

BROWN STREET,
LITTLEBOROUGH

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

Job Number: LKC 21 1470

Date: October 2021

Client: Casey Group Ltd



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EXECUTIVE SUMMARY

Site Details

Site Location:	At the middle of Brown Street, in front of Regent Street, Littleborough. Centred at approximate National Grid Reference 393526E 416412N.
Site Area:	4,000m ² .
Current Land Use:	The site currently comprises a large lightweight industrial type building, shipping containers, a car park, bounded mostly by fencing. The site is under a mixture of tarmac, gravel and concrete tiles.
Proposed Development:	Pre-Planning: residential apartments with soft landscaping and car parking.
Purpose of Report:	Contamination and Geotechnical Assessment.

Preliminary Risk Assessment

PRA Details:	Undertaken by Geo Assist Limited in February 2020. Ref: 6039/UNF
History:	Agricultural Land 1851, Commercial Buildings 1891, Works & Allotment Gardens 1960.
Geology / Hydrogeology:	Alluvial Fan Deposit (E) & Glacial Till (W) – Secondary A Aquifer. Pennine Lower Coal Measures – Secondary A Aquifer.
Mining:	Within Coal Authority reporting area. Not within area that could be affected by any past recorded underground coal mining.
Relevant Environmental Setting:	River Roch located 157m south. 6no. pollution incidents within 250m of site: nearest, 2m SW, May 1996, however no pollution was found, Category 3 – Minor Incident, with the latest being recorded in 1998. 2no. active water abstraction licences within 250m of site: nearest 57m S. Not within Source Protection Zone.
Preliminary Conceptual Model: PL=Pollutant Linkage	PL1 Direct Contact (Human Health): Moderate Risk (metals, PAHs, hydrocarbons, ACM), Moderate/ Low Risk (pesticides). PL2 Inhalation of Vapours: Moderate /Low Risk (volatile contaminants). PL3 Gas: High Risk (hazardous and ground gas). PL4 Controlled waters: Moderate Risk (mobile contaminants). PL5 Sulphate Attack: Moderate /Low Risk (sulphate). PL6 Water Pipelines: Moderate /Low (organic contaminants). PL7 Phytotoxic: Very Low Risk (metals).
Recommendations:	Site Investigation was recommended to further assess all the above pollutant linkages.

Ground Investigation Work Undertaken

Date of Investigation:	17 th September 2021.
Intrusive Investigation Work Undertaken:	5no. window sample boreholes (WS101-WS105). 4no. mechanically excavated trial pits (TP101-TP104).
Monitoring Wells:	Installed in all boreholes.
Soil Sampling:	10no. samples tested for metals, speciated PAHs, pH, sulphate, asbestos and SOM. 2no. samples tested for metals, speciated PAHs, cyanide, pH, sulphate, asbestos, phenol, TPHCWG, BTEX, VOCs, SVOCs, PCBs and SOM. 3no. samples tested for pH and sulphate.
Groundwater Sampling:	1no. samples tested for metals, speciated PAHs, cyanide, pH, sulphate, hardness, phenol, TPHCWG, BTEX, VOCs, SVOCs and PCBs.
Monitoring:	2no. gas monitoring visits to date. A total of 6no. gas monitoring visits over 3 months.

Insitu and Laboratory Geotechnical Testing:	SPTs, pocket penetrometers, shear vanes, PSDs, plasticity.
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Ground Conditions and Geotechnical Assessment

Location	General Ground conditions	Anticipated Foundation Type	Other Considerations
Whole Site	Based on WS103-WS105, TP101-TP104 (location of proposed apartment building). WS101b and WS102 (location of proposed car parking). Maximum investigation depth 5.45mbgl. Localised clay WS101b (0.95-3.10mbgl) SV=81-184kPa, WS102 (1.00-2.00mbgl) SV unknown. SANDSTONE bedrock encountered: WS101b (4.35mbgl), WS103 (4.40mbgl) and WS104 (2.77mbgl). Groundwater encountered across site between 1.20-3.10mbgl.	Ground improvement by vibro stone column.	Consideration of effects of trees also needs to be considered. Temporary supports of excavations may 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	Moderate (metals, PAHs, ACM) Low (hydrocarbons, inorganic/organic contaminants)	Remediation required. Likely to include an environmental cover system in soft landscaping areas. Pre-demolition/major refurbishment asbestos survey recommended. Unlikely probability as no elevated contaminants identified in soils analysed. No further assessment required. To be confirmed following the post demolition investigation.
2	Low	No remediation required. To be confirmed following the post demolition investigation.
3	High	Gas protection measures in line with CS2 likely to be required. To be reassessed once all monitoring visits completed.
4	Moderate / Low	Post demolition leachate testing required.

5	Sulphate posing a risk to building via direct contact (sulphate attack).	Very Low	No remediation required. To be confirmed following the post demolition investigation.
6	Organic contaminants posing a risk to water pipes.	Moderate	UU risk assessment undertaken. Barrier piping likely to be required.
7	Phytotoxic metals posing a risk to flora via root uptake.	Low	Given risk to flora, some remediation is recommended. Remediation associated with PL1 will be more than sufficient.

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. Remediation recommendations may need to be revised upon completion of the proposed post demolition investigation.

Phase	PL	Remediation Requirements	Validation Requirements
Post-Demolition Work	1, 2, 5, 6, 7	<u>Post-demolition Trial Pitting</u> This is recommended to confirm ground conditions below the current buildings and allow delineation of areas of concern. 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	<u>Earthworks Inspections / Unexpected Contamination</u> 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.

¹ CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.

