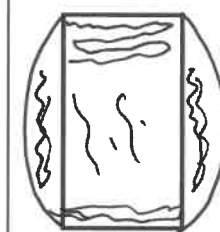
CLIENT	LK Consult Ltd
SITE	LKC 18 1349 – King David's School, Crumpsall
JOB NUMBER	MRN 3383/81

SAMPLE LABEL	CP102/U15 8.4-8.85m	DATE SAMPLED	19 November 2018
LAB SAMPLE No	80306	DATE RECEIVED	21 November 2018
DATE TESTED	23 November 2018	SAMPLED BY	Client

MATERIAL	Soft brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

SPECIMEN LENGTH	187	mm
SPECIMEN DIAMETER	95	mm
MOISTURE CONTENT OF SAMPLE	28	%
BULK DENSITY	2.11	Mg/m ³
DRY DENSITY	1.66	Mg/m ³
DEPTH OF TOP OF SPECIMEN	8.50	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT
FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
90	12	2.0	23.9	12
180	13	2.0	30.2	15
360	14	2.0	34.1	17

REMARKS

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 05 December 2018

MURRAY RIX

Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

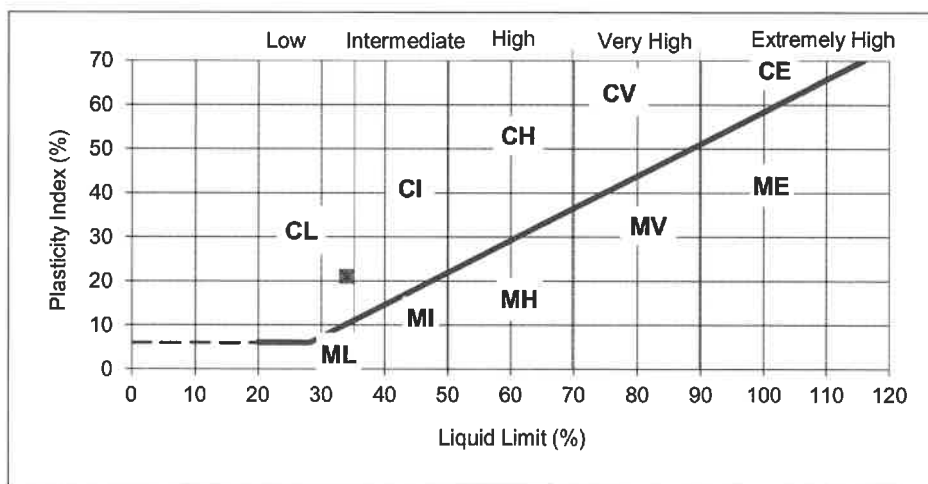
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Ltd
SITE	LKC 18 1349 - King David's School, Crumpsall
JOB NUMBER	MRN 3383/81

SAMPLE LABEL	CP101/B6 2.2-2.5m	DATE SAMPLED	19-Nov-18
SAMPLE No.	80308	DATE RECEIVED	21-Nov-18
DATE TESTED	23-Nov-18	SAMPLED BY	Client

MATERIAL	Firm brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	34	13	21	88



REMARKS

Sample tested after wet sieving

SIGNED 

NAME O.P. Davies BA (Hons)
Page 5 of 5 (Laboratory Manager)

DATE 05-Dec-18

Appendix E

Generic Assessment Criteria

Summary of Category 4 Screening Levels: 2015

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

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.

		LQM Generic Assessment Criteria (mg/kg) Dry weight soil						
Contaminant		SOM	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	6%	180	180	230	980	230	3,400
	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.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	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.

LQM Generic Assessment Criteria (mg/kg) Dry weight soil

Contaminant	SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
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	4	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	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f
+Aromatic	2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f
>EC44	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.

		LQM Generic Assessment Criteria (mg/kg) Dry weight soil						
Contaminant		SOM	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-Trinitrotoluene (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
	Endosulfans (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.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	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).

