Civic Engineers

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One Victoria, Manchester

Prepared for
One Heritage

Report Type
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11 November 2022

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Piling Mat Design

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Civic Job No.	756-02
Issued	11/11/2022 P01 – For Information
Revised	

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1. Introduction

Civic Engineers were appointed by developer One Heritage as the consultant civil and structural engineer for the One Victoria project in Manchester and have subsequently been novated to the Main Contractor, Torsion Construction.

The developoment proposals comprise the construction of two new residential apartment buildings which vary between 10 and 14 storeys. This includes commercial space on the ground floor, along with undercroft car parking, a roof top amenity space and external landscaping.

The purpose of this document is to present the structural design of the piling mat on the site for submission to Building Control and Network Rail Approval.

1.1 Limitations of the Study

The report is written in the context of an agreed scope of work and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. Civic Engineers reserve the right to amend either conclusions or recommendations considering any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are based on third party exploratory records and examination of samples and, where applicable, laboratory tests. No liability can be accepted for conditions not revealed by the probe holes, particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

2. Existing Site Information

2.1 General Description

The Site is located to the north of the River Irwell in the Green Quarter area of Manchester. The development is disected into two distinct sites by Breslyn street. The site is bound by Great Ducie Street to the east, existing builings to the north and Mirabel Street to the south and west. The approximate location of the Site boundary is shown in red below.

The land fronting Great Ducie Street is currently used as a private car park and the land fronting Mirabel Street is currently occupied by an existing two-storey building with a basement structure.

Figure 1: Site boundary

2.2 Location of Piling Mats

Refer to Civic Engineers sketch reference 756-02-CIV-XX-F2-S-S-10001, appended to this report for the location of the piling mats to be designed.

Three piling platform levels required to accommodate the proposed sequencing of the pile installation and maintain a circa 0.100m depth below the underside of the ground floor slab.

3. Geotechnical Assessment

A Phase 2 Site Investigation was carried out by Earth Environmental & Geotechnical in May 2015. The following summarises this geotechnical assessment described within this report in relation to the proposed development works. A copy of this report is provided in Appendix B and should be read in conjunction with the below.

The site investigation confirmed the presence of made ground to a depth of 1.5m. Natural ground beneath this comprised clay and sand with a mudstone bedrock encountered at depths of between 8.10m and 9.40m.

Groundwater was observed at a depth of 3.5m below ground in two ground water monitoring stations.

It is expected that the piling mat will be situated within the made ground strata. There is no geotechnical information available to confirm the allowable bearing pressure of the made ground. It is therefore recommended that a series of plate bearing tests are undertaken to confirm the suitability of the made ground.

The design of the piling mate was undertaken using the properties of the underlying firm clay, Cu = 54kN/m^2. The properties of the underlying clay were determined the single stage triaxial testing undertaken on one sample of the clay strata, taken from a depth of 4.3m bgl. This was undertaken during the phase 2 site investigations by LK Group. SPT values taken in the clay in bore hole number CP101, CP102 and CP102A show values between N9 and N13. Using the 10N as an approximation, a bearing pressure of 100kN/m^2 may be expected within the clay strata.

Civic Engineers have assumed a 6F2 internal friction angle of **40°** as a specified minimum requirement, as recommended from the TWF Document (extract below). This is to be confirmed by the groundworks sub-contractor prior to construction.

Table 1: Extract from TWF document "Working Platforms - Design of Granular Working Platforms for Construction Plant (Table 1 - Indicative characteristic shear strength values for platform fill

Description	ϕ_{fill}	Quality controls
Brick and concrete "hardcore" laid with little to no compaction and not protected from contamination	30-35°	Little to no quality control or maintenance
Specified gap graded material laid with nominal compaction and protected below with geotextile	35-40°	Nominal quality control and maintenance
Specified well graded material laid and fully compacted to DoT Specification and protected below with geotextile	40-45°	Full quality control; regular inspection and maintenance
Specified well graded material laid and fully compacted to DoT Specification, formally tested and protected below with geotextile	>45°	Full quality control; test results reviewed by designer; regular inspection and maintenance

4. Piling Mat Design

4.1 Piling Rig

Details of the piling rig to be used on site have been provided by the Client and are outlined as below:

The type of rig to be used on site is a **Soilmec SF65 CFA** piling rig.

Table 2: Rigging Data as provided by Green Piling Ltd

Loading Case	Loading (kN/m^2)	Effective Track Length (m)	Effective Track Width (m)
1 (Rig Handling)	209	2.28	0.75
2 (Rig Extracting)	273	1.48	0.75

4.2 Working Platform Design

The working platform has been designed in accordance with BR470 Working Platforms for Tracked Plant. Refer to Appendix A for the calculation's sheets for the working platform design for the subgrade established as outlined in the previous section of this report and is subject to confirmation of suitability via plate bearing tests.

Recommended working platform thickness of 600mm of 6F2 compacted in layers in accordance with Specification for Highway Works Table 6/4 (recommended maximum layers of 150mm).

All soft spots, particularly due to previous intrusive site investigative works, are to be identified, excavated and back-filled with well compacted well graded granular engineering fill material.

4.3 Construction of Working Platform

The working platform should be constructed as follows:

1. The maximum gradient of the working platform should be no more than 1 in 10.
2. The edge of the platform should extent at least m beyond the working area and in access routes between piling mats, should be clearly demarcated. Where they are installed as a ramp, a suitable incline should be agreed with the designer.
3. The subgrade formation should be proof-rolled with a smooth wheeled roller prior to placement of the working platform.
4. In fine grained soils, a filtration geotextile should be placed at the base of the working platform to minimise movement/loss of fines.
5. The working platform material should be placed in at least three layers and compacted in accordance with Specification for Highways Works. The final layer should be sealed by compaction in order to minimise infiltration.
6. Any soft posts, tarmac or buried obstructions should be removed in the subgrade prior to placement of the working platform.
7. Any excavation or deterioration of the working platform should be reinstated throughout the operation by the contractor.

4.4 Recommendations

Due to the lack of geotechnical data in the made ground it is specified that plate bearing tests are undertaken prior to the construction of the piling mat at underside of platform level to confirm that the made ground will achieve a minimum allowable bearing capacity of approx. 100kN/m^2 which has formed the basis of the working platform thickness.

Refer to CE sketch of scope drawing 756-02-XX-F2-S-S-10002.

The perimeter interface between the working platform and adjacent surrounding structures is currently unknown and it is recommended that further trial pit excavation is completed once the site is purchased to review interface details between the pile mat and the adjacent buildings, footpath and railway infrastructure surrounding the site.

Appendix A – Piling Mat Design Calculations

Job No	Sheet No		
xx 756-02	xx 1		
Project: xx ONE VICTORIA	xx	Engineer: xx IR	Date: xx 1/11/22
Element: xx WORKING PLATFORM	xx	Checked by: xx	Date: xx

Reference	Calculation	Output

WORKING PLATFORM DESIGN

THE FOLLOWING CALCULATIONS PERTAIN TO THE DESIGN OF THE WORKING PLATFORM FOR ONE VICTORIA PROJECT REFERENCE 756-02 AND ARE CALCULATED TO BRE 470 CODE.

OTHER INFORMATION RECIEVED

⇒ CL-602-LKC21 1684-01 - PHASE 2 S1 (MARCH 2022) BY LK GROUP.

⇒ SOILMEC SF6S WPC (OCT 22) - PILING RIG INFORMATION. BY GREEN PILING.

⇒ ASSUMED 6F2 PILING MAT (RECYCLED AGGREGATE)

THE BELOW CALCULATIONS ARE BASED ON PLACING THE PILING MAT ONTO CLAY.

GEOTECHNICAL SUMMARY.

EXISTING GROUND LEVEL = +30.900m
DEPTH TO CLAY = ≈3.4m (SOFT CONSISTANCY).
LEVEL OF CLAY = +27.600m*

SHEAR STRENGTH $C_u = 54 kN/m^2$
∴ ALLOWABLE BEARING CAPACITY = $\underline{108 kN/m^2}$.

Job No	Sheet No		
xx 756-02	xx 2		
Project		**Engineer**	**Date**
xx ONE VICTORIA	xx	xx IR	xx 1/11/22
Element		**Checked by**	**Date**
xx WORKING PLATFORM	xx	xx	xx

Reference	Calculation	Output
	PILING RIG INFORMATION. (GREEN PILING)	
CASE 1	TRACK LENGTH (L) = 2.28m TRACK WIDTH (W) = 0.75m CHAR. LOAD (q_1) = 209 kN/m²	
CASE 2	TRACK LENGTH (L) = 1.48m TRACK WIDTH (W) = 0.75m CHAR. LOAD (q_2) = 273 kN/m²	
	DESIGN VALUES FOR GROUND	
	SUBGRADE (R_d) = $C_u N_c S_c$ WHERE C_u = 54 kN/m² $N_c = 2+\pi$ $S_c = 1+0.2(W/L)$	
	$\therefore R_{d1} = 54 \times (2+\pi) \times (1+0.2(0.75/2.28)) = 296$ kN/m² $R_{d2} = 54 \times (2+\pi) \times (1+0.2(0.75/1.48)) = 306$ kN/m²	
TABLE A.1	WORKING PLATFORM $\phi = 40°$ $\therefore N_\gamma = 109$ $\gamma = 20$ kN/m³	
	CAN SUBGRADE PROVIDE ADEQUATE BEARING RESISTANCE WITHOUT WORKING PLATFORM?	
TABLE A.3	CASE 1 = 2 × 209 = 418 > 296 ∴ PLATFORM REQ. CASE 2 = 1.5 × 273 = 410 > 306 ∴ PLATFORM REQ.	

Job No	Sheet No		
xx 756-02	xx 3		
Project		**Engineer**	**Date**
xx ONE VICTORIA	xx	xx IR	xx 1/11/22
Element		**Checked by**	**Date**
xx WORKING PLATFORM	xx	xx	xx

Reference	Calculation	Output
	CHECK UPPER LIMIT OF BEARING RESISTANCE OF PLATFORM MATERIAL ALONE.	
	$R_d = 0.5\,\gamma_p W_d N_{\gamma o} S_\gamma$	
	WHERE $S_\gamma = 1 - 0.3(W/L) = 0.901$ (CASE 1) 0.848 (CASE 2)	
	$\therefore R_{d_1} = 0.5 \times 20 \times 0.75 \times 109 \times 0.901 = 737\ kN/m^2$ (CASE 1) $R_{d_2} = 0.5 \times 20 \times 0.75 \times 109 \times 0.848 = 693\ kN/m^2$ (CASE 2).	
	$\therefore$ PLATFORM STRONGER THAN SUBGRADE!	
TABLE A.3	CASE 1 $= 1.6 \times 209 = 334\ kN/m^2 < 737\ kN/m^2$ CASE 2 $= 1.2 \times 273 = 328\ kN/m^2 < 693\ kN/m^2$	$\therefore$ OK $\therefore$ OK.
	CHECK PUNCHING SHEAR FOR MINIMUM UNREINFORCED THICKNESS	
	$R = C_u N_c S_c + (\gamma_D D^2/W) K_p \tan\delta\, S_p$	
	WHERE $C_u = 54\ kN/m^2$ $N_c = 2 + \pi$ $S_c = 1 + 0.2(W/L)$ $\gamma_D = 20\ kN/m^3$ $W = 0.75m$ $K_p \tan\delta = 5.5$ $S_p = 1 + (W/L)$ $D = 0.6m$	
TABLE A.2		
	$R_{d\,case\,1} = (54 \times 5.14 \times 1.066) + (20 \times 0.6^2/0.75) \times 5.5 \times 1.33$ $= 366.1\ kN/m^2$	
	$R_{d\,case\,2} = (54 \times 5.14 \times 1.101) + (20 \times 0.6^2/0.75) \times 5.5 \times 1.51$ $= 385.3\ kN/m^2$.	

Job No	Sheet No		
xx 756-02	xx 4		
Project		**Engineer**	**Date**
xx ONE VICTORIA	xx	xx IR	xx 1/11/22
Element		**Checked by**	**Date**
xx WORKING PLATFORM	xx	xx	xx

Reference	Calculation	Output
	RD CASE 1 = 366.1 > (1.6 × 209) = 334 ∴ OK	UF = 0.91
	RD CASE 2 = 385.3 > (1.2 × 273) = 328 ∴ OK	UF = 0.85
	PLATFORM THICKNESS OK FOR UNREINFORCED CONCRETE	
	CHECK MIN THICKNESS => 600mm > 300mm	OK

Appendix B – Phase 2 Geo-Environmental Report

MIRABEL HOUSE
GREAT DUCIE STREET
MANCHESTER

FINAL
PHASE 2 GEO-ENVIRONMENTAL INVESTIGATION, RISK ASSESSMENT AND REMEDIATION STRATEGY

Job Number: LKC 21 1684
Date: March 2022
Client: One Heritage Great Ducie Street Ltd

INCREASING LAND VALUE

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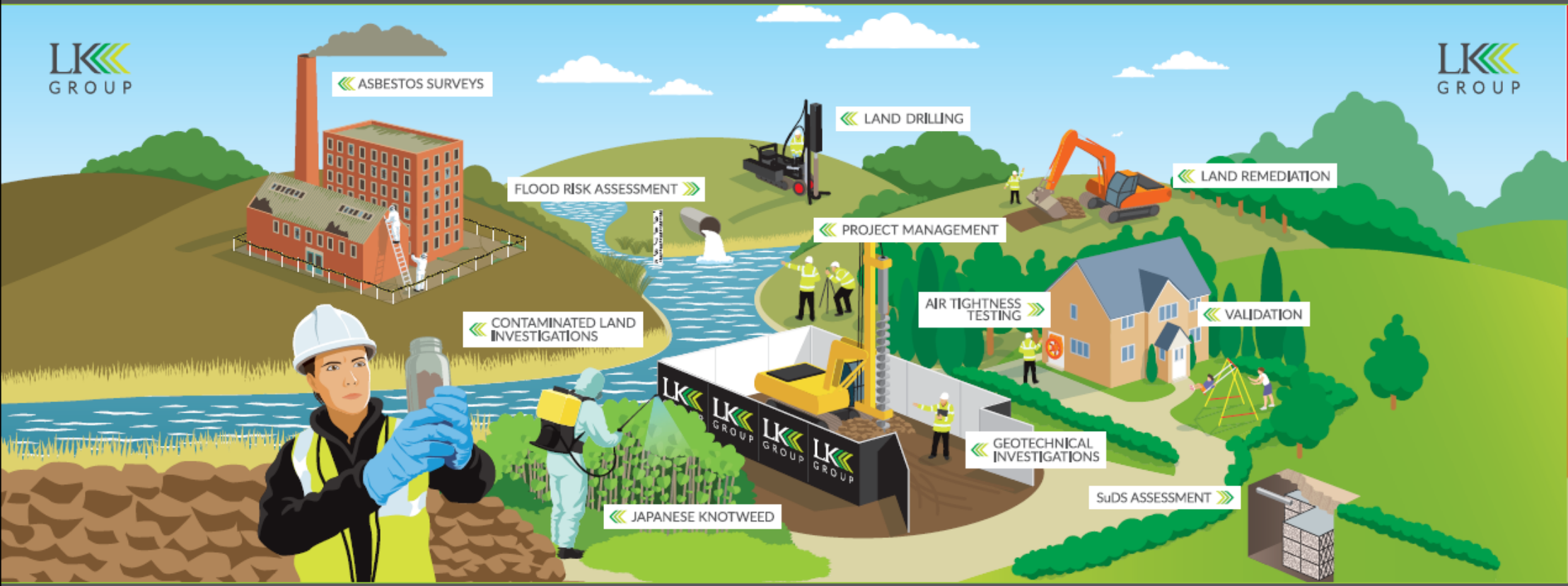
INCREASING LAND VALUE



LK GROUP

LK Consult Document Verification			
Site Address	Mirabel House, Great Ducie Street, Manchester M3 1PQ		
Report Title	Final Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy		
Job Number	LKC 21 1684	**Document Ref.**	CL-602-LKC 21 1684-01
Date Issued	March 2022	**Report Version**	R0
Prepared By	Ella Mcleod Colin Wardle	**Reviewed By**	Colin Crompton

Revision Record			
Revision No.	**Date**	**Nature of Revision**	**Approved By**

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This report has been prepared by LK Consult (LKC) who have exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant, experienced in preparing reports of a similar scope.

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This report is issued on the condition that LKC will not be held liable for any loss arising from ground conditions between sampling points (i.e. boreholes/trial pits/hand augers/surface samples) which have not been shown by the sampling points or related testing carried out during the investigation, nor for any loss arising from conditions below the maximum depth of the investigation. Opinions on such conditions, where given, are for general guidance only.

This report is prepared solely for the benefit of One Heritage Great Ducie Street Ltd. It may not be relied upon by, or submitted to a third party for their reliance for the purposes of valuation, mortgage, insurance and regulatory approval, until all invoices have been settled in full.

Those using this information in subsequent assessments or evaluations do so at their own risk.

EXECUTIVE SUMMARY

Site Details

Site Location:	Land to the east and west of Breslyn Street, between Mirabel Street and Great Ducie Street, Manchester, M3 1PQ. Centred at approximate National Grid Reference 383790 399030.
Site Area:	1,600m^2
Current Land Use:	The site is occupied by a public car park and a two-storey building in the north west.
Proposed Development:	Planning Application No. 122280/FO/2019. 1no. 10-storey apartment block to comprise residential apartments and car parking spaces at ground level. 1no. part 10-storey and part 14-storey apartment block to comprise residential apartments and commercial floor space at ground level.
Purpose of Report:	Contamination and Geotechnical Assessment.

Preliminary Risk Assessment

PRA Details:	Undertaken by LKC (Ref: CL-602- LKC 18 1208-01, dated 1st June 2018.
History:	On site: Road, Timber Yard, Unreferenced Buildings, Public House, Smithy, Possible Plastic Goods Factory. Surrounding Area: Coal Yard, Smithy, Buildings, Works, Railway Land.
Geology / Hydrogeology:	Alluvium (Secondary A Aquifer) over Chester Formation (Principal Aquifer).
Mining:	Not within a Development High Risk Area.
Relevant Environmental Setting:	River Irwell 35m SW. Nearest groundwater abstraction 140m N. Flood Zone 2. Within a Nitrate Vulnerable Zone. Not within Source Protection Zone.
Preliminary Conceptual Model: PL=Pollutant Linkage	PL1 Direct Contact (Human Health): No viable pathways as no soft landscaping proposed at ground level. PL2 Inhalation of Vapours: **Moderate**/Low Risk (volatile contaminants). PL3 Gas: Moderate Risk (hazardous gas). PL4 Controlled waters: **Moderate**/Low Risk (mobile contaminants). PL5 Sulphate Attack: **Moderate**/Low Risk (sulphate). PL6 Water Pipelines: Moderate Risk (organic contaminants). PL7 Phytotoxic: No viable pathway as no soft landscaping proposed at ground level.
Recommendations:	Site Investigation was recommended to further assess PL2, PL3, PL4, PL5, & PL6.

Ground Investigation Work Undertaken

Date of Investigation:	9th November and 6th-9th December 2021.
Intrusive Investigation Work Undertaken:	4no. window sample boreholes (WS101-WS103 & WS103A). 2no. hand dug pits (HD101-HD102). 3no. cable percussion boreholes (CP101, CP102 & CP102A). Rotary follow on through CP101 and CP102A (RCP101 & RCP102A).
Monitoring Wells:	Installed in WS101, WS102, WS103A & CP102A..
Soil Sampling:	8no. samples tested for metals, speciated PAHs, pH, sulphate, asbestos and SOM. 3no. samples tested for metals, speciated PAHs, cyanide, pH, sulphate, asbestos, phenol, TPHCWG, BTEX, VOCs, SVOCs and SOM. 4no. samples tested for BRE SD 1.
Groundwater Sampling:	1no samples tested for metals, speciated PAHs, cyanide, pH, sulphate, hardness, phenol, TPHCWG, BTEX, VOCs, SVOCs.
Monitoring:	4no. gas monitoring visits over 4 weeks.

Insitu and Laboratory Geotechnical Testing:	SPTs, pocket penetrometer tests, BRE SD 1, Atterbergs, Unconfined Compressive Strength, Point Loads, Triaxial.

Ground Conditions and Geotechnical Assessment

Location	General Ground conditions	Allowable Bearing Pressure	Anticipated Foundation Type	Other Considerations
Whole Site	Made Ground (including ash and tarmac) to depths of between 3.4m-3.5mbgl. Soft to firm CLAY to depths of between 4.7-5.4mbgl underlain by granular strata (SAND and SAND& GRAVEL) to 6.2-6.5mbgl. SANDSTONE bedrock encountered from 6.2m-6.5mbgl. Groundwater at 6.3-6.5, rising to 5.3-5.5 during the investigation.	A reliable bearing pressure cannot be applied to the Made Ground. Laboratory testing of the strength of the SANDSTONE returned UCS values of 10.1 and 20.1MPa.	Piled foundations	Temporary supports of excavations will be required. Detailed design should be carried out by structural engineer. Concrete Requirements DS2-AC-2.

Contamination Risk Assessment

The table below shows a summary of the risk assessments undertaken for each pollutant linkage, the revised conceptual model and recommendation for either remediation and / or further investigation.

Pollutant Linkage		Risk	Recommendations
1	No viable pathways (dermal contact, inhalation, ingestion).	--	-No viable human health pathways as no soft landscaping proposed at ground level. -**Recommendation:** No pollutant linkage therefore no further assessment required.
2	Volatile contaminants posing a risk to future site users and offsite receptors via the inhalation of vapours.	**Moderate (S area of site localised around CP101)**	-Likely probability in localised area in south of the site based on elevated concentration of naphthalene identified. -**Recommendation**: Localised remediation required.
		Low (remainder of site)	-No elevated volatile contaminants identified across remainder of the site. -**Recommendation**: No remediation required.
3	Gas posing a risk to buildings, future site users and offsite land users via the migration of gas into building causing explosion and asphyxiation.	Moderate / **Low**	-Low risk assumed given monitoring results and prevailing ground conditions. -**Recommendation:** No remediation required.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	**Low**	-No elevated contaminants and no significant mobile source of contamination identified. -**Recommendation:** No remediation required.
5	Sulphate posing a risk to building via direct contact (sulphate attack).	**Moderate /** Low	-Elevated sulphate identified. Moderate risk considered appropriate. -**Recommendation:** Sulphate resistant concrete (DS-2 AC-2) required.
6	Organic contaminants posing a risk to water pipes.	**Moderate**	-Elevated VOCs/SVOCs identified at typical pipeline depths (0.75-1.35mbgl). -**Recommendation:** UU risk assessment to be completed. Barrier piping likely to be required.

Recommendations and Remedial Strategy

The table below shows the remediation and validation requirements for the site. This information should be documented in a Site Completion Report for submission to the local authority.

Phase	PL	Remediation Requirements	Validation Requirements
Post-Demolition Work	**2, 5, 6**	Post-demolition Investigation Further investigation is recommended following the demolition of the existing building in the western area of site. This is recommended to confirm ground conditions below the current buildings and to undertake contamination and geotechnical testing. This should allow a more targeted remediation strategy to be completed. This work will also provide more geotechnical information for foundation design.	N/A (Investigation Report will be provided with an updated Remediation Strategy).

Phase	PL	Remediation Requirements	Validation Requirements
Pre-Construction	ALL	Earthworks Inspections / Unexpected Contamination The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required. Should asbestos be identified during groundworks, precautions should be taken to ensure the safety of the construction workers and nearby land users. It would be advisable to introduce an asbestos management strategy in line with CIRIA C733[1].	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work.
	2	Naphthalene Delineation (Localised around CP101). Removal of shallow made ground (0.1-0.5mbgl) with tarmac inclusions. It is likely that enabling works will remove this material.	Photographs, waste transfer notes and validation sampling of sides and base of the excavation.
Build-Phase Construction	5	Sulphate Resistant Concrete Sulphate Resistant Concrete in line with DS-2 AC-2 recommended.	N/A
	6	Potable Water Pipes It is recommended that a United Utilities Risk Assessment is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required.	If barrier pipe required: Delivery notes of pipe material. Photographs of the installed pipe.
	1 & 4	No further assessment required with respect to PL1 (direct contact) and PL4 (controlled waters).	N/A
Other Considerations		Grubbing Out of In-Ground Structures It is recommended that in-ground structures are grubbed out as part of the groundworks.	
		Topsoil Growing Medium Soft landscaping is shown on the roof terrace proposed development plan. A topsoil cover of approximately 150mm is recommended for any soft landscaping. Testing of any imported topsoil should meet the requirements detailed in Table 9.2.	
		Re-use of site won material To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used [2]): 5,000 tonnes (*c.* 2,500m^3) treatment of crushed concrete / stone. 1,000 tonnes (*c.* 500m^3) use of non-hazardous soil 5,000 tonnes (*c.* 2,500m^3) use of clays, sand, gravel, brick, concrete, stone etc. 50,000 tonnes (*c.* 25,000m^3) use of bituminous material to be used in roadways. A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered **before** material movement starts onsite. If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'.	

[1] CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.
[2] https://www.gov.uk/guidance/waste-exemptions-using-waste

	For all the above material will need to be tested at the rate and analytical suites presented in Table 9-2.
Other considerations	Health and Safety Considerations In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance3) should be adopted by all workers involved with site enabling and construction works.
	Piling in Contaminated Land It is understood that the buildings may be piled into the bedrock. This may provide a preferential pathway for contaminants to the Principal Aquifer. Once the method of piling has been determined, good practice for the drilling of piles on contaminated sites should be adhered to, such as guidance provided by the Environment Agency4.
	Asbestos Survey A Pre-Demolition and Major Refurbishment Asbestos Survey should be undertaken, and any ACMs removed and properly disposed of, prior to the demolition of the existing buildings, by a suitably qualified professional.

The remediation recommended in the table above should be validated to ensure it has been carried out appropriately. This should be documented in a Completion/Validation Report and submitted to the local authority for completion.

[3] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.
[4] Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.

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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned by One Heritage Great Ducie Street Ltd to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy for Mirabel House, Great Ducie Street, Manchester. The investigation was undertaken in support of a planning application (reference number 122280/FO/2019) to develop the site for mixed residential and commercial end-use.

The following work has previously been undertaken:

- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: CL-602-LKC 18 1208-01, dated 1st June 2018).

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

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

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

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 (ground floor plan).

Location	Land to the east and west of Breslyn Street, between Mirabel Street and Great Ducie Street, Manchester, M3 1PQ. Centred at approximate National Grid Reference 383790 399030.
Area	1,600m^2.
Topography	29 metres above ordnance datum (AOD). Site is approximately level.
Land Use	Site The site is occupied by a public car park and a two-storey building in the north west. Surrounding Area North: Vacant land, commercial and residential apartments. East: Great Ducie Street, Manchester Arena. South: Railway land including old viaduct adjacent to site boundary. West: Commercial and residential apartments.
Proposed Development	1no. 10-storey apartment block to comprise residential apartments and car parking spaces at ground level. 1no. part 10-storey and part 14-storey apartment block to comprise residential apartments and commercial floor space at ground level.

Table 1-1. Summary of site details.

2 Previous Work

2.1 Summary of Existing Information

A PRA report (Ref: CL-602-LKC 18 1208-01, dated 1st June 2018) has previously been undertaken by LKC and is summarised in Section 2.2-2.6.

2.2 Site History

The site history is summarised in Table 2-1.

Site Features	Location	Map Dates Present	Comments
Road	N, Centre and SW	1850	- Running approximately NW-SE in the north of the site and bends in the centre towards the SW. - Named as Sion Hill on 1850 mapping. - Renamed as Boundary Street on 1891 mapping. - Renamed as Breslyn Street on 1975 mapping.
Timber Yard	NW	1850	- Buildings present from 1891 mapping (see below).
Buildings (dwellings, film stores, unknown uses)	W	1850-2018	- Buildings to W of Boundary Street, use unknown on early mapping. - 1945 detailed mapping: several buildings named as 'film stores', remaining 3 buildings named as dwellings. All 2 storeys. Basements present in 2 buildings in the southern area (N of Boundary Road). - 3 dwellings in NW corner no longer present on 1951 mapping. - 1962 detailed mapping: New buildings present in NW corner, use unknown. Film stores still noted. - Buildings still present on 2018 mapping.
Buildings (possible cinema, workrooms, offices)	NE	1850-2000	- Buildings in the NE, to the east of Boundary Street, use unknown on early mapping. - Detailed mapping dated 1945 names buildings as 'Central Kinema Blogs', shown as 3 storeys with basements. - 1962 detailed mapping: Buildings name as 'Central Kinema Blogs', workrooms and offices, 'travel goods'. - Buildings no longer present on 2000 aerial photography (car park on 2018 aerial photography).
Buildings (public house)	SE	1891-2000	- Large building and several small buildings. - Named as public house on 1933 and 1945 mapping. 3 storey building, no basement shown. - Named as Crows Hotel on 1951 mapping. - Building still present on 2000 aerial photography but no longer present on 2018 mapping (used as car park).
Smithy	SW	1891	- Located in the SW corner of the site. Only named on 1891 mapping (1:500 scale) but could have been present later (change of use by at least 1945, see below). - Glazed roof adjacent to east may be associated with Smithy.
Buildings (cinema equipment and film store, theatre club, possible plastic goods factory)	SW	1945-2000	- Named as 'Cinema Equipment and Film Stores' on 1945 mapping. 2 storey buildings, no basement shown. - 1962 mapping, building uses include 'Experimental Theatre Club' and 'Plastic Goods Fac' (factory?). - Building still present on 2000 aerial photography but no longer present on 2018 mapping (used as car park).

Table 2-1: Summary of significant historical features.

Site Features	Location	Map Dates Present	Comments
Car park	E and S	2018	- Car parking shown on most recent mapping and aerial photography (2018 only).
Surrounding Area Features	**Distance/ Location**	**Map Dates Present**	**Comments**
Coal Yard	20m E	1850	- No longer present on 1891 mapping.
Smithy	45m E	1850	- No longer present on 1891 mapping.
Empire Buildings	12m SW	1891	- Use unknown. - No longer present on 1908 mapping.
Buildings	Adj. S	1891	- Includes Victoria Hotel and other unknown uses. - No longer present on 1908 mapping.
Embankments	10m SE	1891	- Sloping down to SW (towards the River Irwell). - No longer present on 1908 mapping.
Printing and engraving Works	30m NW	1891-1933	- No longer named on 1933 mapping (building still present). - Part of Parcels Post Sorting Office by 1951 mapping.
Buildings	Adj. N	1848-2003/2018	- Use unknown on early mapping. - 1945 mapping shows garage, dwellings, warehouses and offices. - 1962 mapping shows offices for adjacent Motor Works, warehouses, joiner, paint warehouse. Dwellings have been demolished. - All buildings demolished by 2009, with the exception of adjacent building to N/NE (still present in 2018).
Works	15m N	1848-2018	- 30m N until 1891 mapping. Extended to 15m N from 1908 mapping and named as Motor Works. - 1945 mapping shows features within the Motor Works as smithy, saw mill, body shop, paint shop, showrooms, warehouse, sunk petrol tank. - Named as Warehouse from 1975 mapping. - Buildings still shown on 2018 mapping and extended to site boundary. Named as The Beaumont Building (use unknown).
Roads	Adj. E & W	1848-2018	- Great Ducie Street (east) and Moreton Street (west). - By 1975, Moreton Street renamed Mirabel Street.
Railway Land	Adj. to S & from 30m E / SE / SW.	1848-2018	- Victoria Station 30m E. - Exchange Station 45m SE and 100m SW. - Victoria Station Yard 30m NE. - Railway lines 30m SE and extend to adjacent to site boundary (S) from 1908 mapping. - Station buildings reduced in size and number of railway lines reduced over time.
Works/Mills	65m SW	1848-2003	- Various works/mills from 65m SW, along the SW banks of River Irwell. - No longer present on 2009 mapping.
Works	85m NW	1891-1933	- Works including wire works and Claviger Works (cycle). - Not named from 1908 mapping (building remains). - No longer present on 1945 mapping.
Post Sorting Office	10m SE	1908-2018	- Building remains on 2018 mapping (not named).
Arena	20m NE	1996-2018	

Table 2-1 (continued): Summary of significant historical features.