Build-Phase Construction	1 and 7	As the made ground is relatively shallow in places, the following options are given: <u>Option 1</u> Removal of all reworked topsoil / made ground from garden and soft landscaping and raise levels (as required) with suitably chemically validated subsoil and topsoil. <u>Option 2</u> If all or some of the made ground remains in place in soft landscaping areas, an environmental cover system will be required. The environmental cover system should be as follows: Shared Landscaping: 300mm thick environmental cover system comprising: Either 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 200mm comprising clean inert fill and sufficient topsoil for a growing medium. Or geotextile membrane and at least 300mm comprising clean inert fill and sufficient topsoil for a growing medium. The subsoil layer can be replaced by additional topsoil. A diagram of a typical environmental cover system is shown in Appendix J.	<u>Option 1</u> Consignment notes confirming the removal of made ground. Photographic evidence of natural strata. Chemical validation of imported soils: See Table 9-2. <u>Option 2</u> Measuring depth of environmental cover system using a staff and providing photographic evidence. Photographic evidence of the granular physical break or geotextile layer will also be collected. Chemical validation of imported soils: See Table 9-2.
	3	<u>Gas Protection Measures</u> In line with CS2 as per UK guidance^{2,3}. This is likely to / should include: • Passive subfloor or active subfloor ventilation system. • Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions. • Minimum penetration of ground slab by services. • All joints and penetrations to be sealed. Depending on the type of building and foundation design the protection measures can vary. The gas protection measures will be detailed and approved with the Local Authority once the foundation design has been confirmed.	Supply and review of foundation designs. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735⁴
	4	<u>Controlled Waters</u> Post demolition leachate testing to be undertaken to confirm contamination risk.	
	6	<u>Potable Water Pipes</u> It is recommended that a United Utilities Water Pipeline Assessment is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required.	Delivery Notes of Pipe Material. Photographs of the Installed Pipe.

² CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

³ BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

⁴ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

	2, 5	No remediation anticipated with respect to PL2 (inhalation of vapours) and PL5 (sulphate), however, this needs to be confirmed once additional work has been completed.	TBC
Other Considerations	<u>Grubbing Out of In-Ground Structures</u> It is recommended that in-ground structures are grubbed out as part of the groundworks. In-ground structures expected in east of the site associated with the current buildings to be demolished.		
	<u>Re-use of site won material</u> 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 ⁵): 5,000 tonnes (c. 2,500m ³) <u>treatment</u> of crushed concrete / stone. 1,000 tonnes (c. 500 ³) <u>use of</u> non-hazardous soil 5,000 tonnes (c. 2,500m ³) <u>use of</u> clays, sand, gravel, brick, concrete, stone etc. 50,000 tonnes (c. 25,000m ³) <u>use of</u> bitumous 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.		
	<u>Health and Safety Considerations</u> 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 ⁶) should be adopted by all workers involved with site enabling and construction works.		
	<u>Asbestos Survey</u> 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.		
	Further information has been requested with regards to the former gas works adjacent north of the site. This will be included in the final report.		

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.

⁵ <https://www.gov.uk/guidance/waste-exemptions-using-waste>

⁶ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned by Casey Group Ltd to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy for Brown Street, Littleborough. The investigation was undertaken in support of a planning application (reference number 19/00884/OUT) to develop the site for residential use.

The following work has previously been undertaken:

- » Phase I Desk Study and Preliminary Contaminated Land Risk Assessment report, undertaken by GeoAssist Ltd (Ref: 6039/UNF V1.00 PCLRA, dated February 2020).

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

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

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

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

1.2 Site Details

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

Location	At the middle of Brown Street, in front of Regent Street, Littleborough. Centred at approximate National Grid Reference 393520E 416420N.
Area	Approximately 4,000 m ² .
Topography	150 metres above ordnance datum (AOD). East and south of the site are approximately level, while the topography falls from south to north on the western part of the site, with an approximate difference of 3m in level.
Land Use	<u>Site</u> Hardstood ground comprising hardcore across the site and the northern tip is overgrown woodland. At the time of the ground investigation the site was in use as self-storage units, with shipping containers across the site and a large light commercial type building being used as commercial units. <u>Surrounding Area</u> East: Residential Properties. South: Residential Properties. West: Commercial / Industrial state North: Park land with trees
Proposed Development	Residential apartments including soft landscaping and car parking.

Table 1-1. Summary of site details.

2 Previous Work

2.1 Summary of Existing Information

A PRA report (Ref: 6039/UNF V1.00 PCLRA, dated February 2020) has previously been undertaken by GeoAssist Ltd and is summarised in Section 2.2-2.6.

This also includes a summary of a previous intrusive investigation undertaken by LKC (Section 2.4).

The conceptual model (Section 2.6) has been updated to be in line with LKC current risk assessment methodology.

2.2 Site History

The site history is summarised in Table 2-1.

Site Features	Location	Map Dates Present	Comments
Agricultural Land	Whole Site	1851-1891	- Developed by 1891
Building (industrial / commercial)	Centre	1891-1910	- Redeveloped by 1930 with a larger industrial type building labelled as work from 1960
Works	Centre	1960-1992	- Redeveloped by 1993 with a commercial/industrial type building
Allotment Gardens	N	1960-1989	- Last shown in the 1989 mapping.
Surrounding Area Features	Distance/ Location	Map Dates Present	Comments
Reservoir	60m SW	1851-1960	- Redeveloped by 1960
Gas Works	20 N	1891-1988	- Reclaimed by 1988.
Reservoirs	>132 N	1891-1978	- No longer present in the 1978-1980 mapping
Artificial Silk Mill and Cooling Tank	90 W	1930-1956	- Last shown in the 1956 mapping and is redeveloped with a warehouse and works by 1960
Mounds/Worked Ground	20 W	1930-1990	- Developed into industrial / commercial park
Warehouse	90 W	1960-1990	- Developed into industrial / commercial park
Electricity Sub-station	50 SW	1978-Present	
Works	60 S&W	1978-1990	- Developed into industrial / commercial park
Garages	100 SW	1978-1996	