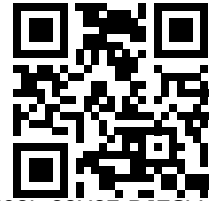
^{dir} = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

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

Appendix F

HazWasteOnline Output Sheets

Waste Classification Report



SM92L-22X37-PJFSV

Job name

King David High School

Description/Comments

Project

LKC 18 1349

Site

King David High School

Related Documents

#	Name	Description
1	HWOL-18-36164-20181123 173837.hwol	.hwol file used to create the Job

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Colin Crompton
Date:
03 Dec 2018 15:04 GMT
Telephone:
0161 763 7200

Company:
LK Group
Unit 29, Eton Business Park
Eton Hill Rd, Radcliffe
Manchester
M26 2ZS

Report

Created by: Colin Crompton
Created date: 03 Dec 2018 15:04 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	CP101-726885-15/11/2018-0.00	0.00-0.70	Non Hazardous		2
2	CP101-726886-15/11/2018-0.70	0.70-1.00	Non Hazardous		4
3	CP101-726887-15/11/2018-1.50	1.50-2.10	Non Hazardous		6
4	CP102-726888-16/11/2018-0.00	0.00-1.00	Non Hazardous		7
5	CP102-726889-16/11/2018-1.20	1.20-2.00	Non Hazardous		9

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	11
Appendix B: Rationale for selection of metal species	12
Appendix C: Version	12

Classification of sample: CP101-726885-15/11/2018-0.00

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

Sample details

Sample Name:	LoW Code:	
CP101-726885-15/11/2018-0.00	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.00-0.70 m		
Moisture content:		
16%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				23	mg/kg	1.32	25.509	mg/kg	0.00255 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.22	mg/kg	1.142	0.211	mg/kg	0.0000211 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide }				15	mg/kg	1.462	18.416	mg/kg	0.00184 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	copper { dicopper oxide; copper (I) oxide }				68	mg/kg	1.126	64.311	mg/kg	0.00643 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	230	mg/kg	1.56	301.356	mg/kg	0.0193 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.44	mg/kg	1.353	0.5	mg/kg	0.00005 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				23	mg/kg	2.976	57.501	mg/kg	0.00575 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.51	mg/kg	2.554	1.094	mg/kg	0.000109 %	✓	
	034-002-00-8											
10	zinc { zinc chromate }				92	mg/kg	2.774	214.386	mg/kg	0.0214 %	✓	
	024-007-00-3											
11	pH				7.8	pH		7.8	pH	7.8 pH		
12	naphthalene				0.67	mg/kg		0.563	mg/kg	0.0000563 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.38	mg/kg		0.319	mg/kg	0.0000319 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				1.9	mg/kg		1.596	mg/kg	0.00016 %	✓	
		201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
15	fluorene	201-695-5	86-73-7		1.6 mg/kg		1.344 mg/kg	0.000134 %	✓	
16	phenanthrene	201-581-5	85-01-8		20 mg/kg		16.8 mg/kg	0.00168 %	✓	
17	anthracene	204-371-1	120-12-7		5.3 mg/kg		4.452 mg/kg	0.000445 %	✓	
18	fluoranthene	205-912-4	206-44-0		41 mg/kg		34.44 mg/kg	0.00344 %	✓	
19	pyrene	204-927-3	129-00-0		35 mg/kg		29.4 mg/kg	0.00294 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		16 mg/kg		13.44 mg/kg	0.00134 %	✓	
21	chrysene	601-048-00-0	205-923-4		18 mg/kg		15.12 mg/kg	0.00151 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		20 mg/kg		16.8 mg/kg	0.00168 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		8.2 mg/kg		6.888 mg/kg	0.000689 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		16 mg/kg		13.44 mg/kg	0.00134 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		9 mg/kg		7.56 mg/kg	0.000756 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		1.8 mg/kg		1.512 mg/kg	0.000151 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		8.3 mg/kg		6.972 mg/kg	0.000697 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		29 mg/kg	1.785	43.487 mg/kg	0.00435 %	✓	
29	asbestos	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		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
Total:								0.08 %		