2.3 Environmental Setting

The environmental setting is summarised in Table 2-2.

Categories			Details
Geology	Artificial		- None recorded on site on BGS mapping. - Made Ground recorded adjacent to the east and south.
	Superficial		- Alluvium (clay, silt, sand and gravel) across site. - No drift recorded at the NE boundary and offsite to the NE.
	Bedrock		- Chester Formation (sandstone). - Ardwick Fault 110m (orientated NW-SE, downthrow to NE).
	BGS logs		- BH Ref: SJ89NW1458, 3m E: made ground to 3.5m, soft to firm silty and sandy CLAY with occasional gravel to 4.9m, Medium dense SAND and GRAVEL with occasional cobbles to 6.2m, very dense weakly cemented SAND with occasional sandstone fragments to 7.0m. N values: 1.5m=17, 3m=19, 5.5m=33, 6.5m=+200. - BH Ref: SJ89NW1470, 15m NE: made ground to 5.23m, compacted SAND with small clay and gravel content to 8.82m, weathered SANDSTONE to 10m. - BH Ref: SJ89NW1457, 84m SE: made ground to 3.8m, sandy CLAY with sand and gravel bands to 7.7m, weakly cemented slightly silty ROCKSAND (SANDSTONE) with sand bands to 15.00m with thin clay at 11.41-11.55m.
Hydro-geology	Aquifer Designation	Superficial	- Secondary A Aquifer.
		Bedrock	- Principal Aquifer.
	Source Protection Zone (SPZ)		- Site is not within an SPZ.
	Groundwater Abstractions		- 18 within 250m. All associated with Strangeways Brewery from 140m N, for process water, drinking, cooking, sanitary, washing.
Hydrology	Nearest Surface Water		- River Irwell 35m SW, flowing to the southeast.
	Water Quality Data		- River Irwell 89m SW: River Quality E.
	Flooding		- Flood Zone 2.
	Surface Water Abstractions		- None within 1km.
	Discharge Consent		- 9 within 250m. - Nearest 84m W, storm sewage overflow into the River Irwell.
	Pollution Incidents		- 2 within 250m. - Nearest 183m E, dated 1995, Category 3 Minor Incident, no pollution found.
Minerals / Mining	Coal Mining Development High Risk Area		- Not within site area.
	Surface Extractions		- 1 within 500m. - Strangeways Brick Field 446m N, common clay and shale, ceased.
	Cheshire Brine Compensation District		- Not within site area.

Table 2-2: Summary of the environmental setting.

Categories		Details
Ground Stability (on-site)	Collapsible Ground	- No to very low hazard.
	Compressible Ground	- No to moderate hazard.
	Ground Dissolution	- No hazard.
	Landslide	- Very low to low hazard.
	Running Sand	- No to low hazard.
	Shrinking / Swelling Clay	- No to very low hazard.
Landfill sites	Known/Registered[1]	- None recorded within 250m.
	Potential[1]	- Potentially infilled land (water) 190m NE and 235m NE: unknown filled ground (pond, marsh, river, stream, dock etc). - Made Ground also recorded on BGS mapped in the surrounding area.
Radon		- Probability of <1% of homes above Action Level. - No further action required.
Designated Sites		- Nitrate vulnerable zone onsite.
Contemporary Trade Directory		- 4 within 100m. - 2 laundries 8m W & 13m S, inactive. - Needs Electrical 28m S (electrical goods sales, manufacturers and wholesalers), inactive. - Gls Ceramics 29m SW (ceramic manufacturers, supplies and services), inactive.
Fuel Station Entries		- None within 250m.
Unexploded Ordnance (UXO) Risk		- Moderate.

Table 2-2 (continued): Summary of the environmental setting.

2.4 Site Reconnaissance

A site reconnaissance was carried out on 30th May 2018.

Relevant features identified on site are summarised below:

- The site is occupied by a public car park and a two-storey building in the north west.
- A road, Breslyn Street, runs through the centre of the site.
- The car park is hardstood with tarmacadam surfacing which was noted to be cracking in a number of locations.
- The car park surface is uneven and is raised up above Breslyn Street.
- The building on site appeared to be being used by a building firm as offices.
- A disused railway viaduct forms the southern boundary of the site.
- Adjacent to the north east of the site, a retail premises being used by a world foods supplier is located.
- Evidence of surface water drains and a service cover for a fire hydrant was noted on site.
- No visual or olfactory evidence of significant contamination was identified.
- In its current state, the car park was accessible for site investigation plant but any investigation to be done in the footprint of the building would need to be post demolition.

The surrounding area land use is a mixture of residential and commercial with a lighting shop and residential apartments to the north, residential apartments and offices to the west and a restaurant within the railway arches to the south. Great Ducie Street and the Manchester Arena are located to the east.

2.5 Contamination Sources / Pathways and Receptors

Potential contamination sources are detailed in Table 2-3.

Source	Contaminants
Onsite Timber Yard	- Machinery, vehicles: fuels, oils. - Wood treatment (e.g. creosote, fungicides, chromated copper arsenate).
Onsite warehouses, smithy, factory, buildings of unknown use (possible works)	- Unknown inorganic and organic contaminants (dependant on specific uses).
Onsite Car Park	- Spillages / leakages: petroleum hydrocarbons, oils (source expected to be minimal and localised)
Onsite Made Ground (general made ground, demolition of buildings with basements)	- Ash and clinker (e.g. from hearths and boilers, often historically used for site raising / levelling): Heavy metals, sulphates and PAHs[5]. - Asbestos Containing Material (ACM). - Other unknown inorganic / organic contaminants (dependant on fill material source). - If significant depth of organic / putrescible material: Hazardous gas (principally carbon dioxide and methane).
Offsite Potentially Infilled Ground	- Hazardous gas (principally carbon dioxide and methane). - Given age, size and location of potentially infilled features, not considered to be a significant source.
Offsite Railway Land (adjacent railway line on viaduct)[6]	- The main risk will be from particulates (PAHs, metals) as railway line is offsite and raised above site on viaduct.
Surrounding land uses (garage, coal yard, smithy, printing works, motor works, other mills/works)	- Metals, inorganic compounds and organic compounds. - Not expected to be a significant source due to distance from site.

Table 2-3: Potential contamination sources

Potential receptors are detailed in Table 2-4.

Receptors	
Human Health	- Future site users (including residents, visitors and site workers). - Offsite land users.
Controlled Waters	- River Irwell 35m SW. - Principal Aquifer (bedrock).
Buildings and structures.	
Potable water pipes.	
Flora omitted as no landscaping on ground floor proposed development plans.	

Table 2-4: Potential receptors

Potential pathways are detailed in Table 2-5.

[5] Defra (2002). "Potential Contaminants for the Assessment of Land." R&D Publication CLR 8.
[6] Department of the Environment Industry Profile – Railway land (1995).

Pathways		
Soil	Human Health[7] (mixed commercial and residential land use with no soft landscaping)	- Inhalation of vapours outside. - Inhalation of vapours inside. - Omitted: ingestion of soil, ingestion of soil-derived indoor dust, dermal contact with soil, dermal contact with soil-derived indoor dust, inhalation of soil-derived outdoor dust, inhalation of soil-derived indoor dust, ingestion of contaminated vegetables and ingestion of soil attached to vegetables .
	- Windblown dust / fibres to adjacent receptors.	
	- Direct contact with receptors (building foundations, services).	
Water	- Surface run-off over impermeable surface. - Site is relatively flat and grassed; therefore, surface run-off will be limited.	
	- Infiltration into the ground, through potentially contaminated material (contamination possibly going into solution). - Site is predominantly hardstood; therefore, infiltration is likely to be limited.	
	- Migration through potentially permeable strata and preferential pathways. - Superficial (alluvium) likely to be variably permeable. - Bedrock (sandstone) likely to be relatively permeable. - Preferential pathways: possible services.	
Gas	- Migration through potentially permeable strata and preferential pathways. - Superficial (alluvium) likely to be variably permeable. - Bedrock (sandstone) likely to be relatively permeable. - Preferential pathways: possible services.	
	- Migration into buildings (e.g. via services) and accumulation of gases in confined spaces (potentially causing explosion if methane is present).	

Table 2-5: Potential pathways

2.6 LKC Preliminary Contamination Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM[8] has been summarised in Table 2-6.

The aim of the conceptual model is to provide a preliminary assessment of the likelihood of a pollutant linkage for each potential combination of contaminant, pathway and receptor. A conceptual model can be used to make an informed decision on the contamination risks associated with the site and determine what site investigation work is required.

The preliminary contamination conceptual model has identified six generic potential pollutant linkages. Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552[9].

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This is based on the guidance provided in CIRIA C552 and further details including a risk matrix is provided in Appendix A.

Where LKC identified a low to very low risk, limited intrusive investigation work, a watching brief (during construction work) or no investigation work will be

[7] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.
[8] Land Contamination Risk Management (LCRM) https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
[9] CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.

recommended. This will be dependent on the nature of the site and the proposed development.

Where the risk falls into the moderate/low risk, LKC will undertake an assessment to establish what category the pollutant linkage will fall into (i.e. moderate or low risk will be chosen).

Where LKC identifies a moderate or higher risk, intrusive work or precautionary remedial measures will be recommended.

The conceptual model is based on the future use of the site (post development), in line with proposed development scheme.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers during development work. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors associated with the future use of the site. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance[10]) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

It should also be noted that Pollutant Linkage 7 (Direct Contact – Plant Uptake) identified in the initial PRA report is not included in Table 2-6 as no soft landscaping is shown on ground floor proposed development plans. This is further explained in Section 6.5.3.

2.7 Recommendations

Based upon the Preliminary Contamination Conceptual Model a site investigation was recommended to assess the potential pollutant linkages further.

[10] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

Pollutant Linkage	Pathway	Receptor	Contaminant (source)	Probability	Consequence	Risk	Assessment and Recommendations
PL1	– No viable pathways (dermal inhalation, ingestion).	– Future site users. – Offsite receptors.	– ACM. – Inorganics (e.g. metals). – Organics (e.g. PAHs, fuels, oils). – Fungicides. (made ground, timber yard, smithy, warehouses / works, car park, offsite land uses)	-	-	-	– No viable pathways anticipated as the proposed development comprises mixed commercial and residential buildings with no soft landscaping. – No pollutant linkage therefore no further assessment required.
PL2	– Inhalation of vapours. – Migration through permeable strata / preferential pathways.	– Future site users. – Offsite receptors.	– Volatile Contaminants such as hydrocarbons, solvents. (made ground, timber yard, smithy, warehouses / works, car park, offsite land uses)	Low Likelihood	Medium	**Moderate** / Low	– Low likelihood as significant volatile contamination not expected from site history and construction methods will likely reduce any potential migration into buildings. – Until ground conditions are confirmed moderate risk assumed. – **Recommendation:** Investigation work required to confirm ground conditions. To include onsite PID testing and possible confirmatory laboratory testing.
PL3	– Inhalation of gas. – Migration through permeable strata / preferential pathways. – Explosion in confined spaces.	– Future site users. – Buildings. – Offsite land users.	– Hazardous Gas: methane, carbon dioxide. (made ground on and offsite).	Low Likelihood	Severe	**Moderate**	– Low likelihood as significant made ground could be present below the site and in the surrounding area. – **Recommendation:** Gas monitoring or precautionary gas protection if significant made ground or putrescible material is identified on site. .
PL4	– Surface Run-off. – Migration through permeable strata / preferential pathways. – Perched waters migration.	– Groundwater (Principal Aquifer). – Surface water (River Irwell).	– Mobile inorganic and organic contaminants, fungicides. (made ground, timber yard, smithy, warehouses / works, car park).	Low Likelihood	Medium	**Moderate** / Low	– Low likelihood as significant contamination not expected from site history, however pathway may exist to controlled waters (particularly the aquifer). – Until ground conditions are confirmed moderate risk assumed as a precaution. – **Recommendation:** Investigation work recommended, to include groundwater sampling (if present).
PL5	– Sulphate attack on concrete.	– Building structure.	– Sulphate (made ground).	Likely	Mild	**Moderate** / Low	– Likely probability as made ground anticipated, which may be in contact with concrete used in future buildings. – Until ground conditions are confirmed moderate risk assumed. – **Recommendation:** Intrusive investigation required, to include sulphate and pH testing.
PL6	– Ingestion of tainted water supply.	– Future site users. – Water pipes.	– Organic Contaminants such as hydrocarbons, solvents (made ground, timber yard, smithy, warehouses / works, car park).	Likely	Medium	**Moderate**	– Likely probability as made ground may be present at pipeline depth. – **Recommendation:** Investigation work required to confirm ground conditions. To include organic testing at anticipated pipeline depth.

Table 2-6. Preliminary Contamination Conceptual Model.

3 Ground Investigation

3.1 Site Investigation Design and Methodology

In order to assess the ground conditions at the site and to investigate the potential pollutant linkages identified in the preliminary contamination conceptual model an intrusive investigation was undertaken.

The investigation was carried out on 9th November 2021 and 6th-9th December 2021 and comprised the following:

- 4no. window sample boreholes drilled to 1.00-5.45 metres below ground level (mbgl) (ref. WS101 to WS103 & WS103A).
- 3no. cable percussion boreholes drilled to 2.30-7.30mbgl, with rotary follow on in CP101 and CP102A to 14.90 and 16.10mbgl respectively. Cable percussion boreholes are referenced CP101, CP102 and CP102A and the relevant rotary follow on boreholes are referenced RCP101 and RCP102A.
- 2no. hand dug pits (using hand auger / spade) excavated to 0.20-0.80mbgl (ref. HD101 to HD102).

Cable percussion boreholes were carried out to allow an assessment of the deeper ground conditions for geotechnical purposes. Rotary follow on was undertaken for geotechnical purposes to assess the conditions of the sandstone bedrock.

Hand dug pits were undertaken in areas where access was restricted to drilling rigs. The 2no. hand dug pits (HD101 and HD102) were terminated at 0.80mbgl and 0.20mbgl respectively due to brick / concrete obstructions.

WS103 had to be repositioned due to an obstruction offsetting the drilling casing. The repositioned borehole is referenced WS103A.

CP102 had to be repositioned due to an obstruction encountered at 2.30mbgl. The repositioned borehole is referenced CP102A (with rotary follow on RCP102A).

All site investigation locations are shown in Figure 4.

The locations were chosen to allow a good coverage across the site as well as target areas of concern. Table 3-1 details the targeted and general coverage (non-targeted) site investigation locations.

Site Investigation Locations	Rationale
WS103 & WS103A	Location of former Smithy and general site coverage.
HD101 & HD102	Undertaken in areas inaccessible with drilling rig and general site coverage. Locations of former buildings and close to former timber yard.
WS101, WS102, CP102, CP102A	Location of former unreferenced buildings, public house (WS102) and general site coverage.
CP101	Close to former unreferenced buildings and former possible plastic goods factory.

Table 3-1: Summary of sampling locations.

The number of site investigation points corresponds to approximately one location per 13m square centres. This is considered to be a conservative sampling density and is in line with BS10175[11] for a 'main investigation'.

3.2 Well Installations

4no. boreholes (WS101, WS102, WS103A & CP102A) were installed with monitoring wells for gas and groundwater monitoring and groundwater sampling. Monitoring wells were installed in accordance with BS10175 and CIRIA C665[12] and generally comprised approximately 1m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

The response zones for the window sample boreholes were generally installed along the entire length of the borehole. The response zone in WS101 was installed between 0.50-1.50mbgl due to collapsing strata.

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

3.3 Sampling Protocol

3.3.1 Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation[13].

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds (TVOCs) using a PhoCheck Tiger photoionisation detector (PID). Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665[14] to aid in screening samples for volatile analysis.

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.

[11] British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2017.
[12] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.
[13] EA (2000). "Technical Aspects of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.
[14] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

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

Contaminants	No. Samples	Location & Depth	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	8	WS102 0.1-0.6m WS102 1.0-2.0m WS103A 1.0-2.0m HD101 0.25-0.5m HD101 0.5-0.8m HD102 0.05-0.2m CP101 0.1-0.5m CP102 0.1-0.4m	A basic suite with a broad selection of contaminants tested on samples across the site at a range of depths where no significant evidence of contamination was identified (with the exception of ash, coal, brick) and no TVOCs identified from the PID tests.
Metals / metalloids, pH, water soluble sulphate, cyanide suite, phenol, TPHCWG, BTEX, MTBE, speciated PAHs, VOCs, SVOCs, SOM and asbestos screen.	2	WS101 0.1-1.1m WS103A 0.1-1.0m	Although no significant evidence of VOC/SVOCs, a more detailed suite including volatile contaminants included to confirm the contamination risk on 2no. samples across the site where relatively deep made ground was encountered.

Table 3-2. 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; TPHCWG=carbon banded and aromatic/aliphatic split petroleum hydrocarbons; PAH=polycyclic aromatic hydrocarbons, BTEX=benzene, toluene, ethylbenzene and xylenes; MTBE=Methyl tert-butyl ether, SOM=Soil Organic Matter.

3.3.2 Water Sampling

To establish the condition of shallow groundwater LKC undertook 1no. groundwater sample. CP102A (cable percussive borehole with rotary follow on) was installed with a monitoring well in order to retrieve a groundwater sample as the window sample boreholes were recorded as dry or had limited groundwater during the gas and groundwater monitoring visits.

Sample collection was undertaken using a low flow sampling pump using thin walled tubing to encourage laminar flow and minimise the potential loss of volatiles during sampling. The borehole was purged of all standing water and the sample collected from the recharged water. The sample was collected in glass and plastic bottles and a glass vial. A water meter was used to test the pH, temperature and conductivity before sampling until equilibrium conditions were met, as per BS10175[15] guidelines.

The water sample was placed in a glass bottle, plastic bottle and septum topped vial and stored in ice packed cool boxes. The samples were sent to Chemtest on the same day for analysis.

Sampling was carried out in accordance with BS5930[16] and BS5667-11[17].

[15] British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2017.
[16] British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.
[17] British Standard (2009). "Water Quality – Sampling. Part 11: Guidance on Sampling of Groundwaters". BS ISO 5667-11:2009.

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

Contaminants	No. Samples	Location	Justification
Metals / metalloids, pH, sulphate, cyanide suite, TPHCWG, BTEX, MTBE, speciated PAHs, phenol, VOCs, SVOCs and hardness.	1	CP102A	Detailed suite undertaken to confirm the contamination risk.

Table 3-3. Summary of groundwater sampling tests undertaken.
Notes:
Metal/metalloids=arsenic, cadmium, chromium, (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc and boron; TPHCWG=carbon banded and aromatic/aliphatic split petroleum hydrocarbons; PAH=polycyclic aromatic hydrocarbons, BTEX=benzene, toluene, ethylbenzene and xylenes; MTBE=Methyl tert-butyl ether, VOC=Volatile organic Compounds, SVOC= Semi Volatile Organic Compounds.

3.4 Gas Monitoring

Four gas monitoring visits have been undertaken over a 4-week period in the window sample borehole installations.

Monitoring was undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665[18] (flow rate measured first). The monitoring was undertaken over a range of weather conditions (including low and falling barometric pressure and heavy rain) to demonstrate worst-case conditions.

In addition, a photoionisation detector (PID) was used to record total volatile organic compounds (TVOCs) in this borehole during Visits 2 and 4.

WS102 was covered by a vehicle during the first visit therefore no data is available from this borehole for visit 1.

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

3.5 Geotechnical Testing

3.5.1 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 window sample boreholes and cable percussion boreholes at approximately 1m intervals, generally within the natural strata.
- Pocket penetrometer tests (giving undrained shear strength) were performed in the window sample boreholes at approximately 1m intervals, within the natural clay strata.

The SPT and pocket penetrometer readings are provided within the profile logs (Appendix B).

[18] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

3.5.2 Laboratory Geotechnical Testing

Soil samples taken during the investigation were collected in tubs, bulk bags and sealed U100 tubes. Rock samples were recovered from rotay coring. Samples scheduled for testing were sent to Murray Rix and Chemtest Laboratories for geotechnical testing.

Table 3-4 shows the geotechnical testing undertaken. Many of the tests are UKAS accredited and further details are given in the laboratory report presented in Appendix D. pH and water soluble sulphate testing was also included as part of the contamination testing (see Table 3-2).

Suites and Contaminants	No. Samples	Location	Justification
BRE SD1	4	WS101 0.1-1.1 WS102 3.5-4 WS103A 1-2 WS103A 4-4.5	Undertaken to aid concrete classification.
Atterberg Limits (plasticity testing)	1	CP101 3.7-4.0m	Tested to assess the shrinkability potential.
Unconfined Compressive Strength (UCS)	4	RCP101 11.9-12.06m RCP101 14.6-14.84m RCP102A 9.0m RCP102A 12.1-12.3m	Undertaken on selected core to assess the strength of the sandstone.
Point Loads (PL)	2	RCP101 9.9m RCP102A 8.0m	PL were undertaken to further categorise the strength of the recovered core.
Single Stage Triaxial	1	CP101 4.3-4.75m	Undertaken to confirm the strength of the clay strata.

Table 3-4. Summary of geotechnical testing undertaken.

4 Ground Conditions

4.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground underlain by natural cohesive strata to depths of between 4.0m and 5.4mbgl which is further underlain by granular strata to depths of between 6.2m and 6.5mbgl. Bedrock of red sandstone was encountered at the base of the cable percussive boreholes. A summary section of the logs is provided in Plate 4-1, with additional comments below.

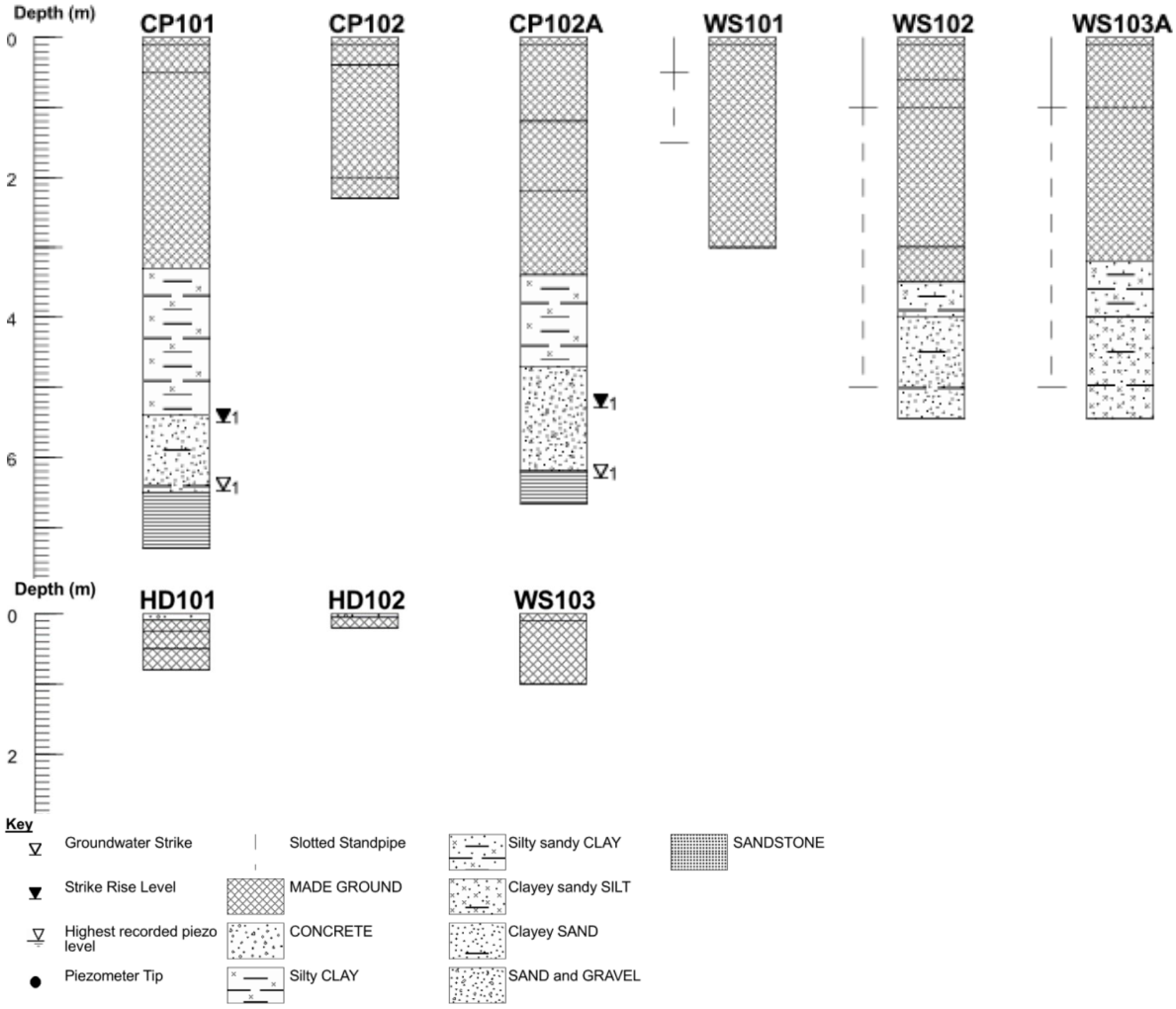


Plate 4-1: Summary of ground conditions.

Additional information on ground conditions:

- Made ground was recorded from depths of 0.2-3.5mbgl and generally consisted of gravel / sand / clay with brick, ash, coal and concrete. Exceptions to this were:
  - WS101 1.4-1.6mbgl - predominantly brick crush.
  - WS102 1.0-3.0mbgl – sandy clayey gravel (reworked).
  - HD101 0.5-0.8mbgl – predominantly ash and coal.
- No visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations.
- The depth of made ground was not proven in the hand dug pits (HD101-HD102).

- In-ground structures were identified in:
  - HD101 (possible brick/cobble at 0.8m).
  - HD102 (possible concrete at 0.2m).
  - BH2 (unknown obstruction at 2.3m).

Superficial deposits comprised soft to firm variably silty sandy CLAY underlain by loose to very dense granular deposits of slightly sandy clay and clay bound SANDs and GRAVELs to depths of between 6.2-6.5mbgl. Soft clayey sandy SILT was recorded wihtin WS103A from a depth of 4.00mbgl to the base of the exploratory hole. .

Red SANDSTONE was encountered at the base of the cable percussive boreholes and proven to a depths of 14.9-16.1mbgl within the rotary cored boreholes. Parameters including total and solid core recovery)TCR and SCR), rock quality designation (RQD) and fracture indices (FI) are included on the profile logs in Appendix B.

4.2 Groundwater

4.2.1 Groundwater Levels

Groundwater strikes were recorded during the investigation in boreholes. In addition, groundwater monitoring within the window sample borehole wells has been undertaken on four occasions. One return visit has been undertaken for CP102A.

Results are summarised in Table 4-1.

BH	Water Strike Depths (mbgl)	Well Response Zone (mbgl)	No. of Monitoring Visits	Monitoring Depths (mbgl)			Sample Taken?	Evidence of Contam?
				Min	Max	Base		
WS101	Dry	0.5-1.5 (MG)	4	Dry	Dry	1.47-1.55	N	N
WS102	Dry	1.0-4.5 (MG/C/S)	4	4.36	Dry	4.34-4.43	N	N
WS103	Dry	-	-	-	-	-	-	-
WS103A	Dry	1.0-5.0 (MG/C/Si)	4	4.1	Dry	4.6-4.8	N	N
CP101	6.5	-	-	-	-	-	-	-
CP102	Dry	-	-	-	-	-	-	-
CP102A	6.3	1.0-15.0 (MG/C/SG/SST)	1	5.57	5.57	14.90	Y	N
HD101	Dry	-	-	-	-	-	-	-
HD102	Dry	-	-	-	-	-	-	-

Table 4-1: Summary of water strike depths within boreholes and trial pits.
Response Zones:
MG=Made Ground; SST = Sandstone; SG=Sands and Gravel; S=Sand; C=Clay; Si=Silt.

4.3 In-Situ Geotechnical Testing

4.3.1 Standard Penetration Tests

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

Approximate Depth (mbgl)	SPT 'N' Values					
	WS101	WS102	WS103A	BH101	BH102	BH102A
1-2	21 (MG)	12 (MG)	10 (MG)	4 (MG)	7 (MG)	42 (MG)
2-3	12 (MG)	10 (MG) 39 (MG)	18 (MG)	6 (MG)	>50 (MG)	13 (MG)
3-4	-	-	3 (MG/C)	9 (C)	-	10 (MG/C)
4-5	-	10 (S)	0 (Si)		-	>50 (S/G)
5-6	-	10 (S)	13 (Si)	13	-	>50 (S/G)
6-7	-	-	-	>50 (SST)	-	>50 (SST) >50 (SST)
7-8	-	-	-	>50 (SST)	-	-
GW Level	Dry	4.36-Dry	4.1-Dry	6.3-6.5	Dry	5.57-6.3

Table 4-2: Summary of SPT (N) values.
Notes:
MG=Made Ground; C=Clay; Si=Silt S=Sand, G=Gravel, SST= Sandstone.
Groundwater level based on strikes during investigation and monitoring data.

4.3.2 Pocket Penetrometer Tests

Pocket penetrometer tests, recording undrained shear strength (s_u), were taken within the superficial clay strata. The results are summarised in Table 4-3 and provided within the profile logs in Appendix B.

Approximate Depth (mbgl)	Average Undrained Shear Strength (kN/m^2)	
	WS101	WS103A
0-1	-	-
1-2	-	-
2-3	-	-
3-4	32.7	33.0
GW Level	Dry	4.1-Dry

Table 4-3: Summary of average hand shear vane readings.
Notes:
Groundwater level based on strikes during investigation and monitoring data.
Pocket penetrometer readings can be influenced by coarse material including silt.

4.4 Geotechnical Laboratory Testing

4.4.1 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 4-4.

Table 4-4 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	3.7-4.0	29	57	21	36	CH	100	36

Table 4-4: Summary of plasticity index testing.

The modified plasticity index is 36%. This characterises the clay as having a medium volume change potential.

4.4.2 *Single Stage Triaxial Test*

Single stage triaxial testing has been undertaken on one samples of the natural clay strata. The results are presented in Appendix D and summarised in Table 4-5.

Location	Depth (mbgl)	Material Description	Undrained Shear strength (kPa)
CP101	4.3-4.75	Firm brown silty sandy CLAY with rare gravel	54

Table 4-5: Summary of single stage triaxial results.

4.4.3 *Unconfined Compressive Strength*

Unconfined compressive strength tests were carried out on the sandstone bedrock samples. Full results are presented in Appendix D and summarised in Table 4-6.

Location	Depth (m)	Material Description	Length / Diameter Ratio	Maximum Strength (MPa)
CP101	14.60-14.84	SANDSTONE	2.02	20.1
CP102A	12.1-12.3	SANDSTONE	2.05	10.1

Table 4-6: Summary of Unconfined Compressive Strength.

4.4.4 *Point Load Tests*

Point Load Tests have been undertaken on samples of the sandstone bedrock. The results are presented in Appendix D and summarised in Table 4-7.