Table 2-1: 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.
	Superficial		- Alluvial Fan Deposits (sand and gravel). - Boulder Clay/Till on edge of west boundary.
	Bedrock		- Pennine Lower Coal Measures, Mudstone, Siltstone and Sandstone of the carboniferous period.
	BGS logs		- None within 100m.
Hydro-geology	Aquifer Designation	Superficial	- Alluvial Fan Deposits - Secondary A. - Till – Secondary Undifferentiated
		Bedrock	- Secondary A.
	Source Protection Zone (SPZ)		- Site is not within an SPZ.
	Groundwater Abstractions		- 2no. active within 250m of site.
Hydrology	Nearest Surface Water		- River Roch 157m south, flowing southwest.
	Water Quality Data		- River Quality B
	Flooding		- No risk from rivers or sea.
	Surface Water Abstractions		- None within 250m.
	Discharge Consent		- None within 250m.
	Pollution Incidents		- 6no. within 250m, all categorised as Category 3 – Minor Incident (latest 1998)
Minerals / Mining	Coal Mining Development High Risk Area (DHRA)		- Not within DHRA.
	Coal Report		- The property is not within a surface area that could be affected by any past recorded underground coal mining. - No shafts present within 20m of the site.
	Surface Extractions		- No mineral extraction within 200m of the site.
	Cheshire Brine Compensation District		- Not within site area.
Ground Stability ¹ (on-site)	Collapsible Ground		- No Hazard.
	Compressible Ground		- No Hazard.
	Landslide		- Very Low.
	Running Sand		- Very Low.
	Shrinking / Swelling Clay		- Low
	Ground Dissolution		- No Hazard.
Landfill sites	Known/Registered		- None within 250m.
	Potential		- None within 250m.
Radon			- Probability of <1% of homes above Action Level. No further action required.
Designated Sites			- None within 250m.
Contemporary Trade Directory			- 2 on site, reclamation centre and car body repairs. - 4 within 100m: Nearest 17m SE (Wrought Ironwork).
Fuel Station Entries			- None within 100m.

Table 2-2: Summary of the environmental setting.

2.4 Contamination Sources / Pathways and Receptors

Potential contamination sources are detailed in Table 2-3.

Source	Contaminants
Onsite Agricultural Fields	- Use of pesticides, insecticides and herbicides: organophosphates, organochlorides, chlorophenols, aldrin, dieldrin, atrazine and DDT.
Onsite Allotments	- Pesticides. - Ash and clinker used for levelling / drainage: heavy metals, sulphates and PAHs ⁷ .
Onsite former buildings	- Asbestos Containing Material (ACM).
Onsite Made Ground	- Ash and clinker: Heavy metals, sulphates and PAHs. - If significant depth of organic / putrescible material: Hazardous gas (principally carbon dioxide and methane).
Onsite Works	- Metals, inorganic compounds and organic compounds. - Solvent's acids, alkalis and PCBs. - Asbestos may have been used within the building as insulation and lagging or as roofing and cladding.
Offsite Potentially Infilled Ground (Reservoirs & worked ground)	- Hazardous gas (principally carbon dioxide and methane). - Given age, size and location of potentially infilled features, not considered to be a significant source.
Surrounding Industries (Gas works, silk mill & cooling tank, warehouse, works, garages)	- Metals, inorganic compounds, organic compounds, soaps and detergents. - Asbestos Containing Material (ACM).
Offsite Electrical sub-station	- PCBs - Given distance, it is not considered to be a significant source given the relatively low mobility of PCBs.
Underlying Pennine Lower Coal Measures	- Ground Gas (principally carbon dioxide and methane).

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	- Secondary A Aquifers, Superficial & bedrock - River Roch 157m South is not considered to be a significant receptor given the distance from the site.
Buildings and structures.	
Potable water pipes.	
Flora within future gardens/landscaping.	

Table 2-4: Potential receptors

Potential pathways are detailed in Table 2-5.

⁷ Defra (2002). "Potential Contaminants for the Assessment of Land." R&D Publication CLR 8.

Pathways		
	Human Health ⁸ (residential land use: apartments with shared landscaping)	- 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. - Inhalation of vapours outside. - Inhalation of vapours inside. - Omitted as no private gardens: ingestion of contaminated vegetables and ingestion of soil attached to vegetables.
		- Windblown dust / fibres to adjacent receptors.
		- Direct contact with receptors (building foundations, services).
		- Root uptake.
Water		- Surface run-off over impermeable surface.
		- Infiltration into the ground, through potentially contaminated material (contamination possibly going into solution).
		- Migration through potentially permeable strata and preferential pathways.
		- Superficial (Till) likely to be low permeability.
		- Superficial (sand and gravel) is likely to be relatively permeable.
Gas		- Bedrock (mudstone, siltstone, sandstone) likely to variable permeable.
		- No preferential pathways are anticipated.
		- Migration through potentially permeable strata and preferential pathways.
		- Superficial (Till) likely to be low permeability.
		- Superficial (sand and gravel) is likely to be relatively permeable.
		- Bedrock (mudstone, siltstone, sandstone) likely to variable permeable.
		- No preferential pathways are anticipated.
		- 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

2.5 LKC Preliminary Contamination Conceptual Model

The preliminary contamination conceptual model in the GeoAssist Ltd report has been updated to be in line with LKC current risk assessment methodology (detailed below). The model is based on the contamination sources, pathways and receptors identified in the original report. LKC also consider the following should be considered:

- » Flora in gardens, potable water supply and proposed buildings could be receptors.
- » Sulphate attack on concrete, potentially in any made ground.

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM⁹ 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.

⁸ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

⁹ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

The preliminary contamination conceptual model has identified seven 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 C552¹⁰.

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 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 guidance¹¹) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

2.6 Recommendations

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

¹⁰ CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.