Key

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

Classification of sample: CP101-726886-15/11/2018-0.70

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

Sample details

Sample Name:	LoW Code:	
CP101-726886-15/11/2018-0.70	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.70-1.00 m		
Moisture content:		
13%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				6.7 mg/kg	1.32	7.696 mg/kg	0.00077 %		✓	
	033-003-00-0	215-481-4	1327-53-3								
2	cadmium { cadmium oxide }				<0.1 mg/kg	1.142	<0.114 mg/kg	<0.0000114 %			<LOD
	048-002-00-0	215-146-2	1306-19-0								
3	chromium in chromium(III) compounds { chromium(III) oxide }				8.1 mg/kg	1.462	10.3 mg/kg	0.00103 %		✓	
		215-160-9	1308-38-9								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	copper { dicopper oxide; copper (I) oxide }				21 mg/kg	1.126	20.57 mg/kg	0.00206 %		✓	
	029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	21 mg/kg	1.56	28.498 mg/kg	0.00183 %		✓	
	082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				8.8 mg/kg	2.976	22.786 mg/kg	0.00228 %		✓	
	028-035-00-7	238-766-5	14721-18-7								
9	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				0.26 mg/kg	2.554	0.578 mg/kg	0.0000578 %		✓	
	034-002-00-8										
10	zinc { zinc chromate }				26 mg/kg	2.774	62.751 mg/kg	0.00628 %		✓	
	024-007-00-3										
11	pH				7.6 pH		7.6 pH	7.6 pH			
12	naphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
		205-917-1	208-96-8								
14	acenaphthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
		201-469-6	83-32-9								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
15	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	phenanthrene	201-581-5	85-01-8		1 mg/kg		0.87 mg/kg	0.000087 %	✓	
17	anthracene	204-371-1	120-12-7		0.2 mg/kg		0.174 mg/kg	0.0000174 %	✓	
18	fluoranthene	205-912-4	206-44-0		1.9 mg/kg		1.653 mg/kg	0.000165 %	✓	
19	pyrene	204-927-3	129-00-0		1.9 mg/kg		1.653 mg/kg	0.000165 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.52 mg/kg		0.452 mg/kg	0.0000452 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.65 mg/kg		0.566 mg/kg	0.0000566 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.57 mg/kg		0.496 mg/kg	0.0000496 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.13 mg/kg		0.113 mg/kg	0.0000113 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.34 mg/kg		0.296 mg/kg	0.0000296 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.11 mg/kg		0.0957 mg/kg	0.00000957 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		0.22 mg/kg		0.191 mg/kg	0.0000191 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		14 mg/kg	1.785	21.744 mg/kg	0.00217 %	✓	
29	asbestos	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		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
Total:								0.0183 %		

Key

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

Classification of sample: CP101-726887-15/11/2018-1.50



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

Sample details

Sample Name:	LoW Code:	
CP101-726887-15/11/2018-1.50	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.50-2.10 m		
Moisture content:		
13%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	• pH				8.4 pH		8.4	pH	8.4 pH		
			PH								
Total:									0%		

Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)

Classification of sample: CP102-726888-16/11/2018-0.00

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

Sample details

Sample Name:	LoW Code:	
CP102-726888-16/11/2018-0.00	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.00-1.00 m		
Moisture content:		
10%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 10% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				24 mg/kg	1.32	28.519 mg/kg	0.00285 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	cadmium { cadmium oxide }				0.23 mg/kg	1.142	0.236 mg/kg	0.0000236 %	✓	
	048-002-00-0	215-146-2	1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }				17 mg/kg	1.462	22.362 mg/kg	0.00224 %	✓	
		215-160-9	1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }				28 mg/kg	1.126	28.372 mg/kg	0.00284 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
6	lead { lead chromate }			1	49 mg/kg	1.56	68.788 mg/kg	0.00441 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
7	mercury { mercury dichloride }				0.14 mg/kg	1.353	0.171 mg/kg	0.0000171 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
8	nickel { nickel chromate }				24 mg/kg	2.976	64.287 mg/kg	0.00643 %	✓	
	028-035-00-7	238-766-5	14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.39 mg/kg	2.554	0.896 mg/kg	0.0000896 %	✓	
	034-002-00-8									
10	zinc { zinc chromate }				43 mg/kg	2.774	107.359 mg/kg	0.0107 %	✓	
	024-007-00-3									
11	pH		PH		8.2 pH		8.2 pH	8.2 pH		
12	naphthalene				0.41 mg/kg		0.369 mg/kg	0.0000369 %	✓	
	601-052-00-2	202-049-5	91-20-3							
13	acenaphthylene				0.17 mg/kg		0.153 mg/kg	0.0000153 %	✓	
		205-917-1	208-96-8							
14	acenaphthene				1.6 mg/kg		1.44 mg/kg	0.000144 %	✓	
		201-469-6	83-32-9							