Location	Depth (mbgl)	Material Description	Diameter (mm)	$I_{s(50)}$ (MPa)
CP101	9.90	Sandstone	85.0	0.14
	11.90-12.06	Sandstone	84.0	0.09
CP102A	8.00	Sandstone	84.0	0.31
	9.00	Sandstone	84.0	0.26

Table 4-7: Summary of Point Load Test results.

4.4.5 *Sulphate and pH*

Water soluble sulphate and pH tests were carried out on soil and groundwater samples. Full results are presented in Appendix C (soils) and Appendix E (groundwater) and summarised in Table 4-8.

Strata	pH		Sulphate	
	Soil	Groundwater	Soil (g/l)	Groundwater (mg/l)
Made Ground	8.1-11.0	8.3	0.021-1.5	450
Natural	8.0-8.1		0.46-0.96	

Table 4-8: Summary of pH and sulphate results.

5 Geotechnical Assessment

5.1 Proposed Development

It is understood that the proposed development will comprise 1no. 10-storey apartment block and 1no. part 10-storey and part 14-storey apartment block.

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

The depths of any underground engineering works (sewers etc.) are unknown and therefore have not been taken into account in the following assessment. It is considered that any such works will be designed so as not to have an effect on, or compromise, proposed or existing foundations or ground stability.

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 typically comprises Made Ground up to 3.50mbgl over natural granular and cohesive superficial deposits of SAND and CLAY over bedrock of SANDSTONE.

5.3 Site Preparation

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

- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development foot print with the resulting void backfilled.

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

5.4 Foundation Conditions and Bearing Capacity

5.4.1 General

It is considered that the Made Ground are not suitable for a founding material due to the inherent variability of the material. Foundation options are therefore:

- Conventional strip footings on vibro granular columns; or
- Deeper pile foundations.

These options are discussed below:

5.4.2 *Ground Improvement*

The use of ground improvement techniques such as vibro granular columns will allow shallow foundations to be utilised with the Made Ground. The vibro granular columns should provide a bearing capacity of around 150kN/m² but will also remove variability within the Made Ground. Specialist advice should be sought from a suitably experienced contractor with regard to allowable bearing capacity and settlements.

5.4.3 *Piled Foundations*

Given the limited depth of superficial cover, consideration should be given to piled foundations, socketed into the bedrock.

Piled foundations will fully penetrate the thick Made Ground and end bear on the competent Chester Formation Sandstone. Piles should penetrate a suitable distance into the Chester Formation in order to generate sufficient carrying capacity from a combination of skin friction and end-bearing.

Driven piles are not ideally suited to the ground conditions since they may encounter hard driving when attempting to penetrate dense sands and stronger cemented layers of rock. The noise and ground vibration induced by pile driving is likely to be unacceptable to residents and neighbouring structures.

It is considered that rotary drilling would provide a suitable method of installing piles even though the boring process tends to loosen the ground and reduces its carrying capacity. Rotary bored piles would require to be temporarily cased through the Made Ground, weathered sands and weak sandstones to prevent collapse of the pile bores and to control groundwater flows.

Bentonite drilling fluid could be used to improve the stability of the uncased sections but may be environmentally unacceptable in the Chester Formation, which is a Principal Aquifer. Advice from the Environment Agency should be sought regarding the use of bentonite and other forms of grout. The use of bentonite may also impact upon the carrying capacity of the piles; even if a high level of workmanship and supervision was maintained.

Alternatively continuous flight auger (CFA) piles could be considered to carry modest or temporary construction loads down to the unlithified sands at relatively shallow depth. However, CFA rigs may have difficulty in penetrating far into the weathered dense sands and cemented sandstones without switching to rock cutting attachments. Such a process would require the use of temporary casing to support the pile bore whilst the auger is withdrawn and modified.

The estimated loads given in this report are only intended for use in the preliminary design, for the detailed design the piling contractor must make their own assessment of the ground investigation data and calculate pile carrying capacities using their own experience of similar ground conditions and installation techniques. The estimated loads given in Table 5-1 are for single isolated bored piles, calculated using static design methods. The effects of group action must be considered when the pile layout has been finalised.

For preliminary purposes the following initial pile carrying capacities have been calculated. When undertaking these preliminary calculations the following parameters have been used:

- Unconfined Compressive Strength values from Tables 4-6 and 4-7;
- Partial Load Factors 2 on side resistance and 3 on base resistance.

Depth	Pile Carrying Capacity (kN)		
	300mm dia.	450mm dia.	600mm dia.
10.00	500	1060	1828
13.00	584	1188	1998
16.00	669	1315	2168

Table 5-1: Preliminary Pile Carrying Capacity.

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.

Consideration must be given to the significant thickness of Made Ground cover having a potential effect upon a piled foundation solution from negative skin friction. 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.

Recommendation

A vibro ground improvement will offer a bearing capacity of 150kN/m^2 but this is not considered enough for the proposed development and it is considered that a piling solution will provide the most reliable and cost-effective option for the site.

5.5 Ground Floor Slabs

A piled foundation solution is considered the most economic foundation solution and as such it is recommended that a suspended or piled floor is utilised to minimise the potential for differential settlement between the floor and shell of the structure.

5.6 Pavement Construction

For areas of hard standing/vehicle parking, untreated Made Ground is considered unsuitable as a sub-grade due to its potential variability and potentially low strength/high compressibility. It should be removed to a depth of 0.5m below formation level and sorted to remove any unsuitable or deleterious materials. The sub formation should be rolled and suitable excavated material can then be replaced, up to formation level, in fully compacted thin layers. Any deficit should be made up with suitable imported fill compacted as above. Following this treatment an overall design CBR of 2-5% should be available, although this will require confirmation at a later date through in-situ CBR tests.

5.7 Drainage

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

5.8 Concrete Durability

Based upon the results of the chemical analyses summarised in Table 4-8 it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-2, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.9 Excavations

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

Due to the variability of the Made Ground it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97[19].

5.10 Further Works

During the course of this investigation, areas of the site were not able to be accessed due to the presence of structures preventing access. It is recommended that post demolition of the structures, further investigation is undertaken to characterise the depth to bedrock and recover core samples for subsequent geotechnical laboratory testing.

5.11 Construction Activity and Inspection

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

- Due to the variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction;
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 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).

[19] CIRIA Report 97 – Trenching Practice – Second Edition (2001 revision)

6 Generic Risk Assessment

6.1 Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM[20]). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

6.2 Soil Risk Assessment

6.2.1 Methodology

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

- Category 4 Screening Levels (C4SLs).
- LQM Suitable 4 Use Levels (S4ULs).
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs).

C4SLs were published in 2013[21,22]. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))[23] 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 S4ULs[24]. 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[25,26,27,28].

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs[29]. 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

[20] Land Contamination Risk Management (LCRM) https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
[21] Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."
[22] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[23] EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.
[24] LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."
[25] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.
[26] EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.
[27] EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.
[28] EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.
[29] CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

PAHs[30,31] and naphthalene the most volatile and soluble[32]. 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 negligible[33]. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)[34] and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

The proposed development is for residential apartments with commercial floor space and no soft landscaping, therefore the assessment criteria for residential without plant uptake has been used.

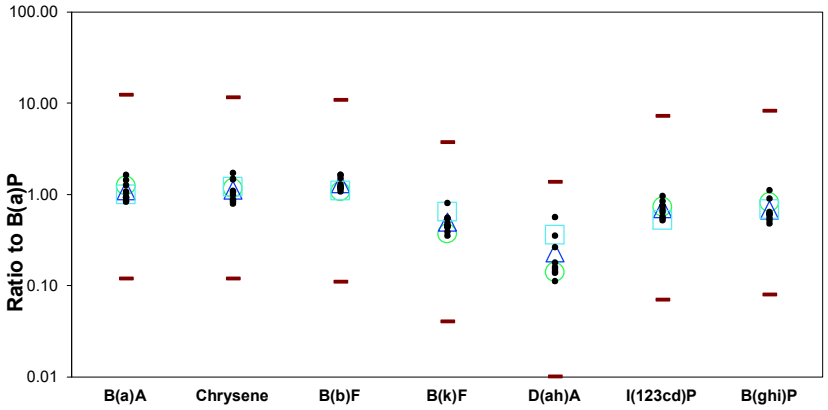
All criteria have been generated using the CLEA V1.06 model[35] based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

A summary of the generic assessment criteria is provided in Appendix G. ATRISK SSVs were not required for this dataset and have not been included.

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*[36], 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 10 samples (where values were >LOD to allow the calculation of a ratio).

[30] EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.
[31] USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."
[32] EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5- 079/TR1.
[33] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[34] HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.
[35] EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.
[36] 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.

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)

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.

Other Contaminants with no C4SLs, LQM S4ULs, ATRISK SSVs or CL:AIRE GACs

Where generic assessment criteria have not been derived (mainly due to insufficient toxicological data), the results were compared against contaminants of assumed likely similar toxicity (with some conservatism) as shown below:

- 2-methylnaphthalene: compared to residential without plant uptake criteria S4UL for naphthalene (13mg/kg 6% SOM). LKC considers this appropriate given that the guidance provided on the ATSDR website[37] indicates that the oral toxicity of 2-methylnapthalene is within an order of magnitude to that of naphthalene, although it was unknown what an appropriate inhalation reference dose is.
- Dibenzofuran and carbazole: compared to residential without plant uptake C4SL for benzo(a)pyrene (5.3mg/kg). These contaminants are a bi-product of organic combustion but can be naturally occurring. The Material Safety Sheets indicates these compounds are not volatile and considering there is no toxicological information available, LKC compared the analytical results to one of the most toxic PAH as a precaution.
- 4-Isopropyltoluene: compared to residential without plant uptake S4UL for toluene (3,900mg/kg 6% SOM).
- 1,3,5-Trimethylbenzene: compared to GAC for 1,2,4-Trimethylbenzene (2.3mg/kg 6% SOM).

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.

[37] ATSDR (2005). Public Health for naphthalene, 1-methynapthalene and 2-methynapthalene.

Contaminant	Units	No. of samples	Elevated Results	Sample Location	Criteria (2.5%)	Source of Criteria
Metals						
Lead	mg/kg	12	680	WA103A (0.1-1m)	200	C4SL
			2,000	WS103A (1-2m)		
			320	HD101 (0.25-0.5m)		
PAHs						
Benzo(a)pyrene	mg/kg	12	31	WS101 (0.1-1.1m)	5.3	C4SL
			6.9	WS103A (0.1-1m)		
			21	CP101 (0.1-0.5m)		
			7.9	CP102 (0.1-0.4m)		
Naphthalene	mg/kg	12	19	CP101 (0.1-0.5m)	5.6	S4UL
GENERAL						
pH	pH	12	Range 8.0 to 11.0			
SOM	%	12	Range 1.3 to 38			
Asbestos	N/A	12	No asbestos 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.

No asbestos was identified in any soil samples analysed.

Elevated results have been identified for lead (WS103A, HD101), Benzo(a)pyrene (WS101, WS03A, CP101, CP102) and naphthalene (CP101).

As no significant concentrations of petroleum hydrocarbons were identified in any of the soil samples a hazard index (HI) as described by the Environment Agency[38] technical report (to examine the potential additivity of toxicological effects between the petroleum hydrocarbon fractions) has not been undertaken as part of this assessment.

6.2.3 *Direct Contact Risk – Pollutant Linkage 1*

No pollutant linkage identified as no soft landscaping is shown on ground floor proposed development plans, therefore no further assessment required.

6.2.4 *Risk from Inhalation of Vapours – Pollutant Linkage 2*

Elevated naphthalene (19mg/kg) was identified in one sample of made ground (CP101 0.1-0.5m), located in the southern area of the site. The elevated naphthalene could represent a vapour risk to the proposed development. The contamination is likely to be from the ash or tarmacadam fragments identified in the made ground in this location.

The elevated naphthalene may pose a risk to site users via the inhalation of vapours.

The probability of vapours posing a risk to site users in the localised area around CP101 is considered to be likely. With a medium consequence, the risk is expected to be moderate. Localised remediation of the shallow site soils is recommended.

No other elevated volatile contaminants were identified. The PID did not detect any TVOCs. The probability of vapours posing a risk to site users across the remainder of the site is considered to be unlikely. With a medium consequence, the risk is expected to be low and no further investigation / assessment is recommended.

[38] EA (2005). "The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils." Science Report P5-080/TR3.

6.3 Gas Risk Assessment

Four gas monitoring visits have been undertaken on the study site. Gas monitoring results in full are presented in Appendix F. Following guidance set out in CIRIA C665[39] and BS8485[40] peak methane and carbon dioxide concentrations have been used in the gas risk assessment. In addition, and as per guidance, flow rates were measured first.

It should be noted that four gas visits have been undertaken over a time period of four weeks to give an indication of the gas risk. This would be in line with a very low generation potential and a low sensitivity of development (ground floor commercial) in CIRIA C665. No gas monitoring visits were undertaken in worst-case conditions (e.g. low and falling barometric pressure).

All gas concentrations, flow, pressure and groundwater levels are shown on Table 6-2.

Boreholes	Visit	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	H_2S (ppm)	CO (ppm)	Flow (l/h)	Groundwater (mbgl)	Pressure (mb)
WS101	1	<0.1	0.7	20.5	<0.1	<0.1	-0.1	Dry	1020 (r)
	2	<0.1	0.6	21.2	<0.1	<0.1	<0.1	Dry	1017 (v)
	3	0.1	0.3	21.4	<0.1	<0.1	<0.1	Dry	1011 (r)
	4	<0.1	0.4	20.8	<0.1	<0.1	<0.1	Dry	1019 (v)
WS102	1	UR	UR	UR	UR	UR	UR	UR	UR
	2	<0.1	1.0	20.5	<0.1	<0.1	<0.1	Dry	1017 (v)
	3	0.1	0.8	21.4	<0.1	<0.1	0.1	Dry	1012 (r)
	4	0.1	0.7	20.5	<0.1	1.0	<0.1	4.36	1018 (v)
WS103A	1	<0.1	3.8	15.2	<0.1	<0.1	<0.1	Dry	1020 (r)
	2	<0.1	1.5	19.5	<0.1	<0.1	<0.1	Dry	1017 (v)
	3	0.1	2.6	18.4	<0.1	<0.1	<0.1	4.1	1012 (r)
	4	<0.1	3.8	15.0	<0.1	<0.1	<0.1	4.6	1019 (v)

Table 6-2: Summary of gas monitoring.

Notes:

If concentrations / flow is zero, then equipment detection limits are assumed.
Table shows peak concentrations of CH_4, CO_2, O_2, H_2S and CO.
UR=unable to record as a vehicle was parked over the monitoring well.
Atmospheric pressure (over past 24hrs): r=rising, v=variable.

Gas Screening Value

In accordance with CIRIA C665, a Gas Screening Value (GSV) may be calculated. Assuming worst-case scenario maximum gas concentrations and flow for each borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS).

Table 6-3 shows the maximum GSV for each borehole and the appropriate characteristic situation (based on GSV only). An overall site assessment (WS101-WS103A) has also been included (worst case values across the site).

[39] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.
[40] BSI (2019). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings." BS8485:2015+A1 2019.

Boreholes	Max GSV (l/hr)	CS
WS101	0.0007	CS1
WS102	0.001	CS1
WS103A	0.0038	CS1
WS101-103A	0.0001(CH_4) 0.0038 (CO_2)	CS1

Table 6-3: Summary of worst-case Gas Screening Values (GSV).
Notes:
CS – Characteristic Situation.

No elevated carbon dioxide concentrations (above 5%v/v) or methane concentrations (above 1%v/v) have been recorded during the monitoring visits. The flow rates recorded were predominantly <0.1l/h, with the exception of a flow of -0.1l/h in WS101 during visit 1, and a flow of 0.1l/h in WS102 during visit 3. No elevated carbon monoxide was recorded.

Despite relatively deep made ground encountered during the investigation (up to a depth of 3.50mbgl), no highly organic or putrescible material was identified.

Further gas monitoring will ultimately be required to confirm the risk assessment due to the number of gas monitoring visits undertaken at the site to date and the frequency of the visits.

Given the minimal methane and carbon dioxide concentrations recorded, the low flow rates and the round conditions encountered, LKC consider the probability of hazardous gas affecting site users as unlikely at this stage. Assuming a severe consequence, there is a moderate/low risk. Based upon the prevailing ground conditions a low risk is assumed.

6.4 Controlled Water Assessment

LKC considers the Principal Aquifer as the primary receptor.

LKC have compared results above Limits of Detection (LOD). Where relevant the review of priority substances takes precedence considering threshold values for groundwater cannot be used '*as part of site-specific investigations*'. The hierarchy is as follows:

- 2016 private water supply standards (UKDWS potable)[41].
- 2001 Environment Agency Values for Environmental Quality Standards (EQS) and UK Drinking Water Standard (UKDWS)[42].

No elevated contaminants above limits of detection were identified in the water sample and there was no evidence of a significant mobile source of contamination during the investigation works. Any infiltration into the ground is likely to be limited as the proposed development is hardstood. Superficial clay recorded on site is also likely to limit any migration.

Given the distance of the River Irwell from site, its location in relation to site and and its size, it is not considered to be a primary receptor. As no significant mobile source

[41] Statutory Instruments (2016). "The Private Water Supplies Regulation 2016." No. 614
[42] EA (2002). "Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the Environment Protection Act 1990."

of contamination was identified, LKC considers the migration of contaminants to the surface water receptor as unlikely.

Based on the above, LKC considers the probability of contaminants affecting the Principal Aquifer and River Irwell as unlikely. Given the medium consequence is anticipated (Pollutant Linkage 4) and no remediation is required.

6.5 Additional Risk Assessments

6.5.1 Concrete (Pollutant Linkage 5)

As stated in Section 5, sulphate resistant concrete will be required at the site. The site was classified as DS-2 AC-2.

Based on the above, the probability of sulphate concentrations affecting buildings is likely. Given the consequence is considered to be mild, the risk (pollutant linkage 5) is anticipated to be moderate / low. A moderate risk is considered appropriate and remediation (sulphate resistant concrete) is required. This should be confirmed with the structural engineer.

6.5.2 Potable Water Supply (Pollutant Linkage 6)

Soil results were compared to United Utilities (UU) guidelines for the selection of potable water pipes in land potentially affected by contamination[43]. Only contaminants of concern, based on the preliminary conceptual model and ground conditions encountered, were analysed. The following contaminants were not considered to be a risk and therefore not included in the analysis suites: ketones and aldehydes.

The following elevated contaminants were identified:

- Elevated TVOCs (inc. naphthalene) and TSVOCs (carbazole) in made ground in WS101 (0.1-1.1m) and WS103A (0.1-1m).

It should be noted typical pipework depths are 0.75mbgl to 1.35mbgl. Further elevated TVOCs (inc. naphthalene) were identified in two locations across the site (WS101 0.1-0.6m and CP102 0.1-0.4m), however these are not at typical pipework depths.

Barrier pipe is likely to be required across the site subject to the depth and location of the water pipes and in consultation with UU.

Once details of the pipeline location and depths are known a UU Risk Assessment should be undertaken.

At this stage, the probability of organic contaminants affecting potable water pipes is likely. Given the consequence is considered to be medium, the risk (pollutant linkage 6) is anticipated to be moderate and remediation (i.e. barrier pipe) is likely to be required subject to consultation with United Utilities.

6.6 Revised Contamination Conceptual Model

The preliminary contamination conceptual model (Table 2-6) has been revised following the risk assessments undertaken in Sections 6.1-6.5. The revised contamination conceptual model follows the same methodology and guidance used in

[43] UU(2011). "United Utilities Water Supplementary Guidance for the Selection of Water Pipes in Land Potentially Affected by Contamination."

the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

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

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

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

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

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

Further details of the remedial proposals and a remedial option appraisal are given in Section 9.

Pollutant Linkage	Pathway	Receptor	Contaminant	Probability	Consequence	Risk	Assessment
PL1	- No viable pathways (dermal contact, inhalation, ingestion).	- Future site users. - Offsite receptors.	- ACM, organic and inorganic contaminants.	-	-	-	- No viable human health pathways as no soft landscaping propose at ground level. - No pollutant linkage therefore no further assessment required *1,2.
PL2	- Inhalation of vapours. - Migration through permeable strata and preferential pathways.	- Future site users. - Offsite receptors.	Volatile Contaminants (S area only localised around CP101): - Naphthalene.	Likely	Medium	**Moderate**	- Likely probability in localised area in south of the site based on elevated concentration of naphthalene identified. - **Recommendation**: Localised remediation required.
			Volatile Contaminants (remainder of site): - None identified.	Unlikely	Medium	**Low**	- No elevated volatile contaminants across remainder of the site. - **Recommendation:** No remediation required.
PL3	- Inhalation of gas. - Migration through permeable strata and preferential pathways. - Explosion in confined spaces (methane only).	- Future site users. - Buildings. - Offsite land users.	- Hazardous Gas (carbon dioxide, methane).	Unlikely	Severe	Moderate / **Low**	- No elevated carbon dioxide or methane identified. - Low risk assumed given monitoring data and prevailing ground conditions. - **Recommendation:** No remediation required.
PL4	- Surface Run-off. - Migration through permeable strata and preferential pathways - Perched waters migration.	- Groundwater (Principal Aquifer). - Surface water (River Irwell).	- Mobile inorganic and organic contaminants.	Unlikely	Medium	**Low**	- No elevated contaminants and no significant mobile source of contamination identified. - **Recommendation:** No remediation required.
PL5	- Sulphate attack on concrete.	- Building structure.	- Sulphate.	Likely	Mild	**Moderate** / Low	- Elevated sulphate identified therefore moderate risk considered appropriate. - **Recommendation:** Sulphate resistant concrete in line with DS-2 AC-2.
PL6	- Ingestion of tainted water supply.	- Future site users (via potable water).	Organic Contaminants: - TVOCs (naphthalene), TSVOCs (carbazole).	Likely	Medium	**Moderate**	- Likely probability as elevated VOCs/SVOCs encountered which could permeate water pipes and contaminate water supply. - **Recommendation:** UU risk assessment undertaken. Barrier piping likely to be required.

Table 6-4: Revised Contamination Conceptual Model.

Notes*[1] Although no ACM identified, contractors should be vigilant during earthworks of any potential ACM. This is discussed further in Section 9.1.

[2] The conceptual model only takes into consideration the future use of the site and long-term exposure. Consideration should also be given to the short-term exposure of construction workers and nearby land users to ACM containing soils during groundworks. This is discussed further in Section 9.1.

7 Waste Disposal Assessment

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

As an initial screen the soil results were inputted into Hazwaste Online™. This is a web-based facility that allows an assessment waste as either hazardous or non-hazardous waste based on relevant guidance and legislation[44, 45 ,46,47 ,48 ,49, 50, 51, 52].

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

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

Where applicable, appropriate metal species based on hazard statements/ molecular weight, site history, ground conditions and likely species present in soils were used (e.g. metal oxides relating to an ash based source).

The results show that all the samples tested are classified as NON-HAZARDOUS WASTE and LoW code “17-05-04 - soil and stones other than those mentioned in 17 05 03” is suitable. The Hazwaste Online™ output sheets are provided in Appendix H.

[44] EA (2018). “Guidance on the Classification and Assessment of Waste (1st Edition v1.1)”. Technical Guidance WM3.
[45] CLP Regulation - Regulation 1272/2008/EC of 16 December 2008.
[46] 1st ATP - Regulation 790/2009/EC of 10 August 2009
[47] Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
[48] WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
[49] Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
[50] 13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
[51] POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
[52] 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

8 Conclusions

8.1 Geotechnical

Geotechnical observations and conclusions are contained in Table 8-1 below, more detailed discussions are contained within Section 5.

Proposed Development	- 1no. 10-storey apartment block to comprise residential apartments and car parking spaces at ground level. 1no. part 10-storey and part 14-storey apartment block to comprise residential apartments and commercial floor space at ground level.
General Ground conditions / Geotechnical Testing	- Based on BH1-BH2A, WS101-WS103A, HD101-HD102. - Maximum investigation depth 16.10mbgl. - Made Ground to 3.2m-3.4mbgl. - Variably silty sandy gravelly CLAY to 4.7-5.4mbgl, silty SAND & clay bound SAND and GRAVEL to 6.2m-6.5mbgl. - SANDSTONE bedrock below 6.2m-6.5mbgl. - Groundwater encountered during investigation at depths of between 6.3m & 6.5mbgl, rising to 5.3m and 5.5mbgl respectively after 20minutes.
Allowable Bearing Pressure	- A reliable bearing pressure should not be assigned to the Made Ground. - The strength of the sandstone bedrock will be reported upon receipt of the laboratory testing results.
Anticipated Foundation Type	- Ground conditions below the proposed development are variable with varying depths of made ground (3.4-3.5mbgl), sand ranging from loose to medium dense to 2mbgl and localised clay strata. Underlying natural superficial deposits comprise cohesive strata over granular strata to depths of 6.2-6.5mbgl before encountering weathered bedrock of sandstone. - Given the variable nature of the superficial deposits and the shallow depth to bedrock, it is considered that a piled foundation will provide the most economic and reliable foundation solution. - The appointed specialist piling contractor will be able to optimise pile design such as pile grouping per pile cap, pile diameter & pile spacing, installation methodology, pile cap settlement, and socket lengths to suit from the SI data.
Shallow Groundwater	- Groundwater identified on the site at depths of between 5.3 and 6.5mbgl and monitored at depths of between 4.1m and 5.57mbgl. - The presence of groundwater at this depth is not considered to represent a restraint to the development.
Concrete Requirements	- Based on BRE Digest 2005[53] – DS-2 AC-2 recommended.
Services	- Services present on site will need re-routing – consideration to the presence of services running through the site. Services may need to re-routed.
Temporary support of excavation	- Will be required due to the granular nature of the Made Ground. Excavations should be supported in accordance with guidance contained in CIRIA R97.

Table 8-1: Geotechnical Observations and Conclusions Table.

8.2 Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 8-2 below (more detailed model provided in Section 6). Where a moderate / low risk was identified, the assumed risk at this stage has been shown in bold.

[53] BRE (2005)."Concrete in Aggressive Ground." Special Digest 1.

Pollutant Linkage		Risk	Recommendations
1	No viable pathways (dermal contact, inhalation, ingestion).	--	- No viable human health pathways as no soft landscaping proposed at ground level. - **Recommendation:** No pollutant linkage therefore no further assessment required.
2	Volatile contaminants posing a risk to future site users and offsite receptors via the inhalation of vapours.	**Moderate (S area of site localised around CP101)**	- Likely probability in localised area in south of the site based on elevated concentration of naphthalene identified. - **Recommendation**: Localised remediation required.
		Low (remainder of site)	- No elevated volatile contaminants identified across remainder of the site. - **Recommendation**: No remediation required.
3	Gas posing a risk to buildings, future site users and offsite land users via the migration of gas into building causing explosion and asphyxiation.	Moderate / **Low**	- Low risk assumed given monitoring data and prevailing ground conditions. - **Recommendation:** No remediation required.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	**Low**	- No elevated contaminants and no significant mobile source of contamination identified. - **Recommendation:** No remediation required.
5	Sulphate posing a risk to building via direct contact (sulphate attack).	**Moderate /** Low	- Elevated sulphate identified. Moderate risk considered appropriate. - **Recommendation:** Sulphate resistant concrete (DS-2 AC-2) required.
6	Organic contaminants posing a risk to water pipes.	**Moderate**	- Elevated VOCs/SVOCs identified at typical pipeline depths (0.75-1.35mbgl). - **Recommendation:** UU risk assessment to be completed. Barrier piping likely to be required.

Table 8-1: Summary Risk Table.

Remedial recommendations are presented in Section 9.

9 Recommendations and Remedial Strategy

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

9.1 Remediation and Validation Recommendations

Table 9-1 details the further works and remedial recommendations / requirements. The table shows work required post-demolition of building(s), pre-construction (i.e. during earthworks) and during / post construction.

Phase	PL	Remediation Requirements	Validation Requirements
Post-Demolition Work	**2, 5, 6**	Post-demolition Investigation Further investigation is recommended following the demolition of the existing building in the western area of site. This is recommended to confirm ground conditions below the current buildings and to undertake contamination and geotechnical testing. This should allow a more targeted remediation strategy to be completed. This work will also provide more geotechnical information for foundation design.	N/A (Investigation Report will be provided with an updated Remediation Strategy).
Pre-Construction	**ALL**	Earthworks Inspections / Unexpected Contamination The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required. Should asbestos be identified during groundworks, precautions should be taken to ensure the safety of the construction workers and nearby land users. It would be advisable to introduce an asbestos management strategy in line with CIRIA C733[54].	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work.

Table 9-1: Further work, remediation and validation requirements
Notes: See Table 6-4 for pollutant linkage (PL) details.

[54] CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.

Phase	PL	Remediation Requirements	Validation Requirements
Pre-Construction	**2**	Naphthalene Delineation (Localised around CP101). Removal of shallow made ground (0.1-0.5mbgl) with tarmac inclusions. It is likely that enabling works for foundations will remove this material.	Photographs, waste transfer notes and validation sampling of sides and base of the excavation.
Build-Phase Construction	**5**	Sulphate Resistant Concrete Sulphate Resistant Concrete in line with DS-2 AC-2 recommended.	N/A
	6	Potable Water Pipes It is recommended that a United Utilities Risk Assessment is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required.	If barrier pipe required: Delivery notes of pipe material. Photographs of the installed pipe.
	1 &4	No further assessment required with respect to PL1 (direct contact) and 4 (controlled waters).	N/A
Other Considerations		Grubbing Out of In-Ground Structures It is recommended that in-ground structures are grubbed out as part of the groundworks.	
		Topsoil Growing Medium Soft landscaping is shown on the roof terrace proposed development plan. A topsoil cover of approximately 150mm is recommended for any soft landscaping. Testing of any imported topsoil should meet the requirements detailed in Table 9.2.	
		Re-use of site won material To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used [55]): 5,000 tonnes (*c.* 2,500m^3) treatment of crushed concrete / stone. 1,000 tonnes (*c.* 500m^3) use of non-hazardous soil 5,000 tonnes (*c.* 2,500m^3) use of clays, sand, gravel, brick, concrete, stone etc. 50,000 tonnes (*c.* 25,000m^3) use of bituminous material to be used in roadways. A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered **before** material movement starts onsite. If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'. For all the above material will need to be tested at the rate and analytical suites presented in Table 9-2.	

Table 9-1 (continued): Further work, remediation and validation requirement
Notes: See Table 6-4 for pollutant linkage (PL) details.

[55] https://www.gov.uk/guidance/waste-exemptions-using-waste

Other considerations	Health and Safety Considerations In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance[56]) should be adopted by all workers involved with site enabling and construction works.
	Piling in Contaminated Land It is understood that the buildings may be piled into the bedrock. This may provide a preferential pathway for contaminants to the Principal Aquifer. Once the method of piling has been determined, good practice for the drilling of piles on contaminated sites should be adhered to, such as guidance provided by the Environment Agency[57].
	Asbestos Survey A Pre-Demolition and Major Refurbishment Asbestos Survey should be undertaken, and any ACMs removed and properly disposed of, prior to the demolition of the existing buildings, by a suitably qualified professional.

Table 9-1 (continued): Further work, remediation and validation requirements
Notes: See Table 6-4 for pollutant linkage (PL) details.

9.2 Validation of Topsoil

Chemical validation of all imported soils to be used on site in the proposed roof terrace should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements is presented in Table 9-2. Ideally, the material should be sampled at source to prevent double handling if soil fails. However, where this is not possible then material imported should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens to ensure suitability for use.