¹¹ 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	- Dermal contact. - Inhalation of soil, fibres and dust. - Windblown dust.	- Future site users. - Offsite receptors.	- ACM (former buildings, potentially in made ground). - Heavy Metals. - PAHs. - Hydrocarbons. - Other inorganic and organic contaminants. (made ground, gas works, silk mill)	Likely	Medium	Moderate	- Likely probability given site history, the surrounding history and potential pathway to receptors in landscaping. - Recommendation: Intrusive investigation required.
			- Pesticides	Low likelihood	Medium	Moderate / Low	- Low Likelihood given that the site has been developed more than once since being used for agriculture / allotments. - Low risk assumed given limited proposed soft landscaping. - Recommendation: No further assessment required.
PL2	- Inhalation of vapours. - Migration through permeable strata and preferential pathways.	- Future site users. - Offsite receptors.	- Volatile Contaminants (TPHCWG, SVOC, VOCs)	Low Likelihood	Medium	Moderate / Low	- Low likelihood given site history; however historic contamination sources are within influencing distance of site. - Moderate at this stage due to unknown depth and composition of made ground. - Recommendation: No testing required unless evidence of volatile contaminants identified in the ground.
PL3	- Inhalation of gas. - Migration through permeable strata and preferential pathways. - Explosion in confined spaces.	- Future site users. - Buildings. - Offsite land users.	- Methane, carbon dioxide. (potentially infilled features, mounds & worked ground within 250m of the site).	Likely	Severe	High	- Likely probability due to viable source of gas identified and sensitive nature of development (residential). - Recommendation: Either gas monitoring or precautionary measures required.

Table 2-6. Preliminary Contamination Conceptual Model.

Pollutant Linkage	Pathway	Receptor	Contaminant (source)	Probability	Consequence	Risk	Assessment and Recommendations
PL4	– Surface Run-off. – Migration through permeable strata and preferential pathways – Perched waters migration.	– Groundwater (Secondary A Aquifer).	– Mobile contaminants such as metals, PAHs, hydrocarbons, mobile compounds (made ground, cotton mill, Gas works).	Likely	Medium	Moderate	– Likely probability as contamination sources exists on site and within influencing distance of the site therefore contamination considered likely. Superficial sands and gravels are also expected. – Recommendation: Intrusive investigation required as part of PL1, in addition groundwater sampling should be undertaken.
PL5	– Sulphate attack on concrete.	– Building structure.	– Sulphate	Likely	Mild	Moderate / Low	– Likely probability given site history, ash likely to be in made ground. – Moderate risk assumed at this stage given unknown depth and composition of made ground. – Recommendation: Intrusive investigation required as part of PL1.
PL6	– Ingestion of tainted water supply.	– Future site users. – Water pipes.	– Organic Contaminants such as hydrocarbons, solvents (made ground, garage).	Low Likelihood	Medium	Moderate / Low	– Low probability as significant contamination not anticipated at pipeline depth (0.75-1.35m). – Risk is considered moderate at this stage due to unknown depth and composition of made ground. – Recommendation: Sampling required if made ground present at pipeline installation depths.
PL7	– Direct Contact (plant uptake).	– Flora.	– Phytotoxic Contaminants (made ground).	Low Likelihood	Minor	Very Low	– Low probability as contamination considered possible, which may be taken up by flora in soft landscaping / gardens. – Recommendation: Investigation work as part of PL1.

Table 2-6 (continued). 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 17th September 2021 and comprised the following:

- » 5no. window sample boreholes drilled to 0.70-5.45 metres below ground level (mbgl) (ref. WS101 to WS105).
- » 4no. trial pits (using JCB) excavated to 1.60-3.00mbgl (ref. TP101 to TP104).

WS101 had to be re-positioned twice due to obstructions. The repositioned boreholes are referenced WS101A and WS101B.

All site investigation locations are shown in Figure 3.

The locations were chosen to allow a good spread 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
WS101-WS102	General site coverage.
WS103-WS105, TP101-TP104	Former Allotments and general site coverage.
TP101-TP104, WS105	Close to former mounds and general site coverage.

Table 3-1: Summary of sampling locations.

Areas where buildings are still present (location on site) could not be accessed. Further post demolition investigation is required in these areas.

The targeted investigation locations as well as the non-targeted investigation locations allow a good spread across the site. The number of sampling points corresponds to one location per 19m square centres. This is considered appropriate given the size of the site and the historical land use. Further investigation work is anticipated to be required post demolition to assess the ground conditions in areas where buildings are currently present.

3.2 Well Installations

All of the boreholes were installed with monitoring wells for gas and groundwater monitoring and groundwater sampling. Monitoring wells were installed in accordance with BS10175 and CIRIA C665¹² 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 installed between 0.70mbgl to 2.70-4.00mbgl.

Well installation details are provided in profile logs in Appendix B.

¹² CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

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 investigation¹³.

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 Mini Rae Lite+ 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 C665¹⁴ 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.

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.

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.

Suites and Contaminants	No. Samples	Location & Depth	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	10	WS101 0.5m WS101b 0.1m WS102 0.3m WS104 0.5m WS105 0.3m WS105 2.1m TP101 0.5m TP102 0.4m TP103 0.3m TP104 0.6m	A basic suite with a broad selection of contaminants tested on samples across the site where no significant evidence of contamination was identified (with the exception of occasional ash and coal) and no TVOCs identified from the PID tests.
Metals / metalloids, pH, water soluble sulphate, cyanide suite, phenol, TPHCWG, BTEX, MTBE, speciated PAHs, SOM and asbestos screen.	2	WS103 0.4m TP103 1.3m	Although no visual/olfactory evidence of contamination was identified (with the exception of some ash), a detailed suite undertaken on TP103 1.3m to confirm the contamination risk for the water pipeline risk assessment. Organic made ground was identified in WS102 1.2-1.6m therefore detailed suite undertaken to confirm the contamination risk.

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, VOC=Volatile organic Compounds, SVOC= Semi Volatile Organic Compounds, SOM=Soil Organic Matter.

3.3.2 Water Sampling / Leaching Testing

To establish the condition of shallow groundwater LKC undertook 1no. groundwater sample.

The groundwater sample was collected a minimum of 1 week after drilling had finished and following well development. 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 BS10175¹⁵ guidelines.