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
15	fluorene	201-695-5	86-73-7		1.4	mg/kg		1.26	mg/kg	0.000126 %	✓	
16	phenanthrene	201-581-5	85-01-8		12	mg/kg		10.8	mg/kg	0.00108 %	✓	
17	anthracene	204-371-1	120-12-7		3.6	mg/kg		3.24	mg/kg	0.000324 %	✓	
18	fluoranthene	205-912-4	206-44-0		21	mg/kg		18.9	mg/kg	0.00189 %	✓	
19	pyrene	204-927-3	129-00-0		17	mg/kg		15.3	mg/kg	0.00153 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		7	mg/kg		6.3	mg/kg	0.00063 %	✓	
21	chrysene	601-048-00-0	205-923-4		8.2	mg/kg		7.38	mg/kg	0.000738 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		7.9	mg/kg		7.11	mg/kg	0.000711 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		3.4	mg/kg		3.06	mg/kg	0.000306 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		6.6	mg/kg		5.94	mg/kg	0.000594 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		3.7	mg/kg		3.33	mg/kg	0.000333 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.72	mg/kg		0.648	mg/kg	0.0000648 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		3.5	mg/kg		3.15	mg/kg	0.000315 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		32	mg/kg	1.785	51.413	mg/kg	0.00514 %	✓	
29	asbestos	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		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
Total:										0.0447 %		

Key

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

Classification of sample: CP102-726889-16/11/2018-1.20

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

Sample details

Sample Name:	CP102-726889-16/11/2018-1.20	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	1.20-2.00 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:	16%	Entry:	
(wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				8.9 mg/kg	1.32	9.871 mg/kg	0.000987 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	cadmium { cadmium oxide }				<0.1 mg/kg	1.142	<0.114 mg/kg	<0.0000114 %		<LOD
	048-002-00-0	215-146-2	1306-19-0							
3	chromium in chromium(III) compounds { chromium(III) oxide }				17 mg/kg	1.462	20.871 mg/kg	0.00209 %	✓	
		215-160-9	1308-38-9							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
5	copper { dicopper oxide; copper (I) oxide }				17 mg/kg	1.126	16.078 mg/kg	0.00161 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
6	lead { lead chromate }			1	12 mg/kg	1.56	15.723 mg/kg	0.00101 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
7	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
8	nickel { nickel chromate }				23 mg/kg	2.976	57.501 mg/kg	0.00575 %	✓	
	028-035-00-7	238-766-5	14721-18-7							
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.27 mg/kg	2.554	0.579 mg/kg	0.0000579 %	✓	
	034-002-00-8									
10	zinc { zinc chromate }				44 mg/kg	2.774	102.532 mg/kg	0.0103 %	✓	
	024-007-00-3									
11	pH				7.3 pH		7.3 pH	7.3 pH		
12	naphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
13	acenaphthylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		205-917-1	208-96-8							
14	acenaphthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-469-6	83-32-9							

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
15	fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18	fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21	chrysene	601-048-00-0	205-923-4		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		22	mg/kg	1.785	32.99	mg/kg	0.0033 %	✓	
29	asbestos	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		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
Total:										0.0263 %		

Key

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

Appendix A: Classifier defined and non CLP determinands

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

Conversion factor: 1.462

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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

• **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: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

• **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: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

• **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 Chronic 1 H410 , Aquatic Acute 1 H400

• **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: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

• **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

• **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

• **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: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

■ **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 Chronic 1 H410 , Aquatic Acute 1 H400

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 (edit as required)

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. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

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

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

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 (edit as required)

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. (edit as required) Worst case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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

Harmonised group entry used as most reasonable case. Pigment cadmium sulposelenide 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. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

vanadium {divanadium pentaoxide; vanadium pentoxide}

worst case/most likely scenario

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2018.306.3704.7580 (03 Nov 2018)
HazWasteOnline Database: 2018.306.3704.7580 (03 Nov 2018)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
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 Wastes 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
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

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