Material Type	Source	Suite of Analysis	Sampling Rate*
Topsoil	Greenfield	Suite A	1 sample per 50m^3
	Brownfield / Unknown	Suite B	

Table 9-2: Sampling requirements for imported soils.
Notes:
Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.
Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.
*Minimum sampling rate of 3 samples per source.

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

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882[58]). LKC advise this information is provided by the supplier before material is imported onto site.

Imported material to be used in gardens will be compared against residential without plant uptake criteria. Appropriate remedial target criteria are presented in Appendix G.

[56] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.
[57] Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.
[58] BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

9.3 Site Completion Report

It is recommended that any remediation carried out on the site is validated by a third party and suitable documentary evidence provided in a Site Completion Report, such as photographs, consignment documents and analytical results. This should include as a minimum:

- Details of the demolition of the current buildings within a Pre-Demolition and Major Refurbishment Asbestos Survey.
- Provision of waste transfer documents.
- Details of the removal of shallow naphthalene contamination around CP101 and validation sampling of the excavation.
- Verification testing of all imported soil for soft landscaping areas.
- Information on the installation of protective pipes.
- Details of any unexpected contamination identified onsite, suitably risk assessed and / or validated.

The Site Completion Report will assist the Local Authority in the discharge of any future relevant planning condition and will also be of use to solicitors acting on behalf of any prospective conveyancer who may have concerns over the former use of the site.

Figures

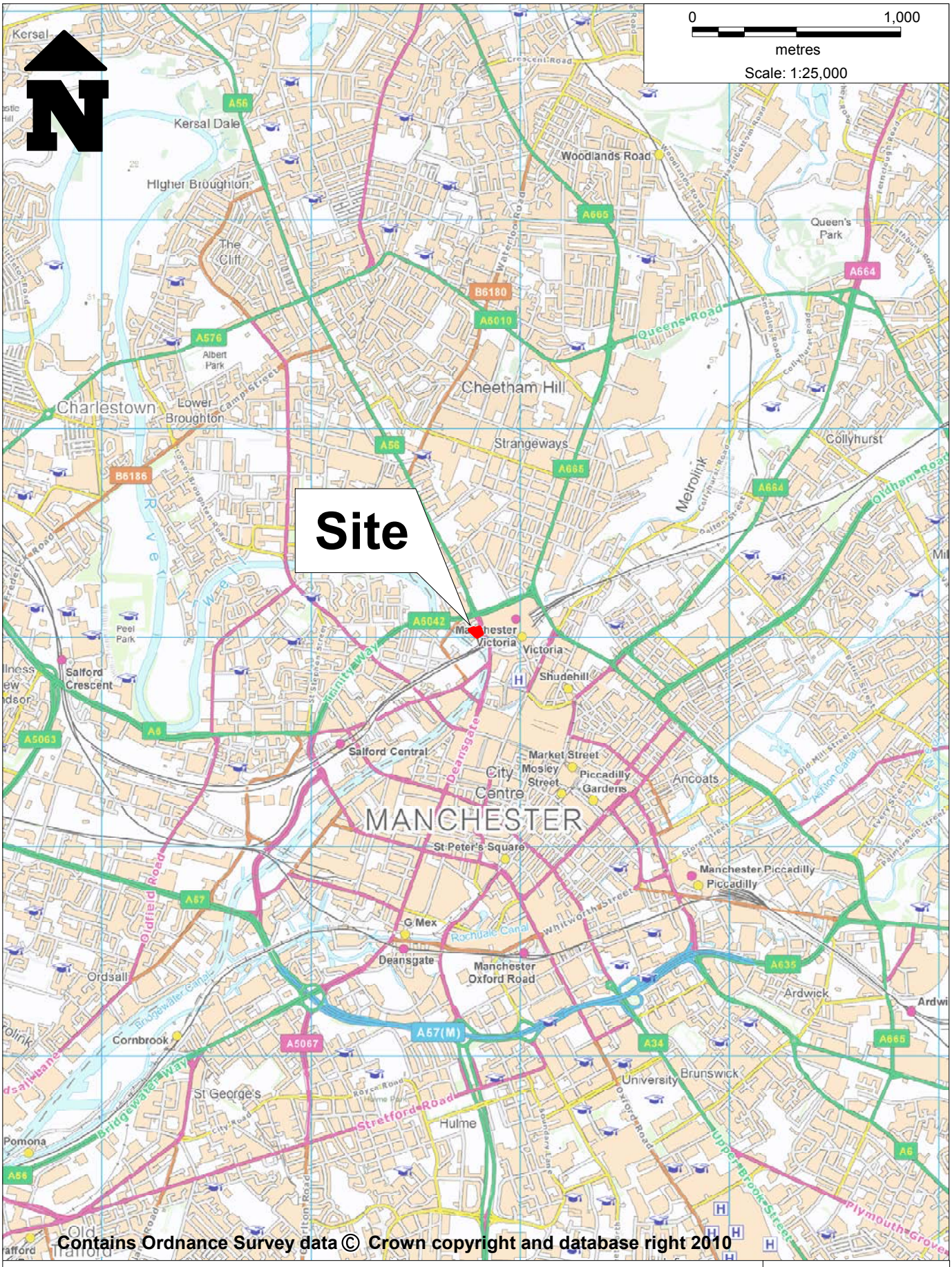
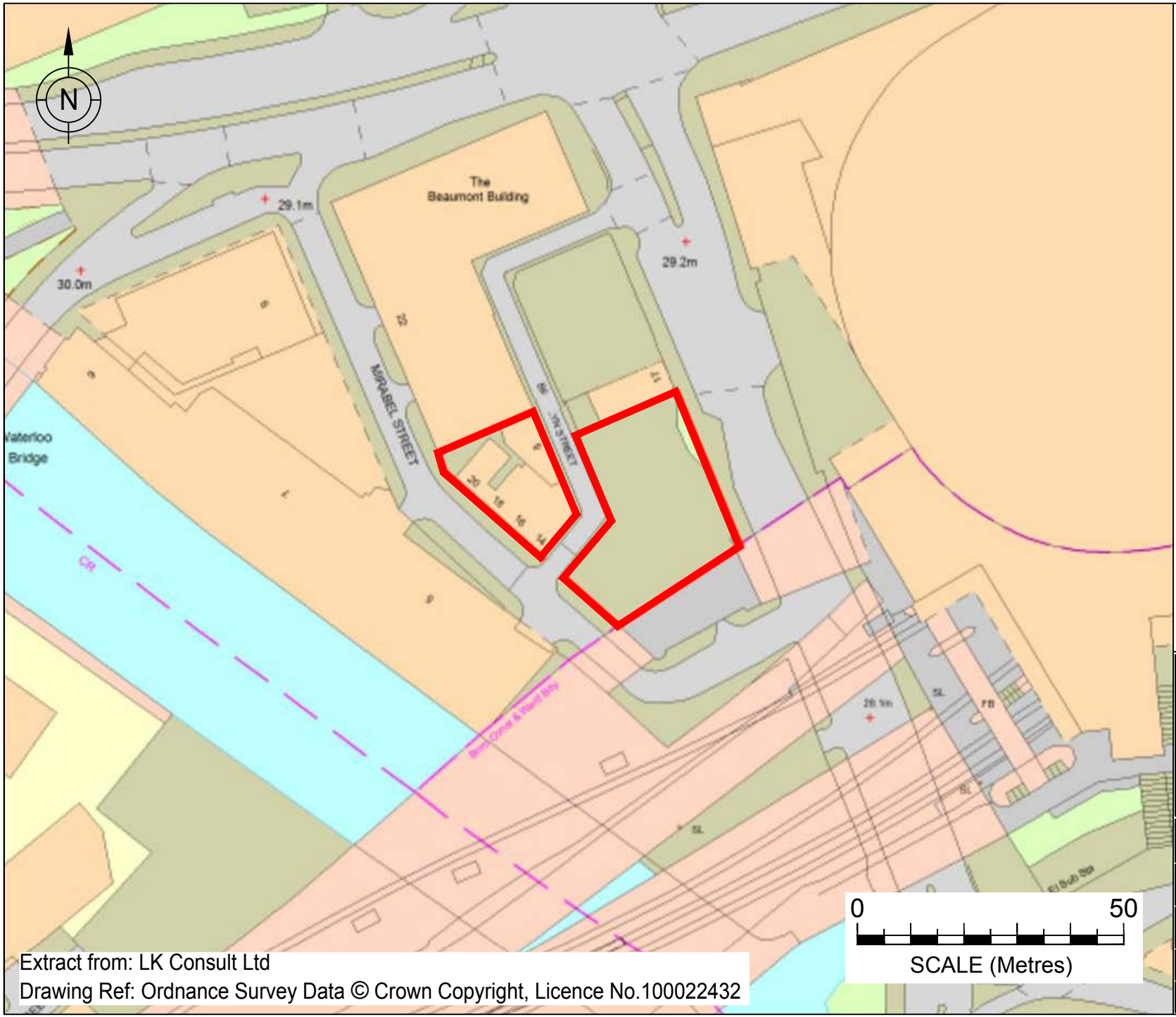


Figure 1: Site Location Plan, Mirabel House, Great Ducie Street, Manchester

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

LK CONSULT LIMITED



Extract from: LK Consult Ltd

Drawing Ref: Ordnance Survey Data © Crown Copyright, Licence No.100022432

KEY

Site Boundary

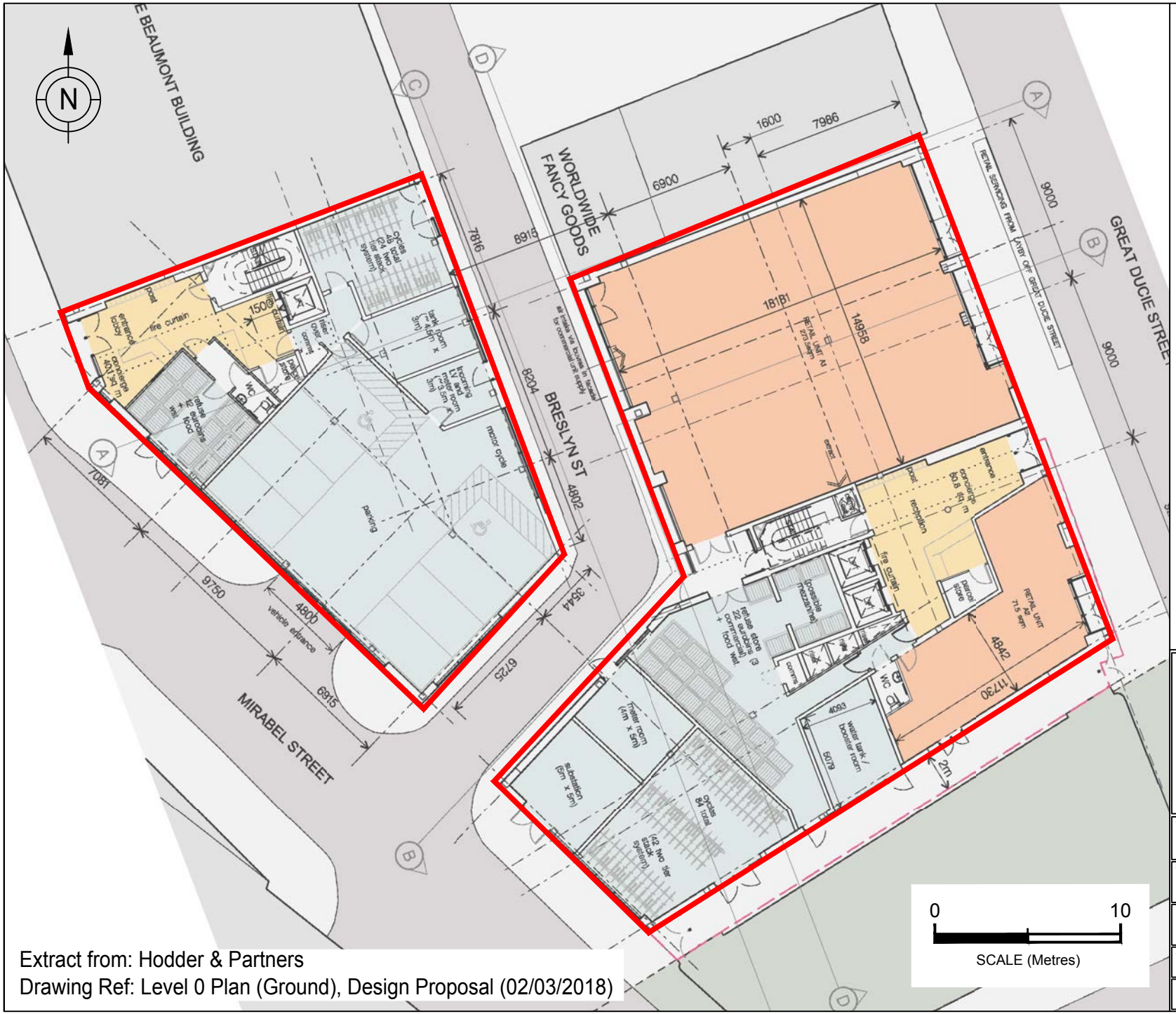
Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing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

LK CONSULT LIMITED

Client:	One Heritage Great Ducie Street Ltd
Site:	Mirabel House, Great Ducie Street, Manchester
Title:	Site Boundary Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 21 1684	1:1000 @ A4	2	

Drawn By:	Checked By:	Drawn:
AC	CB	Jun 2018



Extract from: Hodder & Partners
Drawing Ref: Level 0 Plan (Ground), Design Proposal (02/03/2018)

KEY

Site Boundary

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

LK CONSULT LIMITED

Client:	One Heritage Great Ducie Street Ltd
Site:	Mirabel House, Great Ducie Street, Manchester
Title:	Proposed Site Use
Job No.:	LKC 21 1684
Scale (See Scale Bar):	See Scale Bar
Figure:	3
Revision:	
Drawn By:	AC
Checked By:	CB
Drawn:	Jun 2018

Extract from: © Google Maps
Drawing Ref: Mirabel House, Great Ducie Street, Manchester

KEY

- Site Boundary
- Window Sample Borehole (WS)
- Hand Dug Trial Pit (HD)
- Cable Percussive Borehole (CP) with Rotary Follow-On Where Indicated (RCP)

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

LK CONSULT LIMITED

Client: One Heritage Great Ducie Street Ltd

Site: Mirabel House, Great Ducie Street, Manchester

Title: Site Investigation Location Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 18 1208	See Scale Bar	4	

Drawn By:	Checked By:	Drawn:
AC/CC	EM	Dec 2021

Appendix A

Risk Matrix

Risk Evaluation

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552[59]. It involves the classification of the:

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

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

Table A. Classification of Consequence

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

Table B. Classification of Probability.

[59] CIRIA C552 (2001) Contaminated Land Risk Assessment - A Guide to Good Practice.

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

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

Table C. Comparison of Consequence against Probability

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

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

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

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

Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development. Where there is a moderate/low risk is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

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

Appendix B

Profile Logs

Window Sample Logs
Hand Dug Pit Logs
Cable Percussive Logs
Rotary Logs

LK CONSULT LTD

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

Site
Mirabel House, Great Ducie Street, Manchester

Borehole Number
CP101

Machine : Dando 2000
Method : Cable Percussion

Casing Diameter
150mm cased to 6.50m

Ground Level (mOD)
31.00

Client
One Heritage Great Ducie Street Ltd

Job Number
LKC 21 1684

Location
383800 E 399016 N

Dates
06/12/2021

Engineer
LKC

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					30.90	0.10	MADE GROUND: Tarmacadam.		
0.10-0.50	ES1					(0.40)			
					30.50	0.50	MADE GROUND: Brown slightly silty gravelly SAND with brick fragments, ash, coal, pottery fragments, tarmacadam fragments and concrete. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.		
1.00	D2						MADE GROUND: Brown and red sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded comprising brick and sandstone.		
1.20-1.65	SPT N=4			1,2/2,1,0,1					
1.20-1.65	D3 N/R								
1.50	D4								
						(2.80)			
2.10-2.55	SPT N=6			2,2/2,1,1					
2.10-2.55	D5								
3.20-3.65	SPT N=9			1,1/2,2,2,3	27.70	3.30	Firm consistency dark grey silty CLAY.		
3.20-3.65	D6								
3.70-4.00	B7						Stiff consistency brown sandy silty CLAY between 3.70-4.00mbgl.		
4.30-4.75	U8					(2.10)	Firm consistency brown slightly gravelly sandy silty CLAY between 4.30-4.75mbgl.		
4.80	D9								
5.40-5.85	SPT N=13			2,3/3,2,4,4	25.60	5.40	Medium dense yellowish brown very clayey SAND. Sand is fine.		▼1
5.40-5.85	D10								
5.90-6.30	B11					(1.10)			
				fast(1) at 6.50m, rose to 5.50m in 20 mins.	24.50	6.50	Weak red medium grained SANDSTONE, highly weathered.		▽1
6.60-6.70	D12 N/R								
6.60-6.70	SPT 25*/70 50/30			25/50		(0.80)			
7.00	D13								
7.20-7.30	SPT 25*/60 50/40			25/50	23.70	7.30	Complete at 7.30m		

Remarks
Cable Percussive complete at 7.30mbgl, SPT refusal on highly weathered sandstone. Continued by rotary follow on (Ref. RCP101).
Location estimated from https://gridreferencefinder.com/
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm
Water strike recorded at 6.50mbgl, rose to 5.50mbgl in 20 minutes.
Chiselling from 6.50m to 7.20m for 0.75 hours.

Scale (approx)
1:50

Logged By
CW

Figure No.
LKC 21 1684.CP101

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Mirabel House, Great Ducie Street, Manchester	Borehole Number CP102

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 2.00m	31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location	**Dates**	**Engineer**	**Sheet**
	383802 E 399045 N	07/12/2021	LKC	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					30.90	(0.10) 0.10	MADE GROUND: Tarmacadam.		
0.10-0.40	ES1				30.60	(0.30) 0.40	MADE GROUND: Brown slightly silty gravelly SAND with occasional brick fragments, tarmacadam fragments, coal, ash, glass, pottery, concrete fragments and rare fabric. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.		
1.20-1.65	SPT N=7			1,1/1,2,2,2		(1.60)	(1) MADE GROUND: Soil, ash and brick.		
2.00-2.11	SPT 25*/40 50/70			25/50	29.00	2.00	(1) MADE GROUND: Obstruction.		
					28.70	(0.30) 2.30	Complete at 2.30m		

Remarks
(1) Drillers Description.
Cable Percussive terminated at 2.30mbgl due to obstruction. Borehole repositioned (Ref. CP102A).
Borehole dry.
Location estimated from https://gridreferencefinder.com/
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm
Chiselling from 2.00m to 2.30m for 0.5 hours.

Scale (approx)	Logged By
1:40	CW

Figure No.
LKC 21 1684.CP102

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LK CONSULT LTD

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

Site	Borehole Number
Mirabel House, Great Ducie Street, Manchester	CP102A

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 6.20m	31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location	**Dates**	**Engineer**	**Sheet**
	383802 E 399045 N	07/12/2021	LKC	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					30.90	0.10	MADE GROUND: Tarmacadam.		
0.20	D1					(1.10)	MADE GROUND: Grey SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular and comprises sandstone, brick and shale.		
1.00	D2				29.80	1.20			
1.20-1.65 1.20-1.65	SPT N=42 D3			6,7/10,10,10,12		(1.00)	MADE GROUND: Red sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to medium, angular and comprises brick.		
2.20-2.65 2.20-2.65	SPT N=13 D4			8,6/5,5,2,1	28.80	2.20	MADE GROUND: Grey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular and consists of slag and brick.		
						(1.20)			
3.30-3.75 3.30-3.75	SPT N=10 D5			1,2/2,2,3,3	27.60	3.40	Soft consistency brown silty CLAY.		
3.80-4.10	B6					(1.30)			
4.40-4.70	U7 N/R								
4.70-5.04 4.70-5.04 5.00-5.30	SPT 50/190 D8 B9			12,13/17,20,13	26.30	4.70	Very dense yellowish brown clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded comprising sandstone.		▼1
5.50-5.71	SPT 25*/60 50/150			20,5/23,27		(1.50)			
6.10-6.35	SPT 50/100			8,8/27,23 fast(1) at 6.30m, rose to 5.30m in 20 mins.	24.80	6.20	Weak red medium grained SANDSTONE. Highly weathered.		▽1
						(0.46)			
6.60-6.66	SPT 25*/30 50/30			25/50	24.34	6.66	Complete at 6.66m		

Remarks
Cable Percussive complete at 6.75mbgl, SPT refusal on highly weathered sandstone. Continued by rotary follow on (Ref. RCP102A).
Water strike recorded at 6.30mbgl, rose to 5.30mbgl in 20 minutes.
Location estimated from https://gridreferencefinder.com/
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm
Chiselling from 4.70m to 6.60m for 1.5 hours.

Scale (approx)	Logged By
1:50	CW

Figure No. LKC 21 1684.CP102A

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LK CONSULT LTD

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

Site	Trial Pit Number
Mirabel House, Great Ducie Street, Manchester	HD101

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand dug pit to 0.80mbgl.	0.20m x 0.20m x 0.80m	31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383765 E 399039 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				30.91	(0.09) 0.09	MADE GROUND: Concrete.		
				30.75	(0.16) 0.25	MADE GROUND: Light brown sandy GRAVEL with occasional concrete fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and limestone.		
0.25-0.50	ES1 PID<0.1ppm							
				30.50	(0.25) 0.50	MADE GROUND: Reddish brown fine to coarse SAND with frequent brick fragments.		
0.50-0.80	ES2 PID=0.1ppm			30.20	(0.30) 0.80	MADE GROUND: Black gravelly SAND (predominantly comprising ash and coal). Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded comprising coal.		
						Complete at 0.80m		

Remarks

Hand auger refusal at 0.80mbgl on possible brick/cobble.
Location estimated from handheld GPS, accurate to 3.00m.
Elevation estimated from
https://www.freemaptools.com/elevation-finder.htm

Scale (approx)	Logged By	Figure No.
1:20	EM	LKC 21 1684.HD101

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LK GROUP	**LK CONSULT LTD** Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Mirabel House, Great Ducie Street, Manchester	**Trial Pit Number** **HD102**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Hand dug pit to 0.20mbgl.	0.20m x 0.20m x 0.20m	31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383778 E 399039 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05-0.20	ES1 PID<0.1ppm			30.95	0.05	MADE GROUND: Concrete.		
					(0.15)	MADE GROUND: Brown SAND with occasional brick fragments. Sand is fine to medium. Concrete to 0.10mbgl on southern end of pit.		
				30.80	0.20	Complete at 0.20m		

Remarks

Hand auger refusal at 0.20mbgl on possible concrete.
Location estimated from handheld GPS, accurate to 3.00m.
Elevation estimated from
https://www.freemaptools.com/elevation-finder.htm

North	Scale (approx)	Logged By	Figure No.
↖	1:20	EM	LKC 21 1684.HD102

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Mirabel House, Great Ducie Street, Manchester	Borehole Number **RCP101**

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : water Core Dia: 91 mm Method : Rotary Cored		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location 383800 E 399016 N	**Dates** 07/12/2021	**Engineer** LKC	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(7.00)			
7.00					Assumed Zone of Core Loss Non-Intact	24.00	7.00	Weak red medium grained SANDSTONE. Moderately to highly weathered.		
7.25				AZCL						
				NI			(0.57)			
7.57	83	27	130	24	Very closely spaced, horizontal & sub-horizontal (5-10°), tight, clean some with sand infill, undulating smooth discontinuities.	23.43	7.57	Strong red medium grained SANDSTONE. Slightly weathered.		
8.40										
8.50	87	33	13	13	Closely spaced, horizontal & sub-horizontal (5-10°), tight, clean some with sand infill, undulating smooth discontinuities.		(2.43)			
10.00										

Remarks
Borehole complete at 16.10mbgl.
Borehole drilled from base of Cable Percussive borehole (Ref. CP101).

Scale (approx)	Logged By
1:50	CW

Figure No.
LKC 21 1684.RCP101

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Mirabel House, Great Ducie Street, Manchester	Borehole Number **RCP101**

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : water Core Dia: 91 mm Method : Rotary Cored		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location 383800 E 399016 N	**Dates** 07/12/2021	**Engineer** LKC	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	97	41	12			21.00	10.00	Strong red medium grained SANDSTONE. Slightly weathered.		
11.35				NI	Non-Intact					
11.60	100	55	21	11	Closely spaced, horizontal & sub-horizontal (5-10°), tight, clean some with sand infill, undulating smooth discontinuities.					
13.00							(6.10)			
13.75	100	75	72		Medium spaced, horizontal, tight, clean, planar, smooth discontinuities.					
14.60	100	83	63	5						
15.60				NI	Non-intact					
15.75				5	Medium spaced, horizontal, tight, clean, planar, smooth discontinuities.	14.90	16.10	Complete at 16.10m		
16.10										

Remarks
Borehole complete at 16.10mbgl.
Borehole drilled from base of Cable Percussive borehole (Ref. CP101).

Scale (approx)	Logged By
1:50	CW

Figure No.
LKC 21 1684.RCP101

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Mirabel House, Great Ducie Street, Manchester	Borehole Number RCP102A

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : water		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
Core Dia: 91 mm				
Method : Rotary Cored	Location 383802 E 399045 N	Dates 09/12/2021	Engineer LKC	Sheet 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(6.30)				
						24.70	6.30	Weak red medium grained SANDSTONE. Moderately to highly weathered.			
							(1.60)				
						23.10	7.90	Strong red medium grained SANDSTONE. Slightly weathered.			
							(2.10)				

Remarks
Borehole complete at 14.90mbgl.
Borehole drilled from base of Cable Percussive borehole (Ref. CP102A).
Monitoring well installed to base of borehole.

Scale (approx)	Logged By
1:50	CW

Figure No.
LKC 21 1684.RCP102A

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LK GROUP	LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	Site Mirabel House, Great Ducie Street, Manchester	Borehole Number RCP102A

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : water		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
Core Dia: 91 mm				
Method : Rotary Cored	Location 383802 E 399045 N	Dates 09/12/2021	Engineer LKC	Sheet 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						21.00	10.00	Strong red medium grained SANDSTONE. Slightly weathered.			
							(4.90)				
						16.10	14.90	Complete at 14.90m			

Remarks
Borehole complete at 14.90mbgl.
Borehole drilled from base of Cable Percussive borehole (Ref. CP102A).
Monitoring well installed to base of borehole.

Scale (approx)	Logged By
1:50	CW

Figure No.
LKC 21 1684.RCP102A

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LK CONSULT LTD

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

Site	Number
Mirabel House, Great Ducie Street, Manchester	WS101

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler driven to 3.00mbgl.		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383799 E 399033 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				30.90	(0.10) 0.10	MADE GROUND: Tarmacadam.			
0.10-1.10	ES1 PID=0.1ppm					MADE GROUND: Brown fine to coarse SAND with frequent brick fragments, occasional metal (nails), concrete fragments, tarmacadam fragments, rare timber and fabric, becoming darker in colour with depth.			
1.20-1.65	SPT N=21		3,3/3,7,5,6						
					(2.90)	Predominantly brick crush between 1.40-1.60mbgl (recovered as sandy gravel).			
1.60-2.40	ES2 PID=0.1ppm								
2.00-2.45	SPT N=12		1,1/1,1,5,5			Rare glass fragments between 2.00-3.00mbgl.			
						Limited recovery between 2.00-3.00mbgl.			
				28.00	3.00	Terminated at 3.00m			

Remarks
Borehole terminated at 3.00mbgl due to strata collapsing into borehole between 2.00-3.00mbgl.
Borehole dry.
Location estimated from handheld GPS, accurate to 3.00m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm

Scale (approx)	Logged By
1:40	EM

Figure No. LKC 21 1684.WS101

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LK CONSULT LTD

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

Site
Mirabel House, Great Ducie Street, Manchester

Number
WS102

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler driven to 5.45mbgl.		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383815 E 399023 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				30.90	(0.10) 0.10	MADE GROUND: Tarmacadam.			
0.10-0.60	ES1 PID<0.1ppm				(0.50)	MADE GROUND: Brown clayey SAND with frequent brick fragments, occasional coal, ash, timber and rare glass. Sand is fine to medium.			
				30.40	0.60				
0.60-1.00	ES2 PID=0.1ppm				(0.40)	MADE GROUND: Brown very gravelly very clayey SAND. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and coal.			
				30.00	1.00				
1.00-2.00	ES3 PID<0.1ppm					MADE GROUND: Brownish grey sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone, mudstone and coal.			
1.20-1.65	SPT N=12		2,2/3,3,3,3						
					(2.00)				
2.00-2.45	SPT N=10		2,2/2,2,3,3						
2.00-3.00	B4								
2.60-3.05	SPT N=39		4,9/10,15,10,4						
				28.00	3.00				
3.00-3.50	ES5				(0.50)	MADE GROUND: Brown sandy CLAY with frequent coal, occasional brick fragments and rare ceramic fragments. Sand is fine to medium.			
				27.50	3.50				
3.50-4.00	ESB6				(0.50)	Soft to firm consistency low strength orangish brown very sandy silty CLAY. Sand is fine to medium.			
3.50-4.00	PP 32.70kPa								
				27.00	4.00				
4.00-4.45	SPT N=10		2,2/2,2,3,3			Loose to medium dense very light brown fine to medium SAND with occasional lenses of sandy clay. Limited recovery between 4.00-5.00mbgl.			
4.50-5.00	D7				(1.45)				
5.00-5.45	SPT N=10		5,3/3,3,2,2						
				25.55	5.45	Complete at 5.45m			

Remarks
Strata between 1.00-3.00mbgl noted to be claybound.
Limited recovery between 4.00-5.00mbgl.
Borehole dry and stable.
Elevation estimated from handheld GPS, accurate to 3.00m.
Location estimated from https://www.freemaptools.com/elevation-finder.htm
Strata between 0.60-1.00mbgl is damp.

Scale (approx)	Logged By
1:40	EM

Figure No.
LKC 21 1684.WS102

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LK GROUP	**LK CONSULT LTD** Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Mirabel House, Great Ducie Street, Manchester	**Number** **WS103**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Drive-in Windowless Sampler driven to 1.00mbgl.		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383793 E 399013 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				30.90	(0.10) 0.10	MADE GROUND: Tarmacadam.		
					(0.90)	MADE GROUND: Brown slightly clayey SAND with occasional tarmacadam fragments, brick fragments concrete fragments and rare sub-angular sandstone cobbles. Sand is fine to coarse.		
				30.00	1.00	Terminated at 1.00m		

Remarks
Borehole terminated at 1.00mbgl due to obstruction offsetting the casing.
Borehole repositioned approximately 0.50m SE (ref. WS103A).
Location estimated from handheld GPS, accurate to 3.00m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm

Scale (approx)	**Logged By**
1:20	EM

Figure No.
LKC 21 1684.WS103

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LK CONSULT LTD

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

Site	Number
Mirabel House, Great Ducie Street, Manchester	WS103A

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler driven to 5.45mbgl.		31.00	One Heritage Great Ducie Street Ltd	LKC 21 1684
	Location (Handheld GPS) 383793 E 399013 N	**Dates** 09/11/2021	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				30.90	(0.10) 0.10	MADE GROUND: Tarmacadam.			
0.10-1.00	ES1				(0.90)	MADE GROUND: Brown slightly gravelly clayey SAND with frequent brick fragments, occasional concrete fragments, sandy clay lenses, coal, ash, rare pottery and glass fragments, becoming more clayey with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
				30.00	1.00	MADE GROUND: Brown sandy CLAY with occasional brick fragments and coal. Sand is fine to medium.			
1.00-2.00	ES2								
1.20-1.65	SPT N=10		3,3/3,2,2,3						
2.00-2.45	SPT N=18		4,4/5,5,4,4		(2.20)				
2.50-3.00	ES3								
3.00-3.45	SPT N=3		1,0/0,1,1,1			Limited recovery between 3.00-4.00mbgl.			
				27.80	3.20	Soft to firm consistency low strength orangish brown sandy silty CLAY. Sand is fine to medium.			
3.30-3.45	D4								
3.30-4.00	PP 33kPa				(0.80)				
3.80-4.00	B5								
				27.00	4.00	Soft consistency sandy clayey SILT. Sand is fine to medium.			
4.00-4.45	SPT N=0		1,0/0,0,0,0						
4.00-4.45	D6								
4.60-5.00	B7				(1.45)				
5.00-5.45	SPT N=13		1,0/0,5,4,4						
5.00-5.45	D8								
				25.55	5.45	Complete at 5.45m			

Remarks
Borehole dry and stable.
Location estimated from handheld GPS, accurate to 3.00m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm
Clay strata too soft to take pocket penetrometer readings between 4.00-5.00mbgl.
Strata between 4.00-5.00mbgl is damp.