Only one sample was collected and tested as no groundwater was encountered in the WS101, WS102, WS103 and WS104. Leachate tests are proposed in the post demolition investigation as an alternative.

Groundwater sampling was carried out in accordance with BS5930¹⁶ and BS5667-11¹⁷.

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 / leachate testing undertaken.

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.

Suites and Contaminants	No. Samples	Location	Justification
Metals, speciated PAHs, cyanide, pH, sulphate, hardness, phenol, TPHCWG, BTEX, VOCs, SVOCs and PCBs.	1	WS105 (G)	Organic material and possible contamination identified in soils. Detailed suite undertaken to confirm the absence of contamination.

Table 3-3. Summary of groundwater sampling tests undertaken.

Notes:

G=Groundwater Sample

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, PCB=polychlorinated biphenyls.

3.4 Gas Monitoring

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

Monitoring is being undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665¹⁸ (flow rate measured first). The monitoring will aim to be undertaken over a range of weather conditions (including low and falling barometric pressure and heavy rain) to demonstrate worst-case conditions.

The gas monitoring results, to date, 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 at approximately 1m intervals, generally within the natural strata.
- Shear Vane tests (giving undrained shear strength) were performed in the trial pits at approximately 1m intervals, within the natural clay strata.
- Pocket penetrometer (giving undrained shear strength) were performed in the window sample boreholes (to a maximum depth of 3mbgl), within the natural clay strata.
- Continuous equivalent SPTs were performed in the dynamic probes (strata not determined).

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

3.5.2 Laboratory Geotechnical Testing

Soil samples taken during the investigation were collected in tubs and bulk bags and sent to Murray Rix Laboratories and Chemtest for geotechnical testing. Many of the tests are UKAS accredited and further details are given in the laboratory report presented in Appendix D. Table 3-4 shows the geotechnical testing undertaken.

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

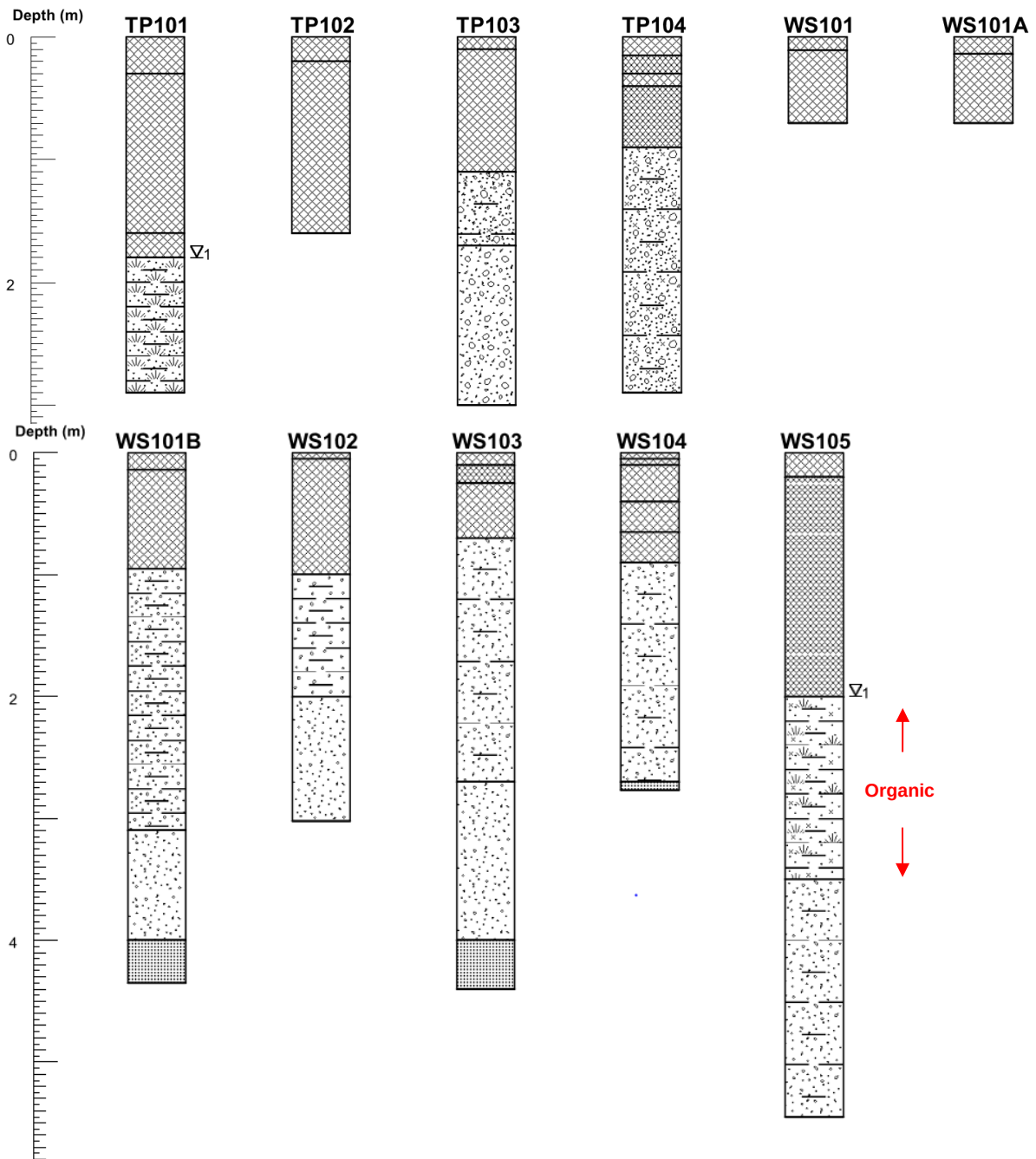
Suites and Contaminants	No. Samples	Location	Justification
pH and water-soluble sulphate	15	WS102 1.2m WS103 2.0m TP103 1.2m WS101 0.5m WS101b 0.1m WS102 0.3m WS104 0.5m WS105 0.3m WS105 2.1m TP101 0.5m TP102 0.4m TP103 0.3m TP104 0.6m WS103 0.4m TP103 1.3m	Additional samples of natural ground taken across the site to assess the pH and sulphate for geotechnical purposes. pH and water-soluble sulphate are also included in Suites 1 and 5.
Atterberg Limits (plasticity testing)	3	WS101B 1.10m WS105 2.80m TP101 1.90m	A selection of clay samples across the site were tested for Atterberg Limits to assess their shrinkability potential associated with current and proposed trees.
Particle Size Distribution (PSD)	2	TP103 1.30m TP104 2.10m	PSD undertaken to confirm grading of granular material.