Scale (approx)	Logged By
1:40	EM

Figure No. LKC 21 1684.WS103A

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Appendix C

Certificates of Analysis – Soil

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-39499-1		
Initial Date of Issue:	19-Nov-2021		
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 21 1684 Mirabel House, Great Ducie Street		
Quotation No.:		**Date Received:**	11-Nov-2021
Order No.:	739802	**Date Instructed:**	11-Nov-2021
No. of Samples:	10		
Turnaround (Wkdays):	5	**Results Due:**	17-Nov-2021
Date Approved:	19-Nov-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult				**Chemtest Job No.:**	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499
Quotation No.:				**Chemtest Sample ID.:**	1317287	1317289	1317290	1317291	1317292	1317293	1317294	1317295	1317296
				Client Sample ID.:	WS101	WS102	WS102	WS102	WS103A	WS103A	WS103A	HD101	HD101
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.1	0.1	1	3.5	0.1	1	4	0.25	0.5
				Bottom Depth (m):	1.1	0.6	2	4	1	2	4.45	0.5	0.8
				Date Sampled:	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021
				Asbestos Lab:	NEW-ASB	NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-		-	-		-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	14	4.7	21	19	16	18	11	11
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Clay	Sand	Sand
pH	M	2010		4.0	9.4	8.4	8.6	8.0	8.1	8.2	8.1	8.9	8.6
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.4				1.3				
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010			0.028		0.033	< 0.010		
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	1.4	1.5	0.28	0.96	1.2	1.0	0.46	0.076	0.66
Chloride (Water Soluble)	M	2220	g/l	0.010	0.025			0.024		0.014	0.023		
Nitrate (Water Soluble)	N	2220	g/l	0.010	0.020			0.020		0.015	0.038		
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50				< 0.50				
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50				< 0.50				
Arsenic	M	2450	mg/kg	1.0	21	12	6.3		26	< 1.0		27	35
Cadmium	M	2450	mg/kg	0.10	0.45	0.17	0.26		< 0.10	< 0.10		0.87	0.49
Chromium	M	2450	mg/kg	1.0	26	19	28		23	12		26	32
Copper	M	2450	mg/kg	0.50	61	47	100		110	170		210	210
Mercury	M	2450	mg/kg	0.10	0.60	0.51	< 0.10		2.3	0.61		1.7	0.72
Nickel	M	2450	mg/kg	0.50	27	19	43		33	22		33	75
Lead	M	2450	mg/kg	0.50	230	150	60		680	2000		320	260
Selenium	M	2450	mg/kg	0.20	< 0.20	0.31	< 0.20		0.33	0.46		0.48	0.58
Vanadium	U	2450	mg/kg	5.0	36	25	28		30	< 5.0		32	97
Zinc	M	2450	mg/kg	0.50	150	76	80		74	56		200	160
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50		< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	6.3	3.2	2.0		6.0	4.4		3.7	38
Diesel Present	N	2670		N/A	False				False				
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	120				< 1.0				
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0				< 1.0				
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	120				< 5.0				
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0				< 1.0				

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317287	1317289	1317290	1317291	1317292	1317293	1317294	1317295	1317296
			Client Sample ID.:		WS101	WS102	WS102	WS102	WS103A	WS103A	WS103A	HD101	HD101
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.1	0.1	1	3.5	0.1	1	4	0.25	0.5
			Bottom Depth (m):		1.1	0.6	2	4	1	2	4.45	0.5	0.8
			Date Sampled:		09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0				< 1.0				
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0				< 1.0				
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	34				< 1.0				
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	260				< 1.0				
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0				< 1.0				
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	290				< 5.0				
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	410				< 10				
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0				< 1.0				
Chloromethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Bromomethane	M	2760	µg/kg	20	< 20				< 20				
Chloroethane	U	2760	µg/kg	2.0	< 2.0				< 2.0				
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0				< 5.0				
Trichloromethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
Benzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0				< 2.0				
Trichloroethene	N	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Dibromomethane	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0				< 5.0				
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10				< 10				
Toluene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10				< 10				
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10				< 10				
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0				< 2.0				
Dibromochloromethane	U	2760	µg/kg	10	< 10				< 10				
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0				< 5.0				

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317287	1317289	1317290	1317291	1317292	1317293	1317294	1317295	1317296
			Client Sample ID.:		WS101	WS102	WS102	WS102	WS103A	WS103A	WS103A	HD101	HD101
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.1	0.1	1	3.5	0.1	1	4	0.25	0.5
			Bottom Depth (m):		1.1	0.6	2	4	1	2	4.45	0.5	0.8
			Date Sampled:		09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0				< 2.0				
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
o-Xylene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Styrene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Tribromomethane	U	2760	µg/kg	1.0	< 1.0				< 1.0				
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Bromobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50				< 50				
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	5.2				< 1.0				
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	10				< 1.0				
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
4-Isopropyltoluene	U	2760	µg/kg	1.0	5.5				< 1.0				
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50				< 50				
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0				< 1.0				
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0				< 1.0				
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0				< 2.0				
Carbon Disulphide	N	2760	µg/kg	50	< 50				< 50				
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0				< 1.0				
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Phenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50				< 0.50				
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50				< 0.50				
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50				< 0.50				

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317287	1317289	1317290	1317291	1317292	1317293	1317294	1317295	1317296
			Client Sample ID.:		WS101	WS102	WS102	WS102	WS103A	WS103A	WS103A	HD101	HD101
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.1	0.1	1	3.5	0.1	1	4	0.25	0.5
			Bottom Depth (m):		1.1	0.6	2	4	1	2	4.45	0.5	0.8
			Date Sampled:		09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50				< 0.50				
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Isophorone	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50				< 0.50				
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Naphthalene	M	2790	mg/kg	0.50	0.51				3.8				
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50				1.2				
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50				< 0.50				
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Acenaphthene	M	2790	mg/kg	0.50	1.3				1.8				
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Dibenzofuran	M	2790	mg/kg	0.50	0.65				1.0				
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Fluorene	M	2790	mg/kg	0.50	1.3				1.5				
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50				< 0.50				
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50				< 0.50				
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Azobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Phenanthrene	M	2790	mg/kg	0.50	30				12				
Anthracene	M	2790	mg/kg	0.50	4.5				2.8				

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499	21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317287	1317289	1317290	1317291	1317292	1317293	1317294	1317295	1317296
			Client Sample ID.:		WS101	WS102	WS102	WS102	WS103A	WS103A	WS103A	HD101	HD101
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.1	0.1	1	3.5	0.1	1	4	0.25	0.5
			Bottom Depth (m):		1.1	0.6	2	4	1	2	4.45	0.5	0.8
			Date Sampled:		09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Carbazole	M	2790	mg/kg	0.50	3.3				1.3				
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Fluoranthene	M	2790	mg/kg	0.50	67				11				
Pyrene	M	2790	mg/kg	0.50	68				11				
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Benzo[a]anthracene	M	2790	mg/kg	0.50	51				6.3				
Chrysene	M	2790	mg/kg	0.50	46				5.9				
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50				< 0.50				
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50				< 0.50				
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	47				8.4				
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	11				2.7				
Benzo[a]pyrene	M	2790	mg/kg	0.50	31				6.9				
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	17				3.6				
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	5.5				1.1				
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	19				3.8				
Naphthalene	M	2800	mg/kg	0.10		2.2	0.19			< 0.10		0.24	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10		0.22	< 0.10			< 0.10		< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10		0.90	0.15			< 0.10		1.3	< 0.10
Fluorene	M	2800	mg/kg	0.10		0.66	0.18			< 0.10		0.78	< 0.10
Phenanthrene	M	2800	mg/kg	0.10		7.3	0.74			0.88		7.7	1.0
Anthracene	M	2800	mg/kg	0.10		1.4	0.19			0.16		1.6	0.27
Fluoranthene	M	2800	mg/kg	0.10		7.5	0.82			0.87		11	1.3
Pyrene	M	2800	mg/kg	0.10		7.1	0.70			0.78		9.2	1.2
Benzo[a]anthracene	M	2800	mg/kg	0.10		2.9	0.36			0.39		4.1	0.73
Chrysene	M	2800	mg/kg	0.10		3.4	0.43			0.45		4.0	0.72
Benzo[b]fluoranthene	M	2800	mg/kg	0.10		3.8	0.41			0.51		4.9	0.94
Benzo[k]fluoranthene	M	2800	mg/kg	0.10		1.5	0.20			0.17		1.7	0.39
Benzo[a]pyrene	M	2800	mg/kg	0.10		3.1	0.25			0.31		3.8	0.87
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10		2.0	0.24			0.26		2.6	0.65
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		0.43	0.14			0.11		0.58	0.23
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10		1.9	0.28			0.28		2.3	0.56
Total Of 16 PAH's	N	2800	mg/kg	2.0		46	5.3			5.2		56	8.9
Total Phenols	M	2920	mg/kg	0.10	< 0.10				< 0.10				

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317297
			Client Sample ID.:		HD102
			Sample Type:		SOIL
			Top Depth (m):		0.05
			Bottom Depth (m):		0.2
			Date Sampled:		09-Nov-2021
			Asbestos Lab:		NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	10
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Sand
pH	M	2010		4.0	11.0
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	
Magnesium (Water Soluble)	N	2120	g/l	0.010	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.18
Chloride (Water Soluble)	M	2220	g/l	0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010	
Cyanide (Free)	M	2300	mg/kg	0.50	
Cyanide (Total)	M	2300	mg/kg	0.50	
Arsenic	M	2450	mg/kg	1.0	19
Cadmium	M	2450	mg/kg	0.10	0.45
Chromium	M	2450	mg/kg	1.0	20
Copper	M	2450	mg/kg	0.50	94
Mercury	M	2450	mg/kg	0.10	0.43
Nickel	M	2450	mg/kg	0.50	21
Lead	M	2450	mg/kg	0.50	270
Selenium	M	2450	mg/kg	0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	32
Zinc	M	2450	mg/kg	0.50	130
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	1.3
Diesel Present	N	2670		N/A	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317297
			Client Sample ID.:		HD102
			Sample Type:		SOIL
			Top Depth (m):		0.05
			Bottom Depth (m):		0.2
			Date Sampled:		09-Nov-2021
			Asbestos Lab:		NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	
Dichlorodifluoromethane	U	2760	µg/kg	1.0	
Chloromethane	M	2760	µg/kg	1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	
Bromomethane	M	2760	µg/kg	20	
Chloroethane	U	2760	µg/kg	2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	
1,1-Dichloroethene	M	2760	µg/kg	1.0	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	
Bromochloromethane	U	2760	µg/kg	5.0	
Trichloromethane	M	2760	µg/kg	1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	
Benzene	M	2760	µg/kg	1.0	
1,2-Dichloroethane	M	2760	µg/kg	2.0	
Trichloroethene	N	2760	µg/kg	1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	
Dibromomethane	M	2760	µg/kg	1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	
Toluene	M	2760	µg/kg	1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	
Tetrachloroethene	M	2760	µg/kg	1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	
Dibromochloromethane	U	2760	µg/kg	10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317297
			Client Sample ID.:		HD102
			Sample Type:		SOIL
			Top Depth (m):		0.05
			Bottom Depth (m):		0.2
			Date Sampled:		09-Nov-2021
			Asbestos Lab:		NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Chlorobenzene	M	2760	µg/kg	1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	
Ethylbenzene	M	2760	µg/kg	1.0	
m & p-Xylene	M	2760	µg/kg	1.0	
o-Xylene	M	2760	µg/kg	1.0	
Styrene	M	2760	µg/kg	1.0	
Tribromomethane	U	2760	µg/kg	1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	
Bromobenzene	M	2760	µg/kg	1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	
N-Propylbenzene	U	2760	µg/kg	1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	
Carbon Disulphide	N	2760	µg/kg	50	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	
Phenol	M	2790	mg/kg	0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	
2-Methylphenol	M	2790	mg/kg	0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	
Hexachloroethane	N	2790	mg/kg	0.50	

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317297
			Client Sample ID.:		HD102
			Sample Type:		SOIL
			Top Depth (m):		0.05
			Bottom Depth (m):		0.2
			Date Sampled:		09-Nov-2021
			Asbestos Lab:		NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	
4-Methylphenol	M	2790	mg/kg	0.50	
Nitrobenzene	M	2790	mg/kg	0.50	
Isophorone	M	2790	mg/kg	0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	
Naphthalene	M	2790	mg/kg	0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	
Acenaphthylene	M	2790	mg/kg	0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	
Acenaphthene	M	2790	mg/kg	0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	
Dibenzofuran	M	2790	mg/kg	0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	
Fluorene	M	2790	mg/kg	0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	
Azobenzene	M	2790	mg/kg	0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	
Phenanthrene	M	2790	mg/kg	0.50	
Anthracene	M	2790	mg/kg	0.50	

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street

Client: LK Consult			**Chemtest Job No.:**		21-39499
Quotation No.:			**Chemtest Sample ID.:**		1317297
			Client Sample ID.:		HD102
			Sample Type:		SOIL
			Top Depth (m):		0.05
			Bottom Depth (m):		0.2
			Date Sampled:		09-Nov-2021
			Asbestos Lab:		NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Carbazole	M	2790	mg/kg	0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	
Fluoranthene	M	2790	mg/kg	0.50	
Pyrene	M	2790	mg/kg	0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	
Chrysene	M	2790	mg/kg	0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	
Naphthalene	M	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.22
Pyrene	M	2800	mg/kg	0.10	0.23
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.15
Chrysene	M	2800	mg/kg	0.10	0.16
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	0.21
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.18
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	

TPH Interpretation

Job	Sample	Matrix	Location	Sample Ref	Sample ID	Sample Depth (m)	Gasoline / Diesel Present	TPH Interpretation
21-39499	1317287	S			WS101	0.1	No	PAH
21-39499	1317292	S			WS103A	0.1	No	N/A

Test Methods

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 measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
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*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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"
SOP	Standard operating procedure
LOD	Limit of detection

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 30 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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-43264-1		
Initial Date of Issue:	14-Dec-2021		
Client	LK Consult		
Client Address:	Unit 29 Eton Business Park Eton Hill Road Radcliffe Manchester Lancashire M26 2ZS		
Contact(s):	Michelle Thorniley		
Project	LKC 21 1684 Mirabel House, Great Ducie Street, Manchester		
Quotation No.:		**Date Received:**	08-Dec-2021
Order No.:	739872	**Date Instructed:**	08-Dec-2021
No. of Samples:	2		
Turnaround (Wkdays):	5	**Results Due:**	14-Dec-2021
Date Approved:	14-Dec-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street, Manchester

Client: LK Consult			**Chemtest Job No.:**		21-43264	21-43264
Quotation No.:			**Chemtest Sample ID.:**		1335536	1335537
			Client Sample ID.:		CP101	CP102
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.1	0.1
			Bottom Depth (m):		0.5	0.4
			Date Sampled:		06-Dec-2021	07-Dec-2021
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	16	14
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		4.0	9.0	9.6
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.021	0.87
Arsenic	M	2450	mg/kg	1.0	9.8	10
Cadmium	M	2450	mg/kg	0.10	0.20	0.47
Chromium	M	2450	mg/kg	1.0	15	18
Copper	M	2450	mg/kg	0.50	35	25
Mercury	M	2450	mg/kg	0.10	0.51	< 0.10
Nickel	M	2450	mg/kg	0.50	14	14
Lead	M	2450	mg/kg	0.50	130	41
Selenium	M	2450	mg/kg	0.20	0.24	< 0.20
Vanadium	U	2450	mg/kg	5.0	22	33
Zinc	M	2450	mg/kg	0.50	68	50
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	4.6	4.7
Naphthalene	M	2800	mg/kg	0.10	19	0.34
Acenaphthylene	N	2800	mg/kg	0.10	0.43	0.13
Acenaphthene	M	2800	mg/kg	0.10	7.3	0.97
Fluorene	M	2800	mg/kg	0.10	7.0	0.99
Phenanthrene	M	2800	mg/kg	0.10	46	8.7
Anthracene	M	2800	mg/kg	0.10	10	2.4
Fluoranthene	M	2800	mg/kg	0.10	42	15
Pyrene	M	2800	mg/kg	0.10	40	13
Benzo[a]anthracene	M	2800	mg/kg	0.10	22	7.4
Chrysene	M	2800	mg/kg	0.10	21	6.3
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	24	9.3
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	9.1	3.6
Benzo[a]pyrene	M	2800	mg/kg	0.10	21	7.9
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	12	6.0
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	3.0	0.88
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	10	4.1

Results - Soil

Project: LKC 21 1684 Mirabel House, Great Ducie Street, Manchester

Client: LK Consult			**Chemtest Job No.:**		21-43264	21-43264
Quotation No.:			**Chemtest Sample ID.:**		1335536	1335537
			Client Sample ID.:		CP101	CP102
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.1	0.1
			Bottom Depth (m):		0.5	0.4
			Date Sampled:		06-Dec-2021	07-Dec-2021
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Total Of 16 PAH's	N	2800	mg/kg	2.0	290	87

Test Methods

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
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2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
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Report Information

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M	MCERTS and UKAS accredited
N	Unaccredited
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All soil samples will be retained for a period of 30 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

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client LK Consult Ltd

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

Contract LKC 21 1684 -
Mirabel House, Great Ducie Street, Manchester

Job Number MRN 4310/1
Date of Issue 07 January 2022
Pages 1 of 7

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

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

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

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

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

Andrew House, Hadfield Street,
Dukinfield, Cheshire SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

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

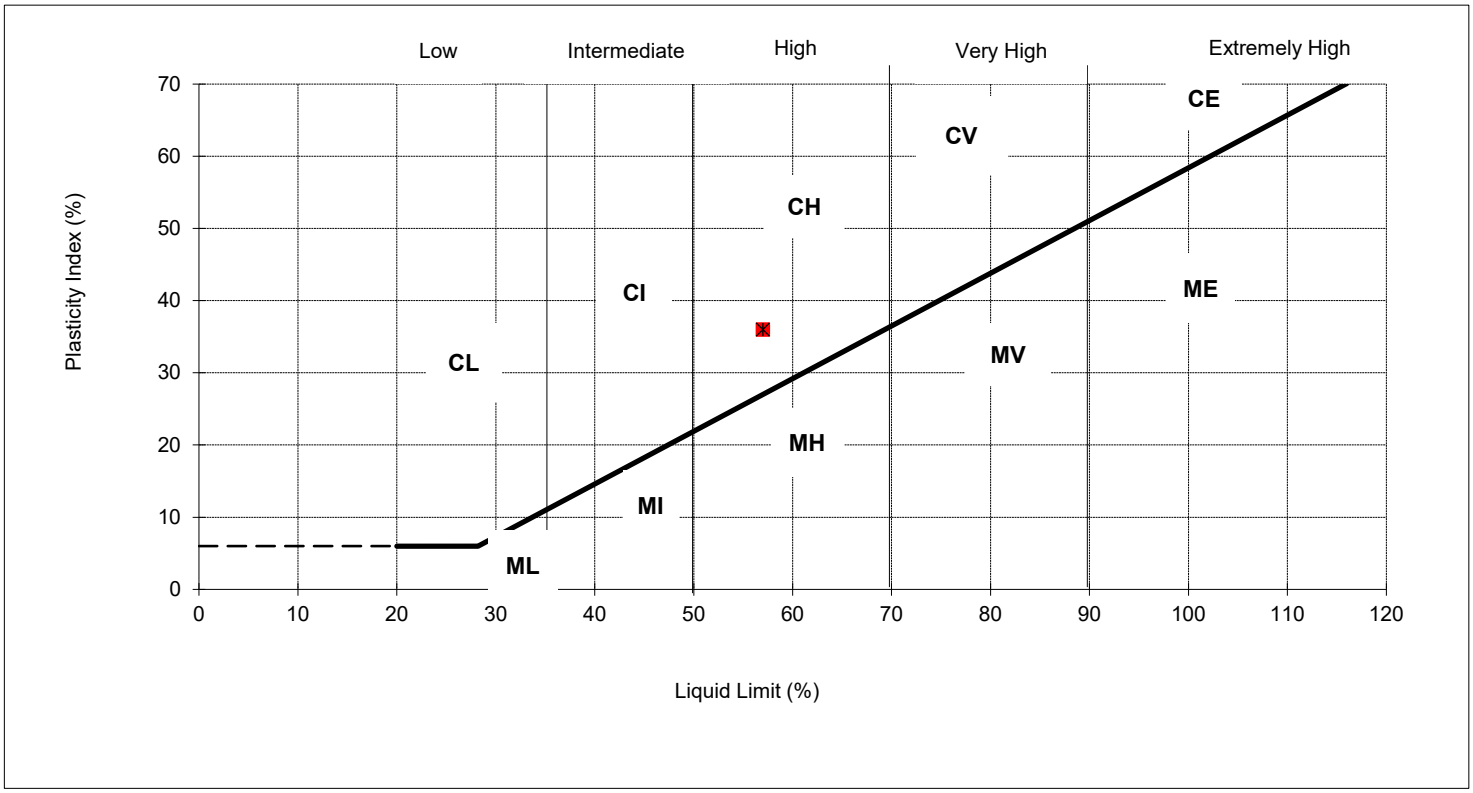
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE LABEL	CP101/B7/3.7-4m	DATE SAMPLED	Not advised
SAMPLE No.	107542	DATE RECEIVED	17-Dec-21
DATE TESTED	20-Dec-21	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
29	57	21	36	100



REMARKS
Sample tested in natural condition

SIGNED

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

DATE 07-Jan-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

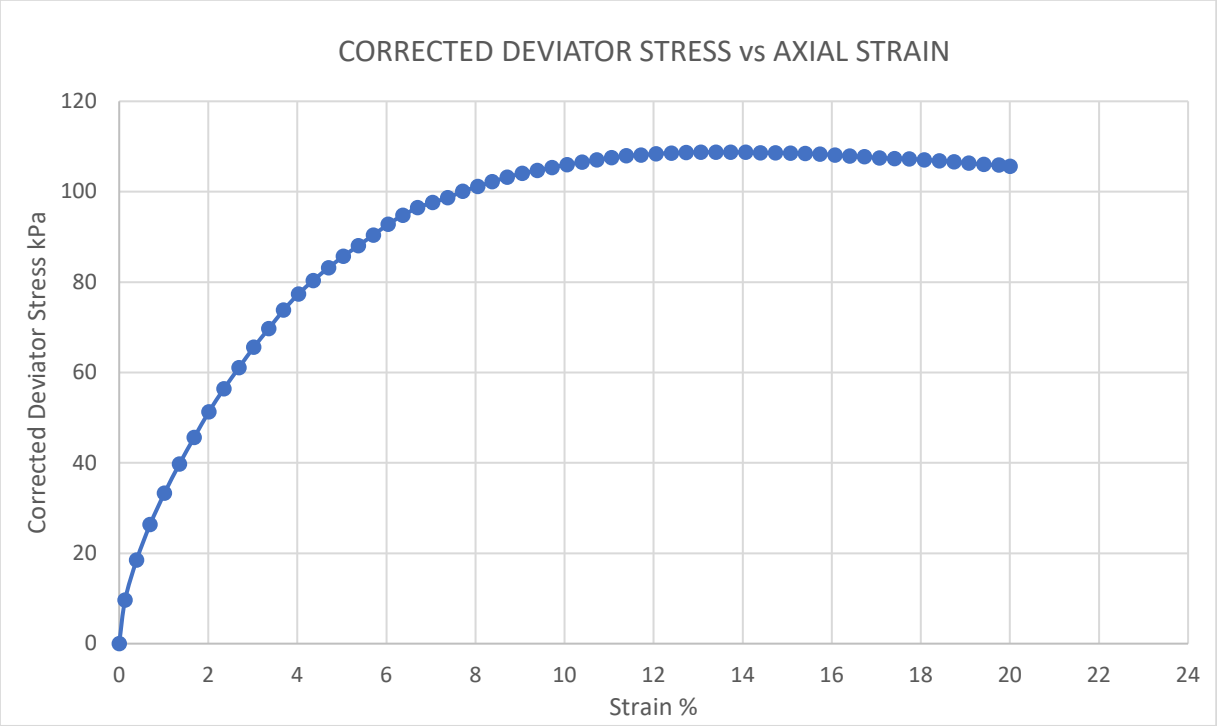
BS 1377 : PART 7: Clause 8 Single Stage

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE LABEL	CP101/U8/4.30-4.75m	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	107543	**DATE RECEIVED**	17-Dec-21
DATE TESTED	06-Jan-22	**SAMPLED BY**	Client
MATERIAL	Firm brown silty sandy CLAY with rare gravel		
ADVISED SOURCE	Site Investigation Sample		

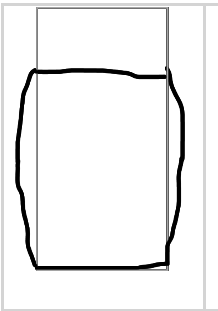
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	100
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	199	Specimen Moisture Content (%)	26
	Specimen Diameter (mm)	101	Specimen Bulk Density (Mg/m3)	1.97
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.56
	Membrane Correction	1.50		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



PLASTIC

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
90	13	2	109	54

Remarks/Abnormalities

Name O.P. Davies BA (Hons) (Laboratory Manager) Signed Date 07 January 2022

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF POINT LOAD STRENGTH INDEX OF ROCK
METHOD IN ACCORDANCE WITH ASTM STANDARD D 5731

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE LABEL	CP101	DATE SAMPLED	Not advised
LAB SAMPLE No	107544-107545	DATE RECEIVED	17-Dec-21
DATE TESTED	06-Jan-22	SAMPLED BY	Client

MATERIAL	Rock Core
ADVISED SOURCE	Site Investigation Sample

Depth (m)	Test Type	D (mm)	*W (mm)	Load (P) (kN)	D_e^2 (mm^2)	D_e (mm)	Is (MPa)	F	$I_{s(50)}$ (MPa)
9.90	D	85.0		0.8	7225.00	85.00	0.11	1.27	0.14
11.90-12.06	D	84.0		0.5	7056.00	84.00	0.07	1.26	0.09
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00

*W Entry required if test type is not Diametrical

REMARKS

SIGNED

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

DATE 07-Jan-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 14 Method C

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE REFERENCE	CP101 14.6-14.84m	DATE RECEIVED	17-Dec-21
SAMPLE NUMBER	107546	DATE SAMPLED	Not advised
DATE TESTED	06-Jan-22	SAMPLED BY	Client

DIMENSIONS

TESTED BY	SC	DIAMETER (mm)	84
LENGTH AFTER PREPARATION (mm)	170	LENGTH/DIAMETER RATIO	2.02

METHOD OF END PREPARATION	Saw / Grinding	TIME IN WATER PRIOR TO TEST	0 Hours
DATE OF DRILLING	Not advised	DRILLED BY	Others
MATERIAL	Rock Core	SAMPLE LOCATION	Not advised

DESCRIPTION OF CORE AFTER TEST	Split vertically from top to bottom, with no visible end effects

COMPRESSIVE STRENGTH

LOAD AT FAILURE (kN)	111.2	MEASURED COMPRESSIVE STRENGTH (N/mm2)	20.1

COMPRESSIVE STRENGTH (MPa)	**20.1**

Comments / Deviation from standard method / Abnormalities noted during visual inspection.
None

NAME O.P. Davies BA (Hons) (Laboraotory Manager) SIGNED DATE 07-Jan-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF POINT LOAD STRENGTH INDEX OF ROCK
METHOD IN ACCORDANCE WITH ASTM STANDARD D 5731

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE LABEL	CP102A	DATE SAMPLED	Not advised
LAB SAMPLE No	107547-107548	DATE RECEIVED	17-Dec-21
DATE TESTED	06-Jan-22	SAMPLED BY	Client

MATERIAL	Rock Core
ADVISED SOURCE	Site Investigation Sample

Depth (m)	Test Type	D (mm)	*W (mm)	Load (P) (kN)	D_e^2 (mm^2)	D_e (mm)	Is (MPa)	F	$I_{s(50)}$ (MPa)
8.00	A	84.0	45.0	1.3	4812.85	69.37	0.27	1.16	0.31
9.00	A	84.0	51.0	1.2	5454.56	73.85	0.22	1.19	0.26
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00

*W Entry required if test type is not Diametrical

REMARKS

SIGNED

NAME O.P. Davies BA (Hons) DATE 07-Jan-22
(Laboratory Manager)

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 14 Method C

CLIENT	LK Consult Ltd
SITE	LKC 21 1684 - Mirabel House, Great Ducie Street, Manchester
JOB NUMBER	MRN 4310/1

SAMPLE REFERENCE	CP102A 12.1-12.3m	DATE RECEIVED	17-Dec-21
SAMPLE NUMBER	107549	DATE SAMPLED	Not advised
DATE TESTED	06-Jan-22	SAMPLED BY	Client

DIMENSIONS

TESTED BY	SC	DIAMETER (mm)	84
LENGTH AFTER PREPARATION (mm)	172	LENGTH/DIAMETER RATIO	2.05

METHOD OF END PREPARATION	Saw / Grinding	TIME IN WATER PRIOR TO TEST	0 Hours
DATE OF DRILLING	Not advised	DRILLED BY	Others
MATERIAL	Rock Core	SAMPLE LOCATION	Not advised

DESCRIPTION OF CORE AFTER TEST	Split vertically from top to bottom, with no visible end effects

COMPRESSIVE STRENGTH

LOAD AT FAILURE (kN)	56.2	MEASURED COMPRESSIVE STRENGTH (N/mm2)	10.1

COMPRESSIVE STRENGTH (MPa)	**10.1**

Comments / Deviation from standard method / Abnormalities noted during visual inspection.
None

NAME O.P. Davies BA (Hons) (Laboraotory Manager) SIGNED DATE 07-Jan-22

Appendix E

Certificates of Analysis – Water

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	21-43993-1		
Initial Date of Issue:	20-Dec-2021		
Client	LK Consult		
Client Address:	Unit 29 Eton Business Park Eton Hill Road Radcliffe Manchester Lancashire M26 2ZS		
Contact(s):	Colin Crompton Michelle Thorniley		
Project	LKC 21 1684 Mirabel House		
Quotation No.:		**Date Received:**	14-Dec-2021
Order No.:	739890	**Date Instructed:**	14-Dec-2021
No. of Samples:	1		
Turnaround (Wkdays):	5	**Results Due:**	20-Dec-2021
Date Approved:	20-Dec-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Water

Project: LKC 21 1684 Mirabel House

Client: LK Consult			**Chemtest Job No.:**		21-43993
Quotation No.:			**Chemtest Sample ID.:**		1339207
			Client Sample ID.:		BH2
			Sample Type:		WATER
			Date Sampled:		13-Dec-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Diesel Present	N	1670		N/A	False
pH	U	1010		N/A	8.3
Sulphate	U	1220	mg/l	1.0	450
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050
Calcium	U	1455	mg/l	2.00	180
Total Hardness as CaCO3	U	1270	mg/l	15	710
Arsenic (Dissolved)	U	1455	µg/l	0.20	< 0.20
Boron (Dissolved)	U	1455	µg/l	10.0	220
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	1.1
Nickel (Dissolved)	U	1455	µg/l	0.50	2.0
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	1.9
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	2.9
Mercury Low Level	U	1460	µg/l	0.010	< 0.010
Chromium (Hexavalent)	U	1490	µg/l	20	< 20
Dissolved Organic Carbon	U	1610	mg/l	2.0	3.1
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0

Results - Water

Project: LKC 21 1684 Mirabel House

Client: LK Consult			**Chemtest Job No.:**		21-43993
Quotation No.:			**Chemtest Sample ID.:**		1339207
			Client Sample ID.:		BH2
			Sample Type:		WATER
			Date Sampled:		13-Dec-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0

Results - Water

Project: LKC 21 1684 Mirabel House

Client: LK Consult			**Chemtest Job No.:**		21-43993
Quotation No.:			**Chemtest Sample ID.:**		1339207
			Client Sample ID.:		BH2
			Sample Type:		WATER
			Date Sampled:		13-Dec-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0
Carbon Disulphide	N	1760	µg/l	50	< 50
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50

Results - Water

Project: LKC 21 1684 Mirabel House

Client: LK Consult			**Chemtest Job No.:**		21-43993
Quotation No.:			**Chemtest Sample ID.:**		1339207
			Client Sample ID.:		BH2
			Sample Type:		WATER
			Date Sampled:		13-Dec-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50
Naphthalene	N	1800	µg/l	0.010	< 0.010
Acenaphthylene	N	1800	µg/l	0.010	< 0.010
Acenaphthene	N	1800	µg/l	0.010	< 0.010
Fluorene	N	1800	µg/l	0.010	< 0.010
Phenanthrene	N	1800	µg/l	0.010	< 0.010

Results - Water

Project: LKC 21 1684 Mirabel House

Client: LK Consult			**Chemtest Job No.:**		21-43993
Quotation No.:			**Chemtest Sample ID.:**		1339207
			Client Sample ID.:		BH2
			Sample Type:		WATER
			Date Sampled:		13-Dec-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Anthracene	N	1800	µg/l	0.010	< 0.010
Fluoranthene	N	1800	µg/l	0.010	< 0.010
Pyrene	N	1800	µg/l	0.010	< 0.010
Benzo[a]anthracene	N	1800	µg/l	0.010	< 0.010
Chrysene	N	1800	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	µg/l	0.010	< 0.010
Benzo[a]pyrene	N	1800	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	µg/l	0.20	< 0.20
Total Phenols	U	1920	mg/l	0.030	< 0.030

TPH Interpretation

Job	Sample	Matrix	Location	Sample Ref	Sample ID	Sample Depth (m)	Gasoline / Diesel Present	TPH Interpretation
21-43993	1339207	W			BH2		No	N/A

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1460	Mercury low-level in Waters by AFS	Mercury	Atomic Fluorescence Spectrometry, with collimated UV source, wavelength 253.7 nm.
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

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"
SOP	Standard operating procedure
LOD	Limit of detection

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 30 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 F

Gas Monitoring Results

LK CONSULT LTD

GAS MONITORING RECORD

Site	Mirabel House
Job Number	LKC 21 1684
Date	17/11/2021
Engineer	JT
Visit	1 of 4

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
HydroTechnik	HT-01	Operating normally.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Rising
Weather Conditions	Overcast, cloudy
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	% LEL[2]	CO Pod (ppm)	H_2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	17/11/2021 11:45	0.00	0.70	20.50	0.00	0.70	0.00	0.00	0.00	78.80	1020	-0.10	Dry	1.50	
WS102															Unable to monitor, vehicle parked on top of well.
WS103A	17/11/2021 11:54	0.00	3.60	15.20	0.00	3.80	0.00	0.00	0.00	81.20	1021	0.00	Dry	4.60	

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

NOTES

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

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

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

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

LK CONSULT LTD

GAS MONITORING RECORD

Site	Mirabel House, Manchester
Job Number	LKC 21 1684
Date	25/11/2021
Engineer	MP
Visit	2 of 4

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
Geotech Dipmeter	HT-01	Operating normally.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Steady
Atmospheric pressure (prev 24hrs)	Variable
Weather Conditions	Dry, light breeze, very cold
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	% LEL[2]	CO Pod (ppm)	H_2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	25/11/2021 09:04	0	0.6	21.2	0	0.6	0	0	0	78.2	1017	0	Dry	1.47	Peak CO=0ppm, peak flow=0l/hr, PID=0ppm.
WS102	25/11/2021 08:42	0	1	20.5	0	1	0	0	0	78.5	1017	0	Dry	4.34	Peak CO=6ppm, peak flow=0l/hr, PID=0ppm.
WS103A	25/11/2021 08:54	0	1.5	19.5	0	1.5	0	0	0	79	1017	0	Dry	4.73	Peak CO=0ppm, peak flow=0l/hr, PID=0ppm.

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

NOTES

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

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

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

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

LK CONSULT LTD

GAS MONITORING RECORD

Site	Mirabel Hose, Manchester
Job Number	LKC 21 1684
Date	02/12/2021
Engineer	JT
Visit	3 of 4

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
HydroTechnik	HT-01	Operating normally.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Rising
Weather Conditions	Sunny, calm, clear
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	% LEL[2]	CO Pod (ppm)	H_2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	02/12/2021 09:22	0.10	0.30	21.40	0.10	0.30	2.00	0.00	0.00	78.20	1011	0.00	Dry	1.50	
WS102	02/12/2021 09:33	0.10	0.80	21.40	0.10	0.80	2.00	0.00	0.00	77.70	1012	0.10	Dry	4.40	
WS103A	02/12/2021 09:40	0.10	2.60	18.40	0.10	2.60	2.00	0.00	0.00	78.90	1012	0.00	4.10	4.70	

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

NOTES

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

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

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

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

LK CONSULT LTD

GAS MONITORING RECORD

Site	Mirabel House, Manchester
Job Number	LKC 21 1684
Date	00/01/1900
Engineer	MP
Visit	4 of 4

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
Geotech Dipmeter	HT-01	Operating normally.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Variable
Weather Conditions	Dry, light breeze, cold
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	% LEL[2]	CO Pod (ppm)	H_2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
BH2A						UR							5.57	14.90	Not gas monitored. Groundwater sample obtained.
WS101	13/12/2021 10:20	0	0.4	20.8	0.1	0.4	0	0	0	78.8	1019	0	Dry	1.55	CO peak=0ppm, peak flow=0l/hr, PID=0ppm, no groundwater available for testing.
WS102	13/12/2021 09:51	0.1	0.7	20.5	0.1	0.7	2	0	0	78.7	1018	0	4.36	4.43	CO peak=1ppm, peak flow=0l/hr, PID=0ppm, no groundwater available for testing.
WS103A	13/12/2021 10:08	0	3.6	15	0.1	3.8	0	0	0	81.4	1019	0	4.6	4.8	CO peak=0ppm, peak flow=0l/hr, PID=0ppm, no groundwater available for testing.

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

NOTES

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

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

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

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

Appendix G

Generic Assessment Criteria Values

CATEGORY 4 SCREENING LEVELS

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

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

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

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

NOTES

$^{Sol\ /\ vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

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

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

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

NOTES

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

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

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

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

NOTES

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

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

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

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

NOTES

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

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

	Contaminant	SOM	Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
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.

Table 4.2a: EIC/AGS/CL:AIRE GAC for organics with 1% SOM

Contaminant	GAC for 1% SOM (mg.kg^{-1})				Soil Saturation Concentration (mg.kg^{-1})
	Residential with consumption of homegrown produce	Residential without consumption of homegrown produce	Allotments	Commercial	
1,1,2 Trichloroethane	0.6	0.88	0.28	94	4030
1,1-Dichloroethane	2.4	2.5	9.2	280	1830
1,1-Dichloroethene	0.23	0.23	2.8	26	2230
1,2,4-Trimethylbenzene	0.35	0.41	0.38	42	557
1,2-Dichloropropane	0.024	0.024	0.62	3.3	1190
2,4-Dimethylphenol	19	210	3.1	16000	1380
2,4-Dinitrotoluene	1.5	170	0.22	3700	141
2,6-Dinitrotoluene	0.78	78	0.12	1900	287
2-Chloronaphthalene	3.7	3.8	40	390	114
Biphenyl	66	220	14	18000	34.4
Bis (2-ethylhexyl) phthalate	280	2700	47	85000	8.68
Bromobenzene	0.87	0.91	3.2	97	853
Bromodichloromethane	0.016	0.019	0.016	2.1	1790
Bromoform	2.8	5.2	0.95	760	2690
Butyl benzyl phthalate	1400	42000	220	940000	26.3
Chloroethane	8.3	8.4	110	960	2610
Chloromethane	0.0083	0.0085	0.066	1.0	1910
Cis 1,2 Dichloroethene	0.11	0.12	0.26	14	3940
Dichloromethane	0.58	2.1	0.10	270	7270
Diethyl Phthalate	120	1800	19	150000	13.7
Di-*n*-butyl phthalate	13	450	2.0	15000	4.65
Di-*n*-octyl phthalate	2300	3400	940	89000	32.6
Hexachloroethane	0.20	0.22	0.27	22	8.17
Isopropylbenzene	11	12	32	1400	390
Methyl *tert*-butyl ether	49	73	23	7900	20400
Propylbenzene	34	40	34	4100	402
Styrene	8.1	35	1.6	3300	626
Total Cresols (2-, 3- and 4-methylphenol)	80	3700	12	160000	15000
Trans 1,2 Dichloroethene	0.19	0.19	0.93	22	3420
Tributyl tin oxide	0.25	1.4	0.042	130	41.3

Notes

It is strongly recommended that the accompanying EIC/AGS/CL:AIRE GAC report is read and understood if using these GAC

GAC in highlighted boxes exceed soil saturation concentration. Soil concentrations above soil saturation may indicate that NAPL is present. Risks from NAPL may need to be considered separately.

Table 4.3a: EIC/AGS/CL:AIRE GAC for organics with 2.5% SOM

Contaminant	GAC for 2.5% SOM (mg.kg^{-1})				Soil Saturation Concentration (mg.kg^{-1})
	Residential with consumption of homegrown produce	Residential without consumption of homegrown produce	Allotments	Commercial	
1,1,2 Trichloroethane	1.2	1.8	0.61	190	8210
1,1-Dichloroethane	3.9	4.1	17	450	2960
1,1-Dichloroethene	0.40	0.41	5.6	46	3940
1,2,4-Trimethylbenzene	0.85	0.99	0.93	99	1360
1,2-Dichloropropane	0.042	0.042	1.2	5.9	2110
2,4-Dimethylphenol	43	410	7.2	24000	3140
2,4-Dinitrotoluene	3.2	170	0.49	3700	299
2,6-Dinitrotoluene	1.7	84	0.27	1900	622
2-Chloronaphthalene	9.2	9.3	98	960	280
Biphenyl	160	500	35	33000	84.3
Bis (2-ethylhexyl) phthalate	610	2800	120	86000	21.6
Bromobenzene	2.0	2.1	7.6	220	1970
Bromodichloromethane	0.030	0.034	0.032	3.7	3220
Bromoform	5.9	11	2.1	1500	5480
Butyl benzyl phthalate	3300	44000	550	940000	64.7
Chloroethane	11	11	200	1300	3540
Chloromethane	0.0098	0.0099	0.13	1.2	2240
Cis 1,2 Dichloroethene	0.19	0.20	0.50	24	6610
Dichloromethane	0.98	2.8	0.19	360	9680
Diethyl Phthalate	260	3500	41	220000	29.1
Di-*n*-butyl phthalate	31	450	5.0	15000	11.4
Di-*n*-octyl phthalate	2800	3400	2100	89000	81.5
Hexachloroethane	0.48	0.54	0.67	53	20.1
Isopropylbenzene	27	28	79	3300	950
Methyl *tert*-butyl ether	84	120	44	13000	33100
Propylbenzene	82	97	83	9700	981
Styrene	19	78	3.7	6500	1440
Total Cresols (2-, 3- and 4-methylphenol)	180	5400	27	180000	32500
Trans 1,2 Dichloroethene	0.34	0.35	1.9	40	6170
Tributyl tin oxide	0.59	3.1	0.10	180	101

Notes

It is strongly recommended that the accompanying EIC/AGS/CL:AIRE GAC report is read and understood if using these GAC.

GAC in highlighted boxes exceed soil saturation concentration. Soil concentrations above soil saturation may indicate that NAPL is present. Risks from NAPL may need to be considered separately.

Table 4.4a: EIC/AGS/CL:AIRE GAC for organics with 6% SOM

Contaminant	GAC for 6% SOM (mg.kg^{-1})				Soil Saturation Concentration (mg.kg^{-1})
	Residential with consumption of homegrown produce	Residential without consumption of homegrown produce	Allotments	Commercial	
1,1,2 Trichloroethane	2.7	3.9	1.4	400	18000
1,1-Dichloroethane	7.4	7.7	35	850	5600
1,1-Dichloroethene	0.82	0.82	12	92	7940
1,2,4-Trimethylbenzene	2.0	2.3	2.2	220	3250
1,2-Dichloropropane	0.084	0.085	2.6	12	4240
2,4-Dimethylphenol	97	730	17	30000	7240
2,4-Dinitrotoluene	7.2	170	1.1	3800	669
2,6-Dinitrotoluene	3.9	87	0.61	1900	1400
2-Chloronaphthalene	22	22	230	2200	669
Biphenyl	360	980	83	48000	201
Bis (2-ethylhexyl) phthalate	1100	2800	280	86000	51.7
Bromobenzene	4.7	4.9	18	520	4580
Bromodichloromethane	0.061	0.070	0.068	7.6	6570
Bromoform	13	23	4.6	3100	12000
Butyl benzyl phthalate	7200	44000	1300	950000	154
Chloroethane	18	18	380	2100	5710
Chloromethane	0.013	0.013	0.23	1.6	2990
Cis 1,2 Dichloroethene	0.37	0.39	1.0	47	12900
Dichloromethane	1.7	4.5	0.34	560	15300
Diethyl Phthalate	570	6300	94	290000	65
Di-*n*-butyl phthalate	67	450	12	15000	27.3
Di-*n*-octyl phthalate	3100	3400	3900	89000	196
Hexachloroethane	1.1	1.3	1.6	120	48.1
Isopropylbenzene	64	67	190	7700	2250
Methyl *tert*-butyl ether	160	220	90	24000	62700
Propylbenzene	190	230	200	21000	2330
Styrene	43	170	8.7	11000	3350
Total Cresols (2-, 3- and 4-methylphenol)	400	6900	63	180000	73300
Trans 1,2 Dichloroethene	0.70	0.71	4.0	81	12600
Tributyl tin oxide	1.3	5.7	0.24	200	241

Notes

It is strongly recommended that the accompanying EIC/AGS/CL:AIRE GAC report is read and understood if using these GAC.

GAC in highlighted boxes exceed soil saturation concentration. Soil concentrations above soil saturation may indicate that NAPL is present. Risks from NAPL may need to be considered separately.

Appendix H

HazWaste Online Output Sheets

HazWasteOnline™

Waste Classification Report

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

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

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

BFG8Y-GLC83-B9VYA

Job name

LKC 21 1684

Description/Comments

Project

LKC 21 1684

Site

Mirabel House

Classified by

Name:
Peter Dunn
Company:
LK Group
Date:
16 Dec 2021 16:36 GMT
Telephone:
0161 763 7200

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

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	18 Sep 2019

Next 3 year Refresher due by Sep 2022

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	CP101-06/12/2021-0.1	0.1-0.5	Non Hazardous		2
2	CP102-07/12/2021-0.1	0.1-0.4	Non Hazardous		4
3	WS101-09/11/2021-0.1	0.1-1.1	Non Hazardous		6
4	WS102-09/11/2021-0.1	0.1-0.6	Non Hazardous		12
5	WS102-09/11/2021-1	1-2	Non Hazardous		14
6	WS102-09/11/2021-3.5	3.5-4	Non Hazardous		16
7	WS103A-09/11/2021-0.1	0.1-1	Non Hazardous		17
8	WS103A-09/11/2021-1	1-2	Non Hazardous		23
9	WS103A-09/11/2021-4	4-4.45	Non Hazardous		25
10	HD101-09/11/2021-0.25	0.25-0.5	Non Hazardous		26
11	HD101-09/11/2021-0.5	0.5-0.8	Non Hazardous		28
12	HD102-09/11/2021-0.05	0.05-0.2	Non Hazardous		30

Related documents

#	Name	Description
1	HWOL_21-43264-20211214 152625.hwol	.hwol file used to create the Job
2	HWOL_21-39499-20211119 143941.hwol	.hwol file used to create the Job
3	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: Peter Dunn

Created date: 16 Dec 2021 16:36 GMT

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Appendix B: Rationale for selection of metal species	36
Appendix C: Version	37

Classification of sample: CP101-06/12/2021-0.1

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

Sample details

Sample name:
CP101-06/12/2021-0.1
Sample Depth:
0.1-0.5 m
Moisture content:
16%
(wet weight correction)

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

Hazard properties

None identified

Determinands

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

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.8	mg/kg	1.32	10.869	mg/kg	0.00109 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.2	mg/kg	1.142	0.192	mg/kg	0.0000192 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15	mg/kg	1.462	18.416	mg/kg	0.00184 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		35	mg/kg	1.126	33.101	mg/kg	0.00331 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	130	mg/kg		109.2	mg/kg	0.0109 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.51	mg/kg	1.353	0.58	mg/kg	0.000058 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14	mg/kg	2.976	35.001	mg/kg	0.0035 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.24	mg/kg	2.554	0.515	mg/kg	0.0000515 %	✓	
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		68	mg/kg	2.774	158.459	mg/kg	0.0158 %	✓	
11		pH			PH		9	pH		9	pH	9pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		19	mg/kg		15.96	mg/kg	0.0016 %	✓	
13		acenaphthylene		205-917-1	208-96-8		0.43	mg/kg		0.361	mg/kg	0.0000361 %	✓	
14		acenaphthene		201-469-6	83-32-9		7.3	mg/kg		6.132	mg/kg	0.000613 %	✓	
15		fluorene		201-695-5	86-73-7		7	mg/kg		5.88	mg/kg	0.000588 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		phenanthrene				46	mg/kg		38.64	mg/kg	0.00386 %	✓	
			201-581-5	85-01-8									
17		anthracene				10	mg/kg		8.4	mg/kg	0.00084 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				42	mg/kg		35.28	mg/kg	0.00353 %	✓	
			205-912-4	206-44-0									
19		pyrene				40	mg/kg		33.6	mg/kg	0.00336 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				22	mg/kg		18.48	mg/kg	0.00185 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				21	mg/kg		17.64	mg/kg	0.00176 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				24	mg/kg		20.16	mg/kg	0.00202 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				9.1	mg/kg		7.644	mg/kg	0.000764 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				21	mg/kg		17.64	mg/kg	0.00176 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				12	mg/kg		10.08	mg/kg	0.00101 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				3	mg/kg		2.52	mg/kg	0.000252 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				10	mg/kg		8.4	mg/kg	0.00084 %	✓	
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				22	mg/kg	1.785	32.99	mg/kg	0.0033 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0647 %		

Key

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

Classification of sample: CP102-07/12/2021-0.1

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

Sample details

Sample name:
CP102-07/12/2021-0.1
Sample Depth:
0.1-0.4 m
Moisture content:
14%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 14% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	11.355	mg/kg	0.00114 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.47	mg/kg	1.142	0.462	mg/kg	0.0000462 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18	mg/kg	1.462	22.625	mg/kg	0.00226 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25	mg/kg	1.126	24.207	mg/kg	0.00242 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	41	mg/kg		35.26	mg/kg	0.00353 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14	mg/kg	2.976	35.834	mg/kg	0.00358 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		**<LOD**
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		50	mg/kg	2.774	119.288	mg/kg	0.0119 %	✓	
11		pH			PH		9.6	pH		9.6	pH	9.6 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		0.34	mg/kg		0.292	mg/kg	0.0000292 %	✓	
13		acenaphthylene		205-917-1	208-96-8		0.13	mg/kg		0.112	mg/kg	0.0000112 %	✓	
14		acenaphthene		201-469-6	83-32-9		0.97	mg/kg		0.834	mg/kg	0.0000834 %	✓	
15		fluorene		201-695-5	86-73-7		0.99	mg/kg		0.851	mg/kg	0.0000851 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	•	phenanthrene		201-581-5	85-01-8		8.7	mg/kg		7.482	mg/kg	0.000748 %	✓	
17	•	anthracene		204-371-1	120-12-7		2.4	mg/kg		2.064	mg/kg	0.000206 %	✓	
18	•	fluoranthene		205-912-4	206-44-0		15	mg/kg		12.9	mg/kg	0.00129 %	✓	
19	•	pyrene		204-927-3	129-00-0		13	mg/kg		11.18	mg/kg	0.00112 %	✓	
20		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		7.4	mg/kg		6.364	mg/kg	0.000636 %	✓	
21		chrysene	601-048-00-0	205-923-4	218-01-9		6.3	mg/kg		5.418	mg/kg	0.000542 %	✓	
22		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		9.3	mg/kg		7.998	mg/kg	0.0008 %	✓	
23		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		3.6	mg/kg		3.096	mg/kg	0.00031 %	✓	
24		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		7.9	mg/kg		6.794	mg/kg	0.000679 %	✓	
25	•	indeno[123-cd]pyrene		205-893-2	193-39-5		6	mg/kg		5.16	mg/kg	0.000516 %	✓	
26		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.88	mg/kg		0.757	mg/kg	0.0000757 %	✓	
27	•	benzo[ghi]perylene		205-883-8	191-24-2		4.1	mg/kg		3.526	mg/kg	0.000353 %	✓	
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		33	mg/kg	1.785	50.664	mg/kg	0.00507 %	✓	
											Total:	0.0376 %		

Key

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

Classification of sample: WS101-09/11/2021-0.1

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

Sample details

Sample name:
WS101-09/11/2021-0.1
Sample Depth:
0.1-1.1 m
Moisture content:
11%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		21	mg/kg	1.32	24.677	mg/kg	0.00247 %	✓	
2		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		1.4	mg/kg	3.22	4.012	mg/kg	0.000401 %	✓	
3		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.45	mg/kg	1.142	0.458	mg/kg	0.0000458 %	✓	
4		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26	mg/kg	1.462	33.82	mg/kg	0.00338 %	✓	
5		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
6		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		61	mg/kg	1.126	61.124	mg/kg	0.00611 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	230	mg/kg		204.7	mg/kg	0.0205 %	✓	
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.6	mg/kg	1.353	0.723	mg/kg	0.0000723 %	✓	
9		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27	mg/kg	2.976	71.52	mg/kg	0.00715 %	✓	
10		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		**<LOD**
11		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		150	mg/kg	2.774	370.349	mg/kg	0.037 %	✓	
12		TPH (C6 to C40) petroleum group			TPH		410	mg/kg		364.9	mg/kg	0.0365 %	✓	
13		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
15		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
17		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
19		pH			PH		9.4	pH		9.4	pH	9.4 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		0.51	mg/kg		0.454	mg/kg	0.0000454 %	✓	
21		acenaphthylene		205-917-1	208-96-8		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
22		acenaphthene		201-469-6	83-32-9		1.3	mg/kg		1.157	mg/kg	0.000116 %	✓	
23		fluorene		201-695-5	86-73-7		1.3	mg/kg		1.157	mg/kg	0.000116 %	✓	
24		phenanthrene		201-581-5	85-01-8		30	mg/kg		26.7	mg/kg	0.00267 %	✓	
25		anthracene		204-371-1	120-12-7		4.5	mg/kg		4.005	mg/kg	0.0004 %	✓	
26		fluoranthene		205-912-4	206-44-0		67	mg/kg		59.63	mg/kg	0.00596 %	✓	
27		pyrene		204-927-3	129-00-0		68	mg/kg		60.52	mg/kg	0.00605 %	✓	
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		51	mg/kg		45.39	mg/kg	0.00454 %	✓	
29		chrysene	601-048-00-0	205-923-4	218-01-9		46	mg/kg		40.94	mg/kg	0.00409 %	✓	
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		47	mg/kg		41.83	mg/kg	0.00418 %	✓	
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		11	mg/kg		9.79	mg/kg	0.000979 %	✓	
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		31	mg/kg		27.59	mg/kg	0.00276 %	✓	
33		indeno[123-cd]pyrene		205-893-2	193-39-5		17	mg/kg		15.13	mg/kg	0.00151 %	✓	
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		5.5	mg/kg		4.895	mg/kg	0.000489 %	✓	
35		benzo[ghi]perylene		205-883-8	191-24-2		19	mg/kg		16.91	mg/kg	0.00169 %	✓	
36		phenol	604-001-00-2	203-632-7	108-95-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
37		1,1-dichloroethane and 1,2-dichloroethane (combined)		203-458-1, 200-863-5	107-06-2, 75-34-3		<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		**<LOD**
38		tetrachloroethylene	602-028-00-4	204-825-9	127-18-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
39		carbon tetrachloride; tetrachloromethane	602-008-00-5	200-262-8	56-23-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
40		trichloroethylene; trichloroethene	602-027-00-9	201-167-4	79-01-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
41		vinyl chloride; chloroethylene	602-023-00-7	200-831-0	75-01-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
42		hexachlorobenzene	602-065-00-6	204-273-9	118-74-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
43		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		36	mg/kg	1.785	57.197	mg/kg	0.00572 %	✓	
44		dichlorodifluoromethane		200-893-9	75-71-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
45		chloromethane; methyl chloride	602-001-00-7	200-817-4	74-87-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
46		bromomethane; methylbromide	602-002-00-2	200-813-2	74-83-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
47		chloroethane	602-009-00-0	200-830-5	75-00-3		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
48		trichlorofluoromethane		200-892-3	75-69-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
49		1,1-dichloroethylene; vinylidene chloride	602-025-00-8	200-864-0	75-35-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
50		bromochloromethane		200-826-3	74-97-5		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
51		chloroform; trichloromethane	602-006-00-4	200-663-8	67-66-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
52		1,1,1-trichloroethane; methyl chloroform	602-013-00-2	200-756-3	71-55-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
53		1,1-dichloropropene	602-031-00-0	209-253-3	563-58-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
54		1,2-dichloropropane; propylene dichloride	602-020-00-0	201-152-2	78-87-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
55		dibromomethane	602-003-00-8	200-824-2	74-95-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
56		bromodichloromethane		200-856-7	75-27-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
57		1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
58		trans-1,3-dichloropropene		431-460-4	10061-02-6		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
59		1,1,2-trichloroethane	602-014-00-8	201-166-9	79-00-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
60		1,3-dichloropropane		205-531-3	142-28-9		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
61		dibromochloromethane		204-704-0	124-48-1		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
62		1,2-dibromoethane	602-010-00-6	203-444-5	106-93-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
63		chlorobenzene	602-033-00-1	203-628-5	108-90-7		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
64		1,1,1,2-tetrachloroethane		211-135-1	630-20-6		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
65		styrene	601-026-00-0	202-851-5	100-42-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
66		bromoform; tribromomethane	602-007-00-X	200-854-6	75-25-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
67		bromobenzene	602-060-00-9	203-623-8	108-86-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
68		1,2,3-trichloropropane	602-062-00-X	202-486-1	96-18-4		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
69		mesitylene; 1,3,5-trimethylbenzene	601-025-00-5	203-604-4	108-67-8		0.0052	mg/kg		0.0046	mg/kg	0.000000463 %	✓	
70		tert-butylbenzene		202-632-4	98-06-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
71		1,2,4-trimethylbenzene	601-043-00-3	202-436-9	95-63-6		0.01	mg/kg		0.0089	mg/kg	0.00000089 %	✓	
72	●	sec-butylbenzene		205-227-0	135-98-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
73		1,3-dichlorbenzene	602-067-00-7	208-792-1	541-73-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
74	●	4-isopropyltoluene		202-796-7	99-87-6		0.0055	mg/kg		0.0049	mg/kg	0.00000049 %	✓	
75		1,4-dichlorobenzene; p-dichlorobenzene	602-035-00-2	203-400-5	106-46-7		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
76	●	n-butylbenzene		203-209-7	104-51-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
77		1,2-dichlorobenzene; o-dichlorobenzene	602-034-00-7	202-425-9	95-50-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
78		1,2-dibromo-3-chloropropane	602-021-00-6	202-479-3	96-12-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
79		1,2,4-trichlorobenzene	602-087-00-6	204-428-0	120-82-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
80	●	hexachlorobutadiene		201-765-5	87-68-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
81	●	1,2,3-trichlorobenzene		201-757-1	87-61-6		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		<LOD
82		carbon disulphide	006-003-00-3	200-843-6	75-15-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
83		dimethylnitrosoamine; N-nitrosodimethylamine	612-077-00-3	200-549-8	62-75-9		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
84		2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]	604-008-00-0	202-433-2 [1] 203-402-6 [2] 203-582-6 [3] 246-691-4 [4]	95-57-8 [1] 106-48-9 [2] 108-43-0 [3] 25167-80-0 [4]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
85		bis(2-chloroethyl) ether	603-029-00-2	203-870-1	111-44-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
86	●	hexachloroethane		200-666-4	67-72-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
87		nitrosodipropylamine	612-098-00-8	210-698-0	621-64-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
88		nitrobenzene	609-003-00-7	202-716-0	98-95-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
89		3,5,5-trimethylcyclohex-2-enone; isophorone	606-012-00-8	201-126-0	78-59-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
90	●	2-nitrophenol		201-857-5	88-75-5		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
91		3,4-xylenol; [1] 2,5-xylenol; [2] 2,4-xylenol; [3] 2,3-xylenol; [4] 2,6-xylenol; [5] xylenol; [6] 2,4(or 2,5)-xylenol [7]	604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]	95-65-8 [1] 95-87-4 [2] 105-67-9 [3] 526-75-0 [4] 576-26-1 [5] 1300-71-6 [6] 71975-58-1 [7]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
92	●	bis(2-chloroethoxy)methane		203-920-2	111-91-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
93		2,4-dichlorophenol	604-011-00-7	204-429-6	120-83-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
94		4-chloroaniline	612-137-00-9	203-401-0	106-47-8		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
95		chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol	604-014-00-3	200-431-6	59-50-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
96	•	2-methyl naphthalene		202-078-3	91-57-6		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
97		4-nitrophenol; p-nitrophenol	609-015-00-2	202-811-7	100-02-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
98		hexachlorocyclopentadiene	602-078-00-7	201-029-3	77-47-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
99		2,4,6-trichlorophenol	604-018-00-5	201-795-9	88-06-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
100		2,4,5-trichlorophenol	604-017-00-X	202-467-8	95-95-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
101	•	2-chloronaphthalene		202-079-9	91-58-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
102	•	dimethyl phthalate		205-011-6	131-11-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
103		2,6-dinitrotoluene	609-049-00-8	210-106-0	606-20-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
104	•	dibenzofuran		205-071-3	132-64-9		0.65	mg/kg		0.579	mg/kg	0.0000579 %	✓	
105	•	4-chlorophenylphenylether		230-281-7	7005-72-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
106		2,4-dinitrotoluene; [1] dinitrotoluene [2]	609-007-00-9	204-450-0 [1] 246-836-1 [2]	121-14-2 [1] 25321-14-6 [2]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
107	•	diethyl phthalate		201-550-6	84-66-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
108		DNOC (ISO); 4,6-dinitro-o-cresol	609-020-00-X	208-601-1	534-52-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
109		azobenzene	611-001-00-6	203-102-5	103-33-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
110	•	4-bromophenylphenylether		202-952-4	101-55-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
111		pentachlorophenol	604-002-00-8	201-778-6	87-86-5		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
112	•	carbazole		201-696-0	86-74-8		3.3	mg/kg		2.937	mg/kg	0.000294 %	✓	
113		dibutyl phthalate; DBP	607-318-00-4	201-557-4	84-74-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
114		BBP; benzyl butyl phthalate	607-430-00-3	201-622-7	85-68-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
115		bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP	607-317-00-9	204-211-0	117-81-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
116	•	di-n-octyl phthalate		204-214-7	117-84-0		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
117	•	monohydric phenols			P1186		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
118		m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]	604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]	108-39-4 [1] 95-48-7 [2] 106-44-5 [3] 1319-77-3 [4]		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
119		1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]	602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]	540-59-0 [1] 156-59-2 [2] 156-60-5 [3]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
120		cumene; [1] propylbenzene [2]	601-024-00-X	202-704-5 [1] 203-132-9 [2]	98-82-8 [1] 103-65-1 [2]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
121		2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		**<LOD**
		602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]	95-49-8 [1] 108-41-8 [2] 106-43-4 [3] 25168-05-2 [4]							
122		o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]				<1.5 mg/kg		<1.5 mg/kg	<0.00015 %		**<LOD**
		612-012-00-9	201-855-4 [1] 202-729-1 [2] 202-810-1 [3]	88-74-4 [1] 99-09-2 [2] 100-01-6 [3]							
								Total:	0.158 %		

Key

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Concentrations at less than 1.0% are "unlikely to be flammable". Flammability of soils is unlikely to result in a hazardous classification in soils (AGS Waste Classification – A Practitioner's Guide).