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 sandy gravelly CLAY (N and E) and sandy clayey GRAVEL (S and W). A summary section of the logs is provided in Plate 4-1, with additional comments below.



Additional information on ground conditions:

Made Ground

- Hardcore noted to 0.05-0.10mbgl in WS102-WS104, TP103 and TP104.
- Tarmacadam gravel noted at surface to 0.20-0.30mbgl in TP102, TP103 and WS105
- Shallow refusal encountered at 0.70mbgl in the north of the site (WS101 and WS101a). Made ground noted to contain brick and concrete cobble content.
- Made ground was encountered across the site between 0.70-2.00mbgl.
- TP101, TP102 TP103 and WS105 on the far eastern boundary of site all recorded deeper Made Ground between 1.60-2.00mbgl.
- TP101 recorded a mild organic odour with oily sheen between 1.30-1.80mbgl.
- TP104 recorded reinforced concrete posts with sandstone cobbles to 0.60mbgl.

Superficial deposits

- WS101 and WS102: firm to stiff consistency gravelly sandy CLAY with cobbles to 2.00-3.10mbgl, medium dense sandy GRAVEL to 3.02-4.00mbgl and SANDSTONE to 4.35mbgl.
- WS103 and WS104: sandy clayey GRAVEL to 2.00-2.70mbgl, dense sandy GRAVEL to 2.70-4.00mbgl and SANDSTONE to 2.77-4.40mbgl.
- WS105: soft to firm consistency organic sandy silty CLAY to 3.50mbgl and medium dense slightly sandy clayey GRAVEL to 5.45mbgl.
- TP101: soft consistency sandy organic CLAY to the base of the pit at 2.90mbgl.
- TP103: clayey sandy GRAVEL to 1.70mbgl and sandy gravelly COBBLES to 3.00mbgl.
- TP104: clayey gravelly SAND to 2.90mbgl.

All boreholes refused shallow on possible SANDSTONE bedrock between 2.77-4.40mbgl, with the exception of WS105 in the far west of site which was completed at 5.45mbgl.

TP102 did not encounter natural soils and was terminated due to instability. All other boreholes and trial pits were noted to be stable.

An organic sheen was noted in the soils in TP101, no odour noted during site works.

4.2 Groundwater

4.2.1 Groundwater Levels

Groundwater strikes were recorded during the investigation in trial pits and boreholes. In addition, groundwater monitoring within the borehole wells has been undertaken on two occasions, to date. An oil-water interface probe (approximately 1cm detection limit) was used to detect the presence of free phase hydrocarbons within each borehole.

Results are summarised in Table 4-1.

BH/TP	Water Strike Depths (mbgl)	Well Response Zone (mbgl)	No. of Monitoring Visits	Monitoring Depths (mbgl)			Sample Taken?	Evidence of Contam?
				Min	Max	Base		
WS101	3.10	0.70-4.00 (MG/C/G)	2	Dry	Dry	3.90	N	N
WS102	Dry	0.70-2.80 (MG/C/G)	2	Dry	Dry	2.70-2.72	N	N
WS103	2.40	0.70-4.00 (MG/G)	2	Dry	Dry	3.80-3.81	N	N
WS104	Dry	0.70-2.70 (MG/G)	2	Dry	Dry	2.64-2.65	N	N
WS105	2.00	0.70-4.00 (MG/C/G)	2	1.25	1.75	3.90-3.92	Y (G)	N
TP101	Dry	-	-	-	-	-	N	N
TP102	Dry	-	-	-	-	-	N	N
TP103	Dry	-	-	-	-	-	N	N
TP104	1.20	-	-	-	-	-	N	N

Table 4-1: Summary of water strike depths within boreholes and trial pits.

Response Zones:

MG=Made Ground; C=Clay; and G=Gravel.

Notes:

G=Groundwater Sample

4.3 In-Situ Geotechnical Testing

4.3.1 Standard Penetration Tests

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

Approximate Depth (mbgl)	SPT 'N' Values				
	WS101	WS102	WS103	WS104	WS105
1-2	15 (C)	9 (MG/C)	29 (G)	22 (G)	6 (MG)
2-3	24 (C)	33 (G/G)	17 (G)	16 (G)	5 (C)
3-4	22 (C/G)	50 (G)	20 (G)	50 (G)	29 (C)
4-5	50 (S/S)	-	50 (S/S)	-	17 (G)
5-6	-	-	-	-	25 (G)
GW Level	3.10	Dry	2.40	Dry	1.25-2.00

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

Notes:

S/S = Sandstone; C=Clay; G=Gravel.

Groundwater level based on strikes during investigation and monitoring data.

4.3.2 Shear Vanes

Hand shear vane readings, recording, were taken within the clay strata of the trial pits. Pocket penetrometer readings were taken within the clay strata of the window sample boreholes. Both record undrained shear strength (s_u). 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)			
	TP101	WS101b	WS103	WS105
1-2	28	81, 184	92	7.36
2-3	38	86	123, 113	5.07
3-4	-	-	-	5.72
GW Level	1.80	3.10	Dry	1.25-2.00

Table 4-3: Summary of average hand shear vane/pocket penetrometer readings.

Notes:

Groundwater level based on strikes during investigation and monitoring data.

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

4.4 Geotechnical Laboratory Testing

4.4.1 Particle Size Distribution

Particle size distribution (PSDs) tests were carried out on granular strata to confirm the material type. The full results will be included in the final report.

Full results are presented in Appendix D and summarised below in Table 4-4.

Location	Depth (mbgl)	Material	Percent passing through sieve		
			63mm	2mm	0.063mm
TP103	1.30	Brown silty SAND and GRAVEL	100	56	23
TP104	2.10	Brown silty SAND and GRAVEL	100	44	13

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

Notes:

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

4.4.2 Atterberg Limits

Representative samples of natural clay were subjected to Atterberg Limits (plasticity) and Moisture Content testing. The full results will be included in the final report.

Results are presented in Appendix D and summarised in Table 4-5.

Table 4-5 also includes the modified plasticity index as detailed in Chapter 4.2-D5 of the NHBC standards (modified plasticity index = plasticity index x % less than 425µm sieve / 100%).

Location	Depth (mbgl)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class	Passing 425 micron (%)	Modified Plasticity Index (%)
WS101b	1.10	14	35	13	22	CL	83	18.26
WS105	2.80	85	98	35	63	CE	92	57.96
TP101	1.90	71	101	39	62	CE	89	55.18

Table 4-5: Summary of plasticity index testing.

TP101 and WS105 encountered organic clay with an extremely high-volume change potential. WS101b in the north of the site has a low to medium volume change potential.

4.4.3 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 4-6.

Strata	pH		Sulphate	
	Soil	Groundwater	Soil (g/l)	Groundwater (mg/l)
Made Ground	7.1-9.3	6.9	<0.01-0.63	21
Natural	8.2-8.4		0.019-0.058	

Table 4-6: Summary of pH and sulphate results.

5 Geotechnical Assessment

5.1 Proposed Development

It is understood that the proposed development will comprise a residential apartment block with associated landscaping and infrastructure. Details of the number of storeys or proposed loadings are not known.

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 granular Made Ground to depths of between 0.70m and 2.00mbgl over natural cohesive superficial deposits of CLAY within WS101 and WS102 to depths of between 2.00m and 3.10mbgl over medium dense to very dense granular strata. Within locations WS103 and WS104a, cohesive deposits are absent with medium dense granular strata immediately beneath the Made Ground. At the location of WS105 and TP101, the Made Ground is underlain by soft, low strength, organic CLAY between 2.00m to 3.50mbgl (WS105) and 1.80m to >2.90mbgl (TP101).

The granular strata at the base of the exploratory holes grades into weathered bedrock.

5.3 Site Preparation

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

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

5.4 Foundation Conditions and Bearing Capacity

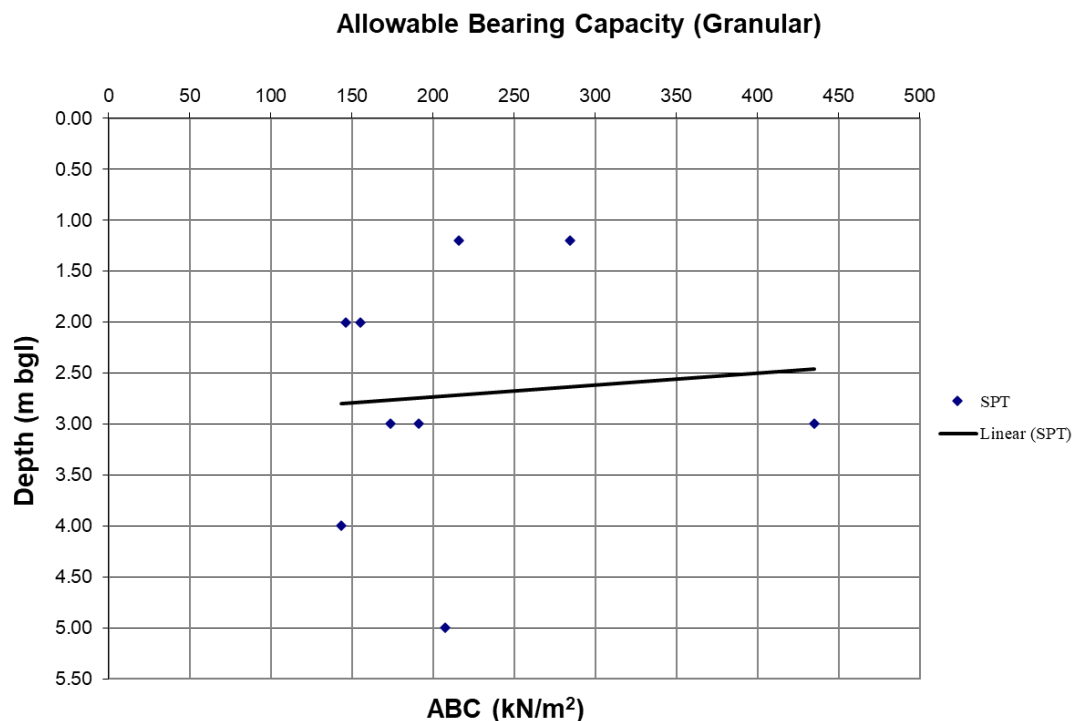
5.4.1 General

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

- Pad foundations bearing on granular strata;
- Conventional strip footings on vibro granular columns; or,
- Deeper pile foundations.

These options are discussed below:

Allowable bearing capacity of the natural granular material has been assessed using in-situ testing by SPT. The results of the testing have been plotted against depth as is shown in Graph 5-1 below:



Graph 5-1: Summary of ABC vs depth from in-situ SPT.

From Graph 5-1 it can be seen that the ABC of the granular deposits offer 150kN/m² for a shallow strip footing, with an angle of internal friction (ϕ) of between 31° and 39°, averaging 34°.