Hazard Statements hit:

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

Because of determinands:

TPH (C6 to C40) petroleum group: (conc.: 0.0365%)
mesitylene; 1,3,5-trimethylbenzene: (conc.: 4.63e-07%)
1,2,4-trimethylbenzene: (conc.: 8.9e-07%)
4-isopropyltoluene: (conc.: 4.9e-07%)

Classification of sample: WS102-09/11/2021-0.1

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

Sample details

Sample name:
WS102-09/11/2021-0.1
Sample Depth:
0.1-0.6 m
Moisture content:
14%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 14% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	13.626	mg/kg	0.00136 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.17	mg/kg	1.142	0.167	mg/kg	0.0000167 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19	mg/kg	1.462	23.882	mg/kg	0.00239 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		47	mg/kg	1.126	45.508	mg/kg	0.00455 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	150	mg/kg		129	mg/kg	0.0129 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.51	mg/kg	1.353	0.594	mg/kg	0.0000594 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		19	mg/kg	2.976	48.632	mg/kg	0.00486 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.31	mg/kg	2.554	0.681	mg/kg	0.0000681 %	✓	
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		76	mg/kg	2.774	181.318	mg/kg	0.0181 %	✓	
11		pH			PH		8.4	pH		8.4	pH	8.4 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		2.2	mg/kg		1.892	mg/kg	0.000189 %	✓	
13		acenaphthylene		205-917-1	208-96-8		0.22	mg/kg		0.189	mg/kg	0.0000189 %	✓	
14		acenaphthene		201-469-6	83-32-9		0.9	mg/kg		0.774	mg/kg	0.0000774 %	✓	
15		fluorene		201-695-5	86-73-7		0.66	mg/kg		0.568	mg/kg	0.0000568 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		phenanthrene				7.3	mg/kg		6.278	mg/kg	0.000628 %	✓	
			201-581-5	85-01-8									
17		anthracene				1.4	mg/kg		1.204	mg/kg	0.00012 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				7.5	mg/kg		6.45	mg/kg	0.000645 %	✓	
			205-912-4	206-44-0									
19		pyrene				7.1	mg/kg		6.106	mg/kg	0.000611 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				2.9	mg/kg		2.494	mg/kg	0.000249 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				3.4	mg/kg		2.924	mg/kg	0.000292 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				3.8	mg/kg		3.268	mg/kg	0.000327 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				1.5	mg/kg		1.29	mg/kg	0.000129 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				3.1	mg/kg		2.666	mg/kg	0.000267 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				2	mg/kg		1.72	mg/kg	0.000172 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				0.43	mg/kg		0.37	mg/kg	0.000037 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				1.9	mg/kg		1.634	mg/kg	0.000163 %	✓	
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				25	mg/kg	1.785	38.381	mg/kg	0.00384 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0523 %		

Key

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

Classification of sample: WS102-09/11/2021-1

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

Sample details

Sample name:
WS102-09/11/2021-1
Sample Depth:
1-2 m
Moisture content:
4.7%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 4.7% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		6.3	mg/kg	1.32	7.927	mg/kg	0.000793 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.26	mg/kg	1.142	0.283	mg/kg	0.0000283 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28	mg/kg	1.462	39	mg/kg	0.0039 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		100	mg/kg	1.126	107.297	mg/kg	0.0107 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	60	mg/kg		57.18	mg/kg	0.00572 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		43	mg/kg	2.976	121.964	mg/kg	0.0122 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		**<LOD**
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		80	mg/kg	2.774	211.501	mg/kg	0.0212 %	✓	
11		pH			PH		8.6	pH		8.6	pH	8.6 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		0.19	mg/kg		0.181	mg/kg	0.0000181 %	✓	
13		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
14		acenaphthene		201-469-6	83-32-9		0.15	mg/kg		0.143	mg/kg	0.0000143 %	✓	
15		fluorene		201-695-5	86-73-7		0.18	mg/kg		0.172	mg/kg	0.0000172 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		phenanthrene				0.74	mg/kg		0.705	mg/kg	0.0000705 %	✓	
			201-581-5	85-01-8									
17		anthracene				0.19	mg/kg		0.181	mg/kg	0.0000181 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				0.82	mg/kg		0.781	mg/kg	0.0000781 %	✓	
			205-912-4	206-44-0									
19		pyrene				0.7	mg/kg		0.667	mg/kg	0.0000667 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.36	mg/kg		0.343	mg/kg	0.0000343 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.43	mg/kg		0.41	mg/kg	0.000041 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.41	mg/kg		0.391	mg/kg	0.0000391 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				0.2	mg/kg		0.191	mg/kg	0.0000191 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				0.25	mg/kg		0.238	mg/kg	0.0000238 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				0.24	mg/kg		0.229	mg/kg	0.0000229 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				0.14	mg/kg		0.133	mg/kg	0.0000133 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				0.28	mg/kg		0.267	mg/kg	0.0000267 %	✓	
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				28	mg/kg	1.785	47.636	mg/kg	0.00476 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.06 %		

Key

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

Classification of sample: WS102-09/11/2021-3.5

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

Sample details

Sample name:
WS102-09/11/2021-3.5
Sample Depth:
3.5-4 m
Moisture content:
21%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 21% Wet Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1	•	pH				8 pH		8 pH	8pH		
				PH							
								Total:	0%		

Key

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

Classification of sample: WS103A-09/11/2021-0.1

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

Sample details

Sample name:
WS103A-09/11/2021-0.1
Sample Depth:
0.1-1 m
Moisture content:
19%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 19% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		26	mg/kg	1.32	27.806	mg/kg	0.00278 %	✓	
2		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		1.3	mg/kg	3.22	3.391	mg/kg	0.000339 %	✓	
3		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		**<LOD**
4		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23	mg/kg	1.462	27.229	mg/kg	0.00272 %	✓	
5		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
6		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		110	mg/kg	1.126	100.317	mg/kg	0.01 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	680	mg/kg		550.8	mg/kg	0.0551 %	✓	
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		2.3	mg/kg	1.353	2.522	mg/kg	0.000252 %	✓	
9		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		33	mg/kg	2.976	79.556	mg/kg	0.00796 %	✓	
10		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.33	mg/kg	2.554	0.683	mg/kg	0.0000683 %	✓	
11		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		74	mg/kg	2.774	166.282	mg/kg	0.0166 %	✓	
12		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
13		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
15		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
17		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
19		pH			PH		8.1	pH		8.1	pH	8.1 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		3.8	mg/kg		3.078	mg/kg	0.000308 %	✓	
21		acenaphthylene		205-917-1	208-96-8		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
22		acenaphthene		201-469-6	83-32-9		1.8	mg/kg		1.458	mg/kg	0.000146 %	✓	
23		fluorene		201-695-5	86-73-7		1.5	mg/kg		1.215	mg/kg	0.000122 %	✓	
24		phenanthrene		201-581-5	85-01-8		12	mg/kg		9.72	mg/kg	0.000972 %	✓	
25		anthracene		204-371-1	120-12-7		2.8	mg/kg		2.268	mg/kg	0.000227 %	✓	
26		fluoranthene		205-912-4	206-44-0		11	mg/kg		8.91	mg/kg	0.000891 %	✓	
27		pyrene		204-927-3	129-00-0		11	mg/kg		8.91	mg/kg	0.000891 %	✓	
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		6.3	mg/kg		5.103	mg/kg	0.00051 %	✓	
29		chrysene	601-048-00-0	205-923-4	218-01-9		5.9	mg/kg		4.779	mg/kg	0.000478 %	✓	
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		8.4	mg/kg		6.804	mg/kg	0.00068 %	✓	
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.7	mg/kg		2.187	mg/kg	0.000219 %	✓	
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		6.9	mg/kg		5.589	mg/kg	0.000559 %	✓	
33		indeno[123-cd]pyrene		205-893-2	193-39-5		3.6	mg/kg		2.916	mg/kg	0.000292 %	✓	
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		1.1	mg/kg		0.891	mg/kg	0.0000891 %	✓	
35		benzo[ghi]perylene		205-883-8	191-24-2		3.8	mg/kg		3.078	mg/kg	0.000308 %	✓	
36		phenol	604-001-00-2	203-632-7	108-95-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
37		1,1-dichloroethane and 1,2-dichloroethane (combined)		203-458-1, 200-863-5	107-06-2, 75-34-3		<0.003	mg/kg		<0.003	mg/kg	<0.0000003 %		**<LOD**
38		tetrachloroethylene	602-028-00-4	204-825-9	127-18-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
39		carbon tetrachloride; tetrachloromethane	602-008-00-5	200-262-8	56-23-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
40		trichloroethylene; trichloroethene	602-027-00-9	201-167-4	79-01-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
41		vinyl chloride; chloroethylene	602-023-00-7	200-831-0	75-01-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
42		hexachlorobenzene	602-065-00-6	204-273-9	118-74-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
43		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		30	mg/kg	1.785	43.38	mg/kg	0.00434 %	✓	
44		dichlorodifluoromethane		200-893-9	75-71-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
45		chloromethane; methyl chloride	602-001-00-7	200-817-4	74-87-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
46		bromomethane; methylbromide	602-002-00-2	200-813-2	74-83-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
47		chloroethane	602-009-00-0	200-830-5	75-00-3		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
48		trichlorofluoromethane		200-892-3	75-69-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
49		1,1-dichloroethylene; vinylidene chloride	602-025-00-8	200-864-0	75-35-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
50		bromochloromethane		200-826-3	74-97-5		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
51		chloroform; trichloromethane	602-006-00-4	200-663-8	67-66-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
52		1,1,1-trichloroethane; methyl chloroform	602-013-00-2	200-756-3	71-55-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
53		1,1-dichloropropene	602-031-00-0	209-253-3	563-58-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
54		1,2-dichloropropane; propylene dichloride	602-020-00-0	201-152-2	78-87-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
55		dibromomethane	602-003-00-8	200-824-2	74-95-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
56		bromodichloromethane		200-856-7	75-27-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
57		1,3-dichloropropene; [1] (Z)-1,3-dichloropropene [2]	602-030-00-5	208-826-5 [1] 233-195-8 [2]	542-75-6 [1] 10061-01-5 [2]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
58		trans-1,3-dichloropropene		431-460-4	10061-02-6		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
59		1,1,2-trichloroethane	602-014-00-8	201-166-9	79-00-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
60		1,3-dichloropropane		205-531-3	142-28-9		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
61		dibromochloromethane		204-704-0	124-48-1		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
62		1,2-dibromoethane	602-010-00-6	203-444-5	106-93-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		**<LOD**
63		chlorobenzene	602-033-00-1	203-628-5	108-90-7		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
64		1,1,1,2-tetrachloroethane		211-135-1	630-20-6		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
65		styrene	601-026-00-0	202-851-5	100-42-5		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
66		bromoform; tribromomethane	602-007-00-X	200-854-6	75-25-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
67		bromobenzene	602-060-00-9	203-623-8	108-86-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
68		1,2,3-trichloropropane	602-062-00-X	202-486-1	96-18-4		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
69		mesitylene; 1,3,5-trimethylbenzene	601-025-00-5	203-604-4	108-67-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
70		tert-butylbenzene		202-632-4	98-06-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
71		1,2,4-trimethylbenzene	601-043-00-3	202-436-9	95-63-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
72		sec-butylbenzene		205-227-0	135-98-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
73		1,3-dichlorbenzene	602-067-00-7	208-792-1	541-73-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
74		4-isopropyltoluene		202-796-7	99-87-6		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
75		1,4-dichlorobenzene; p-dichlorobenzene	602-035-00-2	203-400-5	106-46-7		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
76		n-butylbenzene		203-209-7	104-51-8		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
77		1,2-dichlorobenzene; o-dichlorobenzene	602-034-00-7	202-425-9	95-50-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
78		1,2-dibromo-3-chloropropane	602-021-00-6	202-479-3	96-12-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
79		1,2,4-trichlorobenzene	602-087-00-6	204-428-0	120-82-1		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
80		hexachlorobutadiene		201-765-5	87-68-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
81		1,2,3-trichlorobenzene		201-757-1	87-61-6		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		<LOD
82		carbon disulphide	006-003-00-3	200-843-6	75-15-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
83		dimethylnitrosoamine; N-nitrosodimethylamine	612-077-00-3	200-549-8	62-75-9		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
84		2-chlorophenol; [1] 4-chlorophenol; [2] 3-chlorophenol; [3] chlorophenol [4]	604-008-00-0	202-433-2 [1] 203-402-6 [2] 203-582-6 [3] 246-691-4 [4]	95-57-8 [1] 106-48-9 [2] 108-43-0 [3] 25167-80-0 [4]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
85		bis(2-chloroethyl) ether	603-029-00-2	203-870-1	111-44-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
86		hexachloroethane		200-666-4	67-72-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
87		nitrosodipropylamine	612-098-00-8	210-698-0	621-64-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
88		nitrobenzene	609-003-00-7	202-716-0	98-95-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
89		3,5,5-trimethylcyclohex-2-enone; isophorone	606-012-00-8	201-126-0	78-59-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
90		2-nitrophenol		201-857-5	88-75-5		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
91		3,4-xylenol; [1] 2,5-xylenol; [2] 2,4-xylenol; [3] 2,3-xylenol; [4] 2,6-xylenol; [5] xylenol; [6] 2,4(or 2,5)-xylenol [7]	604-006-00-X	202-439-5 [1] 202-461-5 [2] 203-321-6 [3] 208-395-3 [4] 209-400-1 [5] 215-089-3 [6] 276-245-4 [7]	95-65-8 [1] 95-87-4 [2] 105-67-9 [3] 526-75-0 [4] 576-26-1 [5] 1300-71-6 [6] 71975-58-1 [7]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
92		bis(2-chloroethoxy)methane		203-920-2	111-91-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
93		2,4-dichlorophenol	604-011-00-7	204-429-6	120-83-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
94		4-chloroaniline	612-137-00-9	203-401-0	106-47-8		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
95		chlorocresol; 4-chloro-m-cresol; 4-chloro-3-methylphenol	604-014-00-3	200-431-6	59-50-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
96	●	2-methyl naphthalene		202-078-3	91-57-6		1.2	mg/kg		0.972	mg/kg	0.0000972 %	✓	
97		4-nitrophenol; p-nitrophenol	609-015-00-2	202-811-7	100-02-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
98		hexachlorocyclopentadiene	602-078-00-7	201-029-3	77-47-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
99		2,4,6-trichlorophenol	604-018-00-5	201-795-9	88-06-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
100		2,4,5-trichlorophenol	604-017-00-X	202-467-8	95-95-4		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
101	●	2-chloronaphthalene		202-079-9	91-58-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
102	●	dimethyl phthalate		205-011-6	131-11-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
103		2,6-dinitrotoluene	609-049-00-8	210-106-0	606-20-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
104	●	dibenzofuran		205-071-3	132-64-9		1	mg/kg		0.81	mg/kg	0.000081 %	✓	
105	●	4-chlorophenylphenylether		230-281-7	7005-72-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
106		2,4-dinitrotoluene; [1] dinitrotoluene [2]	609-007-00-9	204-450-0 [1] 246-836-1 [2]	121-14-2 [1] 25321-14-6 [2]		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
107	●	diethyl phthalate		201-550-6	84-66-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
108		DNOC (ISO); 4,6-dinitro-o-cresol	609-020-00-X	208-601-1	534-52-1		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
109		azobenzene	611-001-00-6	203-102-5	103-33-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
110	●	4-bromophenylphenylether		202-952-4	101-55-3		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
111		pentachlorophenol	604-002-00-8	201-778-6	87-86-5		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
112	●	carbazole		201-696-0	86-74-8		1.3	mg/kg		1.053	mg/kg	0.000105 %	✓	
113		dibutyl phthalate; DBP	607-318-00-4	201-557-4	84-74-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
114		BBP; benzyl butyl phthalate	607-430-00-3	201-622-7	85-68-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
115		bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP	607-317-00-9	204-211-0	117-81-7		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
116	●	di-n-octyl phthalate		204-214-7	117-84-0		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		**<LOD**
117	●	monohydric phenols			P1186		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
118		m-cresol; [1] o-cresol; [2] p-cresol; [3] mix-cresol [4]	604-004-00-9	203-577-9 [1] 202-423-8 [2] 203-398-6 [3] 215-293-2 [4]	108-39-4 [1] 95-48-7 [2] 106-44-5 [3] 1319-77-3 [4]		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
119		1,2-dichloroethylene; [1] cis-dichloroethylene; [2] trans-dichloroethylene [3]	602-026-00-3	208-750-2 [1] 205-859-7 [2] 205-860-2 [3]	540-59-0 [1] 156-59-2 [2] 156-60-5 [3]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
120		cumene; [1] propylbenzene [2]	601-024-00-X	202-704-5 [1] 203-132-9 [2]	98-82-8 [1] 103-65-1 [2]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
121		2-chlorotoluene; [1] 3-chlorotoluene; [2] 4-chlorotoluene; [3] chlorotoluene [4]				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %		<**LOD**
		602-040-00-X	202-424-3 [1] 203-580-5 [2] 203-397-0 [3] 246-698-2 [4]	95-49-8 [1] 108-41-8 [2] 106-43-4 [3] 25168-05-2 [4]							
122		o-nitroaniline; [1] m-nitroaniline; [2] p-nitroaniline [3]				<1.5 mg/kg		<1.5 mg/kg	<0.00015 %		<**LOD**
		612-012-00-9	201-855-4 [1] 202-729-1 [2] 202-810-1 [3]	88-74-4 [1] 99-09-2 [2] 100-01-6 [3]							
								Total:	0.11 %		

Key

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

Classification of sample: WS103A-09/11/2021-1

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

Sample details

Sample name:
WS103A-09/11/2021-1
Sample Depth:
1-2 m
Moisture content:
16%
(wet weight correction)

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

Hazard properties

None identified

Determinands

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

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		<1	mg/kg	1.32	<1.32	mg/kg	<0.000132 %		**<LOD**
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		**<LOD**
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		12	mg/kg	1.462	14.732	mg/kg	0.00147 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		170	mg/kg	1.126	160.777	mg/kg	0.0161 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	2000	mg/kg		1680	mg/kg	0.168 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.61	mg/kg	1.353	0.694	mg/kg	0.0000694 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		22	mg/kg	2.976	55.001	mg/kg	0.0055 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.46	mg/kg	2.554	0.987	mg/kg	0.0000987 %	✓	
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		56	mg/kg	2.774	130.496	mg/kg	0.013 %	✓	
11		pH			PH		8.2	pH		8.2	pH	8.2 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
13		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
14		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
15		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16	•	phenanthrene		201-581-5	85-01-8		0.88	mg/kg		0.739	mg/kg	0.0000739 %	✓	
17	•	anthracene		204-371-1	120-12-7		0.16	mg/kg		0.134	mg/kg	0.0000134 %	✓	
18	•	fluoranthene		205-912-4	206-44-0		0.87	mg/kg		0.731	mg/kg	0.0000731 %	✓	
19	•	pyrene		204-927-3	129-00-0		0.78	mg/kg		0.655	mg/kg	0.0000655 %	✓	
20		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.39	mg/kg		0.328	mg/kg	0.0000328 %	✓	
21		chrysene	601-048-00-0	205-923-4	218-01-9		0.45	mg/kg		0.378	mg/kg	0.0000378 %	✓	
22		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.51	mg/kg		0.428	mg/kg	0.0000428 %	✓	
23		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.17	mg/kg		0.143	mg/kg	0.0000143 %	✓	
24		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.31	mg/kg		0.26	mg/kg	0.000026 %	✓	
25	•	indeno[123-cd]pyrene		205-893-2	193-39-5		0.26	mg/kg		0.218	mg/kg	0.0000218 %	✓	
26		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.11	mg/kg		0.0924	mg/kg	0.00000924 %	✓	
27	•	benzo[ghi]perylene		205-883-8	191-24-2		0.28	mg/kg		0.235	mg/kg	0.0000235 %	✓	
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		<5	mg/kg	1.785	<8.926	mg/kg	<0.000893 %		**<LOD**
											Total:	0.206 %		

Key

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

Classification of sample: WS103A-09/11/2021-4

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

Sample details

Sample name:
WS103A-09/11/2021-4
Sample Depth:
4-4.45 m
Moisture content:
18%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 18% Wet Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1	•	pH				8.1 pH		8.1 pH	8.1 pH		
				PH							
								Total:	0%		

Key

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

Classification of sample: HD101-09/11/2021-0.25

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

Sample details

Sample name:
HD101-09/11/2021-0.25
Sample Depth:
0.25-0.5 m
Moisture content:
11%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		27	mg/kg	1.32	31.727	mg/kg	0.00317 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.87	mg/kg	1.142	0.885	mg/kg	0.0000885 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26	mg/kg	1.462	33.82	mg/kg	0.00338 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		210	mg/kg	1.126	210.429	mg/kg	0.021 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	320	mg/kg		284.8	mg/kg	0.0285 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.7	mg/kg	1.353	2.048	mg/kg	0.000205 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		33	mg/kg	2.976	87.413	mg/kg	0.00874 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.48	mg/kg	2.554	1.091	mg/kg	0.000109 %	✓	
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		200	mg/kg	2.774	493.798	mg/kg	0.0494 %	✓	
11		pH			PH		8.9	pH		8.9	pH	8.9 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		0.24	mg/kg		0.214	mg/kg	0.0000214 %	✓	
13		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
14		acenaphthene		201-469-6	83-32-9		1.3	mg/kg		1.157	mg/kg	0.000116 %	✓	
15		fluorene		201-695-5	86-73-7		0.78	mg/kg		0.694	mg/kg	0.0000694 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		phenanthrene				7.7	mg/kg		6.853	mg/kg	0.000685 %	✓	
			201-581-5	85-01-8									
17		anthracene				1.6	mg/kg		1.424	mg/kg	0.000142 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				11	mg/kg		9.79	mg/kg	0.000979 %	✓	
			205-912-4	206-44-0									
19		pyrene				9.2	mg/kg		8.188	mg/kg	0.000819 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				4.1	mg/kg		3.649	mg/kg	0.000365 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				4	mg/kg		3.56	mg/kg	0.000356 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				4.9	mg/kg		4.361	mg/kg	0.000436 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				1.7	mg/kg		1.513	mg/kg	0.000151 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				3.8	mg/kg		3.382	mg/kg	0.000338 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				2.6	mg/kg		2.314	mg/kg	0.000231 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				0.58	mg/kg		0.516	mg/kg	0.0000516 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				2.3	mg/kg		2.047	mg/kg	0.000205 %	✓	
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				32	mg/kg	1.785	50.842	mg/kg	0.00508 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.125 %		

Key

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

Classification of sample: HD101-09/11/2021-0.5

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

Sample details

Sample name:
HD101-09/11/2021-0.5
Sample Depth:
0.5-0.8 m
Moisture content:
11%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		35	mg/kg	1.32	41.128	mg/kg	0.00411 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.49	mg/kg	1.142	0.498	mg/kg	0.0000498 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		32	mg/kg	1.462	41.625	mg/kg	0.00416 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		210	mg/kg	1.126	210.429	mg/kg	0.021 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	260	mg/kg		231.4	mg/kg	0.0231 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.72	mg/kg	1.353	0.867	mg/kg	0.0000867 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		75	mg/kg	2.976	198.666	mg/kg	0.0199 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.58	mg/kg	2.554	1.318	mg/kg	0.000132 %	✓	
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		160	mg/kg	2.774	395.038	mg/kg	0.0395 %	✓	
11		pH			PH		8.6	pH		8.6	pH	8.6 pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
13		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
14		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
15		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16	•	phenanthrene				1	mg/kg		0.89	mg/kg	0.000089 %	✓	
			201-581-5	85-01-8									
17	•	anthracene				0.27	mg/kg		0.24	mg/kg	0.000024 %	✓	
			204-371-1	120-12-7									
18	•	fluoranthene				1.3	mg/kg		1.157	mg/kg	0.000116 %	✓	
			205-912-4	206-44-0									
19	•	pyrene				1.2	mg/kg		1.068	mg/kg	0.000107 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.73	mg/kg		0.65	mg/kg	0.000065 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.72	mg/kg		0.641	mg/kg	0.0000641 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.94	mg/kg		0.837	mg/kg	0.0000837 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				0.39	mg/kg		0.347	mg/kg	0.0000347 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				0.87	mg/kg		0.774	mg/kg	0.0000774 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25	•	indeno[123-cd]pyrene				0.65	mg/kg		0.579	mg/kg	0.0000579 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				0.23	mg/kg		0.205	mg/kg	0.0000205 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27	•	benzo[ghi]perylene				0.56	mg/kg		0.498	mg/kg	0.0000498 %	✓	
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				97	mg/kg	1.785	154.115	mg/kg	0.0154 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.128 %		

Key

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

Classification of sample: HD102-09/11/2021-0.05

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

Sample details

Sample name:
HD102-09/11/2021-0.05
Sample Depth:
0.05-0.2 m
Moisture content:
10%
(wet weight correction)

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

Hazard properties

None identified

Determinands

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

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		19	mg/kg	1.32	22.578	mg/kg	0.00226 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.45	mg/kg	1.142	0.463	mg/kg	0.0000463 %	✓	
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		20	mg/kg	1.462	26.308	mg/kg	0.00263 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		**<LOD**
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		94	mg/kg	1.126	95.25	mg/kg	0.00953 %	✓	
6		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	270	mg/kg		243	mg/kg	0.0243 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.43	mg/kg	1.353	0.524	mg/kg	0.0000524 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		21	mg/kg	2.976	56.251	mg/kg	0.00563 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		**<LOD**
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		130	mg/kg	2.774	324.575	mg/kg	0.0325 %	✓	
11		pH			PH		11	pH		11	pH	11pH		
12		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
13		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
14		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
15		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-581-5	85-01-8									
17		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			204-371-1	120-12-7									
18		fluoranthene				0.22	mg/kg		0.198	mg/kg	0.0000198 %	✓	
			205-912-4	206-44-0									
19		pyrene				0.23	mg/kg		0.207	mg/kg	0.0000207 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.15	mg/kg		0.135	mg/kg	0.0000135 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.16	mg/kg		0.144	mg/kg	0.0000144 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.21	mg/kg		0.189	mg/kg	0.0000189 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				0.1	mg/kg		0.09	mg/kg	0.000009 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				0.18	mg/kg		0.162	mg/kg	0.0000162 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-883-8	191-24-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				32	mg/kg	1.785	51.413	mg/kg	0.00514 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0824 %		

Key

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

Appendix A: Classifier defined and non GB MCL determinands

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

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

- **lead compounds with the exception of those specified elsewhere in this Annex**

GB MCL index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

- **pH** (CAS Number: PH)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

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

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **1,1-dichloroethane and 1,2-dichloroethane (combined)** (EC Number: 203-458-1, 200-863-5, CAS Number: 107-06-2, 75-34-3)

Description/Comments: Combines the hazard statements and risk phrases for 1,1-dichloroethane and 1,2-dichloroethane
Data source: N/a
Data source date: 14 Oct 2016
Hazard Statements: Flam. Liq. 2; H225 , Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 1B; H350 , Aquatic Chronic 3; H412

- **dichlorodifluoromethane** (EC Number: 200-893-9, CAS Number: 75-71-8)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Aquatic Chronic 3; H412 , Ozone 1; H420 , Press. Gas; H280

- **trichlorofluoromethane** (EC Number: 200-892-3, CAS Number: 75-69-4)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H312 , Ozone 1; H420

- **bromochloromethane** (EC Number: 200-826-3, CAS Number: 74-97-5)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H312 , Skin Corr. 1B; H314 , Eye Dam. 1; H318 , Acute Tox. 4; H332 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Ozone 1; H420

- **bromodichloromethane** (EC Number: 200-856-7, CAS Number: 75-27-4)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Dam. 1; H318 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 1A; H360

- **trans-1,3-dichloropropene** (EC Number: 431-460-4, CAS Number: 10061-02-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Flam. Liq. 3; H226 , Acute Tox. 3; H301 , Asp. Tox. 1; H304 , Acute Tox. 3; H311 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Irrit. 2; H319 , Acute Tox. 4; H332 , STOT SE 3; H335 , Aquatic Chronic 1; H410

- **1,3-dichloropropane** (EC Number: 205-531-3, CAS Number: 142-28-9)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H332 , Flam. Liq. 2; H225 , Flam. Liq. 3; H226 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335

- **dibromochloromethane** (EC Number: 204-704-0, CAS Number: 124-48-1)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 3;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 4; H312 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 4; H332 , STOT SE 3; H335 , STOT SE 3; H336 , Muta. 2; H341 , Aquatic Chronic 2; H411

- **1,1,1,2-tetrachloroethane** (EC Number: 211-135-1, CAS Number: 630-20-6)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , Acute Tox. 3; H331 , Eye Dam. 1; H318 , Acute Tox. 4; H332 , Carc. 2; H351 , Acute Tox. 4; H312 , Aquatic Chronic 3; H412 , Skin Irrit. 2; H315

- **tert-butylbenzene** (EC Number: 202-632-4, CAS Number: 98-06-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Flam. Liq. 3; H226 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 3; H331 , Acute Tox. 4; H332 , STOT SE 3; H335 , Asp. Tox. 1; H304 , Aquatic Chronic 2; H411

- **sec-butylbenzene** (EC Number: 205-227-0, CAS Number: 135-98-8)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Aquatic Chronic 2; H411

- **4-isopropyltoluene** (EC Number: 202-796-7, CAS Number: 99-87-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Chronic 2; H411

- **n-butylbenzene** (EC Number: 203-209-7, CAS Number: 104-51-8)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Flam. Liq. 3; H226 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **hexachlorobutadiene** (EC Number: 201-765-5, CAS Number: 87-68-3)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 3;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 3; H301 , Acute Tox. 2; H310 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Irrit. 2; H319 , Acute Tox. 2; H330 , Carc. 2; H351 , Repr. 2; H361 , STOT SE 2; H371 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **1,2,3-trichlorobenzene** (EC Number: 201-757-1, CAS Number: 87-61-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , STOT SE 3; H336 , Aquatic Acute 1; H400 , Aquatic Chronic 3; H410

- **hexachloroethane** (EC Number: 200-666-4, CAS Number: 67-72-1)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , STOT RE 2; H373

- **2-nitrophenol** (EC Number: 201-857-5, CAS Number: 88-75-5)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 4; H312 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 4; H332 , STOT SE 3; H335 , STOT RE 2; H373 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **bis(2-chloroethoxy)methane** (EC Number: 203-920-2, CAS Number: 111-91-1)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 3; H301 , Acute Tox. 4; H312 , Acute Tox. 1; H330 , Acute Tox. 2; H330 , STOT SE 1; H370 , STOT RE 2; H373

- **2-methyl naphthalene** (EC Number: 202-078-3, CAS Number: 91-57-6)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , STOT SE 3; H336 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **2-chloronaphthalene** (EC Number: 202-079-9, CAS Number: 91-58-7)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **dimethyl phthalate** (EC Number: 205-011-6, CAS Number: 131-11-3)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , Acute Tox. 3; H331 , STOT SE 3; H335 , STOT SE 3; H336 , Repr. 2; H361 , Aquatic Chronic 3; H412

- **dibenzofuran** (EC Number: 205-071-3, CAS Number: 132-64-9)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 4; H312 , Acute Tox. 4; H332 , Aquatic Chronic 2; H411

- **4-chlorophenylphenylether** (EC Number: 230-281-7, CAS Number: 7005-72-3)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Dam. 1; H318 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **diethyl phthalate** (EC Number: 201-550-6, CAS Number: 84-66-2)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Skin Irrit. 2; H315 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , STOT SE 3; H335 , STOT RE 2; H373 , Repr. 2; H361 , Acute Tox. 4; H302 , STOT SE 3; H336 , Skin Sens. 1; H317 , Aquatic Chronic 1; H410

- **4-bromophenylphenylether** (EC Number: 202-952-4, CAS Number: 101-55-3)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Eye Dam. 1; H318 , Eye Irrit. 2; H319 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **carbazole** (EC Number: 201-696-0, CAS Number: 86-74-8)

Description/Comments: VOC; Data from C&L Inventory Database; IARC considers substance Group 2B;
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Muta. 2; H341 , Carc. 2; H351 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301

- **di-n-octyl phthalate** (EC Number: 204-214-7, CAS Number: 117-84-0)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Repr. 2; H361 , Skin Sens. 1; H317 , Resp. Sens. 1; H334 , Eye Irrit. 2; H319 , Aquatic Chronic 4; H413

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

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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

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

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) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (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) Worse 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 compounds with the exception of those specified elsewhere in this Annex}

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

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 {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (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

boron {diboron trioxide; boric oxide}

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

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

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

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2021.347.4961.9421 (13 Dec 2021)
HazWasteOnline Database: 2021.347.4961.9421 (13 Dec 2021)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021

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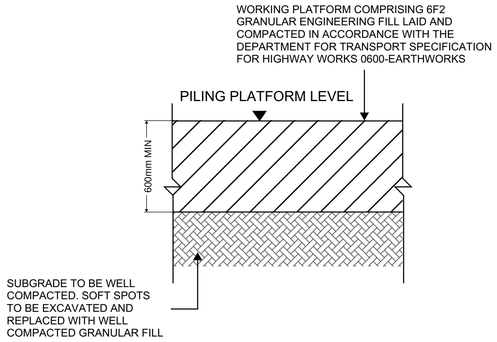
- Geotechnical
- Contaminated Land
- Flood Risk and Drainage
- Asbestos
- Invasive Species
- Land Remediation
- Project Management
- Land Drilling

Appendix C – Piling Mat Sketch



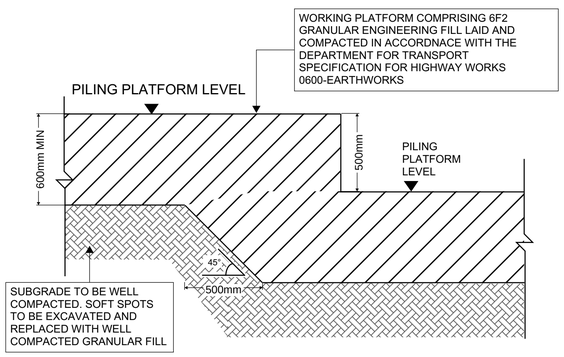
WORKING PLATFORM SECTION

SCALE 1:20 @ A1

ALLOWANCE TO BE MADE FOR ADDITIONAL INTRUSIVE INSPECTIONS TO BE UNDERTAKEN IN ORDER TO REVIEW OF INTERFACE DETAILS BETWEEN THE PILE MAT AND THE ADJACENT BUILDINGS, FOOTPATH AND RAILWAY INFRASTRUCTURE PRIOR TO CONSTRUCTION OF THE PILING MAT

PLATFORM THICKNESS SUBJECT TO CONFIRMATION OF ALLOWABLE BEARING PRESSURE CAPACITY OF MADE GROUND. REFER TO CE SKETCH DRAWING 756-02-CIV-XX-F2-S-S-10002 FOR SCOPE OF TESTING

MINIMUM RIG EXCLUSION ZONE OF 2m FROM SITE BOUNDARY TO BE DEMARKATED ON SITE AND MAY LOCALLY INCREASE SUBJECT TO FINDINGS OF INVESTIGATIVE TRIAL PITS. THIS IS TO BE REVIEWED BY THE PILING CONTRACTOR WITH REGARDS TO RIG TRACKING AND PILE SEQUENCING.



STEP IN WORKING PLATFORM

SCALE 1:20 @ A1

STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.E. PRIOR TO THE COMMENCEMENT OF WORKS.

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KEY

NOTES

1. REFER TO CIVIC ENGINEERS GENERAL NOTES DRAWING NUMBER 756-02-CIV-XX-GN-DR-S-00001, FOR ALL STEELWORK, PRECAST, CONCRETE AND GENERAL NOTES.

2. FOR THE PILING SCHEDULE REFER TO DRAWING No: 756-02-CIV-XX-F2-L-S-5000

3. FOR PILING LAYOUT REFER TO DRAWING No: 756-02-CIV-XX-F2-DR-S-5001

4. PRECISE LOCATIONS OF EXISTING AND DIVERTED SERVICES ARE TO BE CONFIRMED WITH THE CONTRACTOR BEFORE PILING ADJACENT TO THE SERVICES

5. FOUNDATION CONSTRUCTION INVOLVES EXCAVATION AGAINST ADOPTED HIGHWAY AND IN CLOSE PROXIMITY TO BURIED SERVICES. REFER TO THE SITE CONSTRAINTS PLAN

6. THE CONTRACTOR IS TO ALLOW FOR THE DESIGN AND INSTALLATION OF ALL TEMPORARY WORKS REQUIRED TO AVOID EXISTING ABUTTING FOUNDATIONS, FOOTPATH AS AVOID DISTURBANCE OF EXISTING BURIED SERVICES SURROUNDING THE SITE.

7. MADE GROUND PROPERTIES ARE TO BE DETERMINED THROUGH PLATE BEARING TESTS PRIOR TO THE CONSTRUCTION OF PILING MAT. FOR THE PURPOSES OF DESIGN, PROPERTIES FROM UNDERLYING FIRM CLAY, CU=54kN/m² HAS BEEN USED. CLAY PROPERTIES HAVE BEEN DETERMINED FROM HAND SHEAR VANE TESTS UNDERTAKEN DURING PHASE II SITE INVESTIGATION BY LK GROUP.

8. FURTHER SITE INVESTIGATION TO CONFIRM MADE GROUND ALLOWABLE BEARING PRESSURE

9. THE WORKING PLATFORM HAS BEEN DESIGNED TO LOADING FOR A SOLIMEC SF65 CFA PILING RIG, THE SUITABILITY OF THE WORKING PLATFORM TO SUPPORT APPLIED LOAD FROM OTHER MACHINERY AND PLANT IS TO BE REVIEWED AND THIS REMAINS THE RESPONSIBILITY OF THE CONTRACTOR.

10. THE CONTRACTOR IS TO UNDERTAKE REGULAR INSPECTION AND MAINTENANCE OF THE WORKING PLATFORM THROUGHOUT THE PROPOSED WORKS. SOFT SPOTS THAT ARISE DURING THE WORKS ARE TO BE REPLACED WITH WELL COMPACTED 6F2.

11. THE COMPLETED WORKING PLATFORM IS TO BE PROOF LOAD TESTED BY THE CONTRACTOR USING A 750MM DIAMETER PLATE IN EQUAL INCREMENTS UP TO AN APPLIED BEARING PRESSURE OF 410kN/m² (1.5 x MAX BEARING PRESSURE DUE TO PILING RIG) IN ACCORDANCE WITH TWF 2019.02. CONTRACTOR TO ALLOW FOR TESTING IN 8NO. TESTS IN LOCATIONS TO BE AGREED FOLLOWING COMPLETION OF THE WORKING PLATFORM CONSTRUCTION.

Date	Rev	Description	Drawn	Chkd
11.11.22	P01	INFORMATION	IR	CH

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Project

ONE VICTORIA, GREAT DUCIE STREET

Title

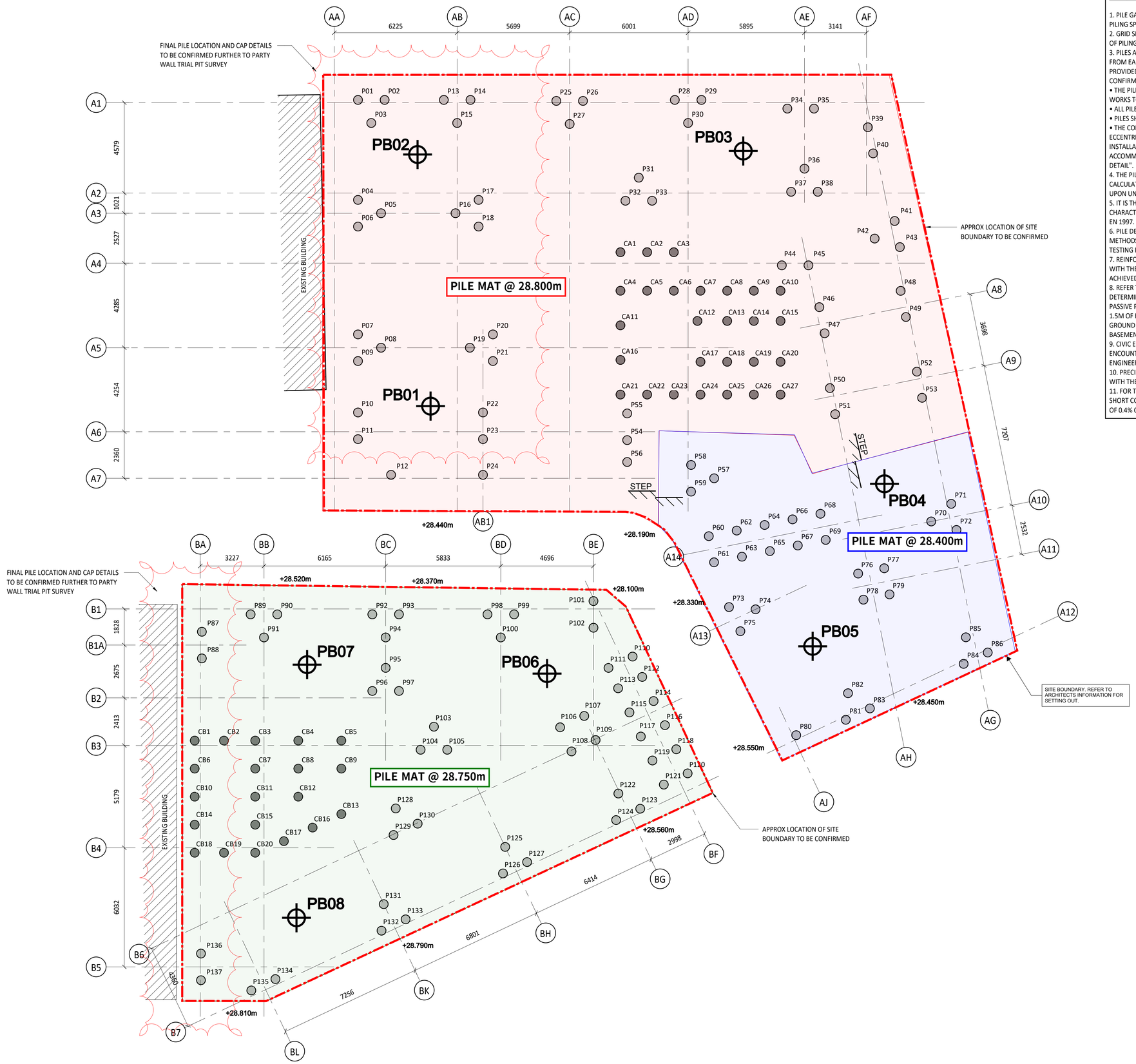
PILING MAT SKETCH - GENERAL ARRANGEMENT

Status

INFORMATION

Project Number	Scale @ A1	Date Created	Drawn	Checked	Suitability
756-02	1:100	NOV 22	IR	CH	

Drawing Number	Revision
756-02-CIV-XX-F2-S-S-10001	P01



PILING NOTES:

1. PILE GA AND SCHEDULE TO BE READ IN CONJUNCTION WITH THE CIVIC ENGINEERS PILING SPECIFICATION.
2. GRID SETTING OUT TO BE CONFIRMED BY THE ARCHITECT PRIOR TO COMMENCEMENT OF PILING.
3. PILES ARE 450mm DIA CFA PILES BASED UPON CAPACITIES PROVIDED BY INITIAL ADVICE FROM EARLY SUBCONTRACTOR INVOLVEMENT AND THE SITE INVESTIGATION REPORT PROVIDED BY LK Group Ref LKC 21 1684 March 22. PILE DESIGN IS TO BE CONFIRMED THROUGH DESIGN BY PILING SUBCONTRACTOR.
• THE PILING CONTRACTOR SHALL PROVIDE A FULL METHOD STATEMENT FOR THE WORKS TO CIVIC ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT.
• ALL PILECAPS ARE TO BE CENTRED BELOW COLUMNS UNLESS NOTED OTHERWISE.
• PILES SHALL BE UNIFORMLY REINFORCED AROUND CIRCUMFERENCE.
• THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTIMATING ANY ADDITIONAL ECCENTRICITIES, MOMENTS AND HORIZONTAL FORCES ARISING FROM INSTALLATION OF PILES ABOVE CUT OFF LEVEL. ALL PILES SHALL BE DESIGN TO ACCOMMODATE SUCH FORCES. PLEASE SEE "ADDITIONAL PILE ECCENTRICITIES DETAIL".
4. THE PILING SUBCONTRACTOR IS RESPONSIBLE FOR PRODUCING DRAWINGS AND CALCULATIONS FOR THE REVIEW OF THE ENGINEER AND BUILDING CONTROL BASED UPON UNFACTORED CHARACTERISTIC LOADS SUPPLIED BY CIVIC ENGINEERS.
5. IT IS THE RESPONSIBILITY OF THE PILING SUBCONTRACTOR TO COMBINE AND FACTOR CHARACTERISTIC LOADS PROVIDED TO DEVELOP DESIGN LOADS FOR PILE DESIGN TO BS EN 1997.
6. PILE DESIGN TO BE COMPLETED IN ACCORDANCE WITH BS EN 1997 USING DESIGN METHODS THAT OMIT THE NEED TO LOAD TEST PILES TO BS EN 1997. INTEGRITY TESTING FOR ALL PILES SHOULD BE UNDERTAKEN ON SITE.
7. REINFORCEMENT WITHIN PILES NOT TO EXCEED 16MM DIAMETER UNLESS AGREED WITH THE ENGINEER. PILE CONTRACTOR TO ENSURE FULL TENSION ANCHORAGE IS ACHIEVED WHERE PILE CAPS/PILES ARE IN TENSION.
8. REFER TO THE SITE INVESTIGATION REPORTS FOR DEPTHS OF MADE GROUND IN DETERMINING PASSIVE SOIL PRESSURES FOR PILES RESISTING HORIZONTAL FORCES. NO PASSIVE PRESSURE RESISTANCE IS TO BE ASSUMED TO BE GAINED FROM A MINIMUM 1.5M OF EARTH AT THE TOP OF THE PILE. PASSIVE RESISTANCE OR SHAFT FRICTION OF GROUND MUST NOT BE TAKEN INTO CONSIDERATION FOR THOSE PILES ADJACENT TO EXISTING BASEMENT WALLS TO AVOID IMPOSING LOAD ONTO THESE WALLS.
9. CIVIC ENGINEERS ARE TO BE NOTIFIED IMMEDIATELY IF OBSTRUCTIONS ARE ENCOUNTERED AND PROPOSALS FOR ALTERNATIVE PILING LOCATIONS ISSUED TO CIVIC ENGINEERS FOR COMMENT PRIOR TO INSTALLATION.
10. PRECISE LOCATIONS OF EXISTING AND DIVERTED SERVICES ARE TO BE CONFIRMED WITH THE CONTRACTOR BEFORE PILING ADJACENT TO THE SERVICES.
11. FOR THE PURPOSE OF REINFORCED CONCRETE DESIGN, PILES SHOULD BE TREATED AS SHORT COLUMNS IN ACCORDANCE WITH BS EN 1992 WITH MINIMUM REINFORCEMENT OF 0.4% OF THE CROSS-SECTIONAL AREA

STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.E. PRIOR TO THE COMMENCEMENT OF WORKS.

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KEY

NOTES

1. TO BE READ IN CONJUNCTION WITH DRW REF 756-02-CIV-XX-F2-S-S-10001

2. PLATE BEARING TESTS (PB01-PB08) TO ASSESS THE LOAD BEARING CAPACITY OF SITE SUBGRADE TO CONFIRM THE DESIGN OF THE PILING PLATFORM FOR INSTALLATION OF CFA PILES. REFER TO BELOW FOR LEVEL m AOD

3. PLATE BEARING TESTS TO BE UNDERTAKEN IN ACCORDANCE WITH BS 1377-9. REQUIRED MAXIMUM TEST LOAD 410kN/m². TEST PLATE DIAMETER TO BE 750mm MINIMUM.

4. TEST LOAD TO BE APPLIED IN 7No EQUAL INCREMENTS MAINATINING CONSTANT LOAD UNTIL PLATE PENETRATION HAS CEASED.

5.SETTLEMENT TO BE RECORDED UNDER EACH LOAD INCREMENT AGAINST TIME, COMMENCING WITH APPLICATION OF LOAD.

6. TEST ASSUMED TO FAIL AT FORCE CAUSING PENETRATION OF 15% PLATE WIDTH

KEY:

PBXX APPROXIMATE LOCATION OF PLATE BEARING TEST

APPROXIMATE POSITION OF SITE BOUNDARY TO BE CONFIRMED

PB01: TEST LEVEL 28.200m
PB02: TEST LEVEL 28.200m
PB03: TEST LEVEL 28.200m
PB04: TEST LEVEL 27.800m
PB05: TEST LEVEL 27.800m
PB06: TEST LEVEL 28.150m
PB07: TEST LEVEL 28.150m
PB08: TEST LEVEL 28.150m

Date	Rev	Description	Drawn	Chkd
11.11.22	P01	INFORMATION	IR	CH

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Project
ONE VICTORIA, GREAT DUCIE STREET

Title
ENABLING WORKS SITE INVESTIGATION

Status
INFORMATION

Project Number	Scale @ A1	Date Created	Drawn	Checked	Suitability
756-02	1:100	NOV 22	IR	CH	

Drawing Number	Revision
756-02-CIV-XX-F2-S-S-10002	P01

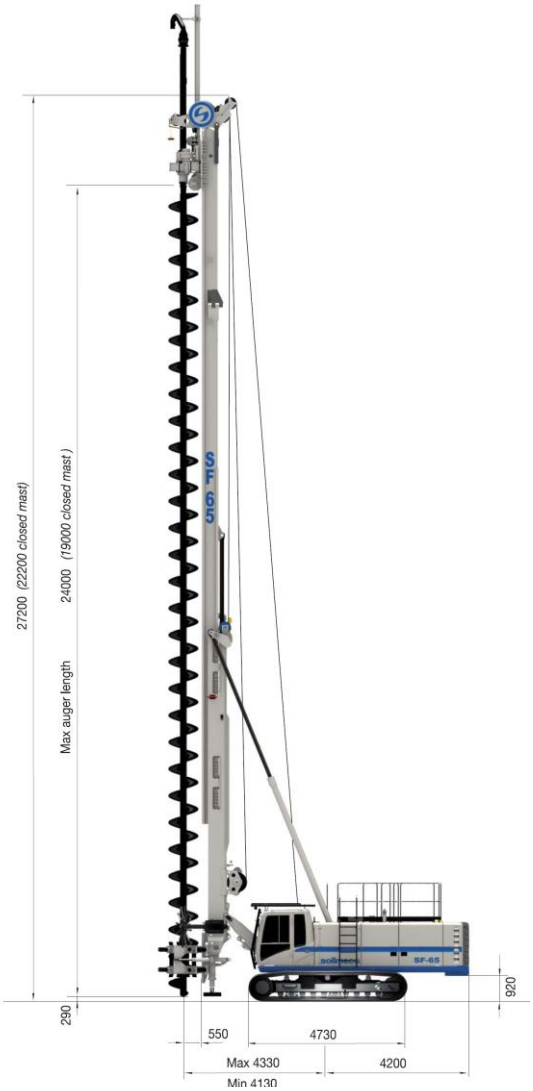
Appendix D – Piling Rig Technical Information

Soilmec SF65
CFA Rotary Rig
Information Sheet

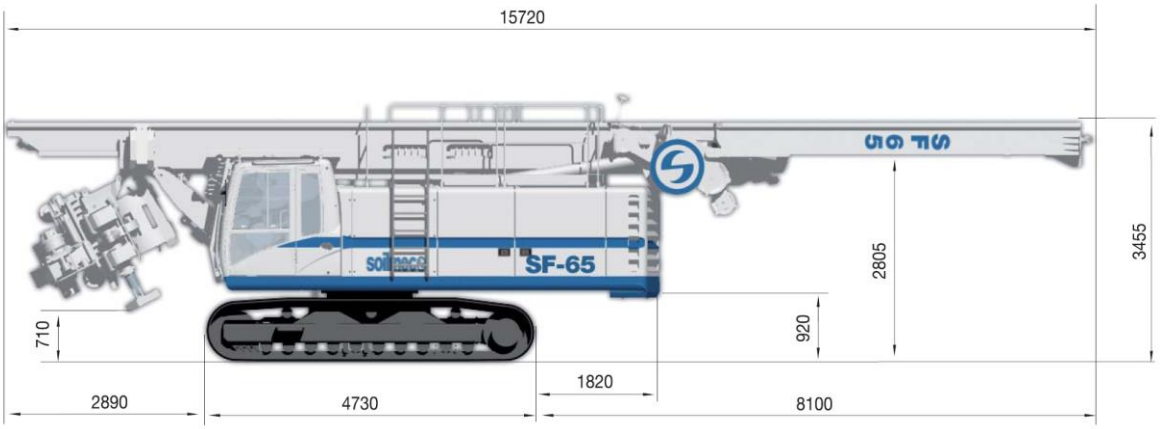
Greenpiling

Working Conditions

TECHNICAL DATA		
Drilling Performance		
Max pile diameter	mm	1000
Max Auger Length (+ Extension)	m	24 (+ 3m) or 19 (+6m)
Max extraction force	kN	572
Pull-down winch force (optional)	kN	97
Rotary Table		
Nominal torque	kNm	165
Maximum drilling speed	rpm	31
Weights and Dimensions		
Transport		
Transport width	mm	2980
Transport height	mm	3455
Transport length	mm	15720
Transport weight	ton	49
Operating		
Operating width	mm	4400
Operating height	mm	29940
Operating weight	ton	53
Overall		
Overall length	mm	4730
Overall width (extended)	mm	4400
Overall width (retracted)	mm	2980
Track shoe width	mm	750
Bearing pressure	See GPL WPC	



Transport Conditions



FEDERATION OF PILING SPECIALISTS

Working Platform Certificate (FPS/WPC/4d)

Greenpiling

Project Name	
Work area covered by this certificate	

(A sketch or marked up pile layout drawing may be attached to this certificate. Include haul roads and gridlines.)

Part 1 – WORKING PLATFORM DESIGN (INCLUDING RAMPS AND ACCESS ROUTES)

Equipment to be used on site.	D.4 Soilmec SF-65 2t winch - 750mm tracks 5750kg auger
Maximum plant loading	Loadcase 1 (Rig Handling) Equiv Track Length=2.28m Bearing Pressure = 209kPa Loadcase 2 (Rig Extracting) Equiv Track Length=1.48m Bearing Pressure 273kPa

(Note: BR470 'Working Platforms for Tracked Plant: Good practice guide to the design, installation, maintenance and repair of ground-supported platforms' is available from IHS BRE Press – Tel 01344 328 038)

Designer Name		**Tel No.**
Designer Organisation		
Specification of testing required to verify the design		

Part 2 – VERIFICATION BY PRINCIPAL CONTRACTOR

The working platform detailed above has been designed, installed to the design and, if specified, tested to safely support the equipment detailed in Part 1 above. The limits of the platform have been clearly identified on site as necessary.

The working platform will be REGULARLY INSPECTED, MAINTAINED, MODIFIED, REPAIRED, and REINSTATED to the as-designed condition after any excavation or damage, throughout the period when the equipment is on the site. A completed copy of this certificate signed by an authorised person from the Principal Contractor shall be given to each user of the working platform prior to commencement of any works on site.

Name & Position		**Date**
Organisation		**Signature**

The HSE has worked closely with the FPS to develop this initiative and supports the principle of reducing accidents by the certification of properly designed, prepared and maintained working platforms

FEDERATION OF PILING SPECIALISTS

Working Platform Certificate (FPS/WPC/4d)

Greenpiling

Working Platform Regular Inspection Log

(To be completed by an authorised representative of the Principal Contractor)

The working platform has been inspected *prior to handover and provides safe access for people and plant*. All necessary maintenance, modification, repair or re-instatement of the working platform is to the as-designed installed condition. If necessary, a revised Working Platform Layout Drawing has been issued to the specialist contractor.

Date	Organisation	Name & Position	Signature	Comments (include key details of alteration, modification, maintenance, repair, date of next inspection, and whether or not revised drawing issued etc. as appropriate)

FEDERATION OF PILING SPECIALISTS

Working Platform Certificate (FPS/WPC/4d)

Greenpiling

Guidance on working platforms for tracked plant

1. Design

1.1. The HSWA 1974 and CDM Regulations 2015 require the Principal Contractor to appoint competent Designers in respect of Working Platform design. This legislation explains how competence can be assessed by reference to professional qualifications or professional memberships and by reference to practical experience of the design of working platforms. Principal Contractors must be satisfied that a competent Designer has been appointed by them in accordance with the relevant legislation before they complete and sign the WPC.

1.2. The stability of tracked plant is fundamentally dependent upon the provision of a suitable and sufficient working platform. It must be properly designed and installed to a recognised standard. Whilst the same type of rig may be operated by different companies, the design bearing pressures may differ due to the specific operating configuration of the rig and/or any modifications. Details of the plant to be used and bearing pressures will be provided by the specialist contractor in advance of work commencing.

1.3. Working platform design is extremely sensitive to the bearing pressure and type of fill used in the platform. (For example, changing the angle of friction of the fill from 35 degrees to 45 degrees can halve the platform thickness.) It is therefore advised that the Designer may have to adopt conservative/cautious estimates of platform shear strength unless higher values can be demonstrated by testing or with reference to appropriate published data.

1.4. The working platform must be *safe for pedestrian access and* free draining to prevent the build-up of water and slurry. It must be free from harmful materials and contaminants. In the case of fine-grained sub-grades, a separation/filter membrane should be installed beneath the platform material to inhibit 'pumping' and infiltration of the fine-grained soils up into the platform material during wet weather (which can impair platform performance and increase maintenance costs).

1.5. Proof testing of the platform can be carried out with a suitably sized circular plate subjected to the maximum design loading. Such testing, as part of an appropriately designed testing regime, should highlight any gross inconsistencies in platform performance. Potentially, significant savings in platform thickness and cost may be realised by adopting a more detailed testing strategy.

1.6. The working platform must have a design life which starts before delivery of the piling equipment and ends on completion of all piling works. This includes load testing, integrity testing, investigation of non-conformances and any remedial works.

1.7. The specialist contractor is to advise the Principal Contractor at the earliest practicable opportunity should the specialist contractor become aware of any circumstances relating to the working platform that renders it unsafe.

2. Installation

2.1. The FPS Working Platform Certificate is mandatory for all sites where a rig or attendant plant operates. It must be signed by an authorised representative of the Principal Contractor. This signature confirms that the legal duties required under CDM have been carried out.

2.2. If the working platform is to be constructed or removed in phases while piling works are ongoing, then the extent of the platform must be clearly defined on the certificate and, in accordance with good practice, physically on site. This is particularly important where the platform material is removed from an area previously made available to the specialist contractor.

2.3. The working platform *must* provide *safe* access for all plant deliveries, sub-contractors and personnel associated with the specialist operations. Properly designed and installed, the working platform could also provide suitable and safe access for following trades for the whole project.

2.4. Poor definition of the edge of the working platform is a major cause of tracked plant instability. It is good practice that the working platform should extend at least 2m beyond the pile position/edge of the building to ensure sufficient safe working area for the specialists personnel and attendant plant. Where having to work within this 2m zone is unavoidable the Designer is to be informed of the requirement to design the platform for working up to its edge.

2.5. Where access ramps are used to move between working levels these must be of sufficient gradient and width to allow the plant to move safely with the stability constraints of the machine. Ramps must be in a straight line between working areas. Rigs and cranes cannot change direction on ramps. Where a change in direction is required, this must be on a flat level platform.

3. Maintenance, modification, repair and reinstatement

3.1. The working platform must be kept free draining. Water and slurry which is allowed to build up on the working platform can hide such hazards as recently constructed piles, trip hazards, uneven or unstable ground, services and excavations. Slurry can be transferred to work equipment which increases the risk of slips on steps as well as difficult handling of work tools.

3.2. Obstructions encountered during installation of the piling works will generally require excavation to remove them. This can create a 'soft spot' which can result in the rig overturning. It is essential, therefore, that any excavations made in the working platform are reinstated to the designed standard, including any reinforcement and separation filter/membrane.

3.3. The working platform shall be subject to regular inspection by a competent individual appointed by the Principal Contractor (e.g. the Temporary Works Co-ordinator) throughout its design life and after any reinstatement or any works which might have modified it. Any damaged or inadequate areas identified must be reinstated to the designed standard. Following the regular inspection, the Working Platform Regular Inspection Log shall be signed by an authorised representative of the Principal Contractor and issued to the specialist contractor with a layout drawing of the working platform amended as appropriate.

4. Working Platform Layout

4.1 Items that must be included and properly located on the working platform layout drawing and be notified by the Principal Contractor to the specialist contractor would include: detail of platform edges and 2m delineation, trial pits, services or voids, areas of backfilling, known underground basements; areas that are covered by the certificate or permit, test locations (if specified by the Designer of the platform) and any other feature that may affect the safety of operations.

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