The strata encountered across the site would not offer a uniform bearing strata so the potential for differential settlements is significant. At the location of WS105 near to the north of the proposed apartment block, the ground conditions comprise 2.00m of Made Ground over soft organic CLAY to 3.50mbgl before encountering medium dense GRAVEL. At WS103 near the south of the proposed apartment block, the ground conditions comprise 0.70m of Made Ground over medium dense GRAVEL, becoming dense below 2.70mbgl.

5.4.2 *Strip Foundations*

Deep strip foundations should be constructed at least 150mm in to the underlying medium dense granular strata where an ABC of 150kN/m² could be achieved. This is dependent upon founding upon uniform strata. As is evident from the exploratory holes undertaken during the course of this investigation, the potential for variation in strata between Made Ground, organic clay and granular deposits is significant and differential settlements are likely with this foundation solution.

Atterberg limits determinations, summarised in Table 4-5 show the cohesive deposits to be of variable plasticity, between 18% and 58% with the highest plasticity attributed to the organic CLAYs. The sides of the foundations will require protection using clay board or similar.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally in accordance with the requirements of NHBC Standards for a clay of high plasticity. It is recommended that at working drawing stage a foundation schedule is prepared for the development taking account of the soil plasticity and the locations of trees.

5.4.3 *Ground Improvement*

The use of ground improvement techniques such as vibro granular columns will allow shallow foundations to be utilised within 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, organic, cohesive and granular soils. Specialist advice should be sought from a suitably experienced contractor with regard to allowable bearing capacity and settlements.

5.4.4 *Piled Foundations*

As an alternative, consideration maybe given to the use of piled foundations. The exploratory holes undertaken record sandstone bedrock at depths of between 2.70m (WS104) and 4.00mbgl (WS101B & WS103) in which end bearing piles may prove a suitable foundation option.

Due to the significant depths of Made Ground and compressible organic clays, consideration would also need to be given to the potential for negative skin friction to affect the piles.

Warranty providers such as LABC typically require the ground to be investigated to a minimum of 5m below the base of piles. This would also allow the presence of potential bedrock to be proven across the site.

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

Deep strip foundations below 2.5m depth are generally not economic and would require structural engineer input, and whilst a piling solution is viable it is considered that vibro granular columns will provide the most reliable and cost effective option for the site.

5.5 Ground Floor Slabs

Due to the presence of substantial thickness' of Made Ground across the site it is considered that ground bearing floor slabs, whilst viable, will require detailed design to accommodate variability of the formation and account for differential settlement.

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

5.6 Pavement Construction

It is considered that the topsoil is not suitable for use as a sub-grade. 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 4-6 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

Some of the exploratory holes were observed to be unstable during the excavation/drilling and the Made Ground and natural deposits included granular strata containing perched groundwater. The short and long term stability of near vertically sided excavations can therefore not be guaranteed and random and sudden instability within these soils should be anticipated.

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 R97¹⁹. Groundwater seepages were noted in several trial pits, however, these were minor and it is considered that conventional sump pumping should be adequate.

Should de-watering in gravels be required, then consideration must be given to the potential for settlement to impact off site structures.

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

5.10 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).

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 (LCRM²⁰). 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 S4ULs²⁴. 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 GACs²⁹. 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 soluble³². 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 negligible³³. 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 limited shared soft landscaping, therefore the assessment criteria for residential without plant uptake has been used.

All criteria have been generated using the CLEA V1.06 model³⁵ 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 and CL:AIRE GACs were not required for this dataset and have not been included.

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."

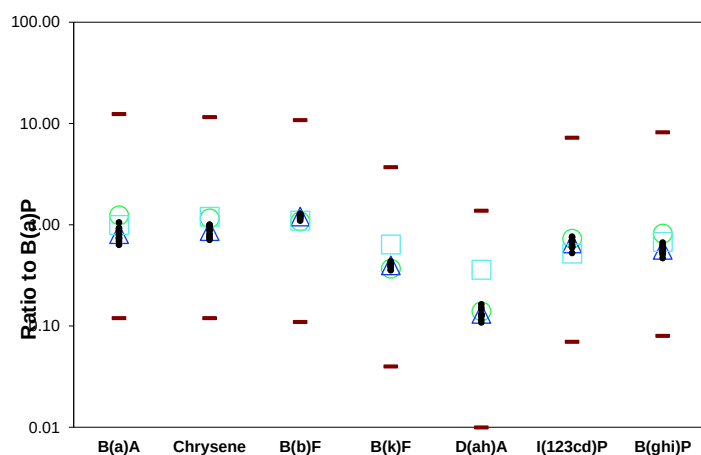
³⁴ HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

³⁵ EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.

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 12 samples (where values were >LOD to allow the calculation of a ratio).

Notes:

B(a)P = Benzo(a)pyrene; D(ah)A = Dibenzo(ah)anthracene; B(a)A = Benzo(a)anthracene; B(b)F = Benzo(b)fluoranthene;
B(k)F = benzo(k)fluoranthene; I(123cd)P = Indeno(123cd)pyrene; B(ghi)P = Benzo(ghi)perylene
● = Ratio to B(a)P for all data ○ = Mean ratio to B(a)P for Culp data △ = Mean ratio to B(a)P from all data at the site
□ = Mean ratio to B(a)P for UK data presented by HPA ■ = Upper and Lower limits (order of magnitude from Culp data)

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

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

6.2.2 Soil Results Comparison against Assessment Criteria

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

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.

Contaminant	Units	No. of samples	Elevated Results	Sample Location	Criteria	Source of Criteria
Metals						
Arsenic	mg/kg	12	48	WS101b (0.1m)	37	C4SL
			50	WS102 (0.3m)		
			68	WS104 (0.5m)		
			68	WS105 (0.3m)		
			44	TP101 (0.5m)		
Lead	mg/kg	12	490	WS101 (0.5m)	200	C4SL
			1100	WS101b (0.1m)		
			430	WS103 (0.4m)		
			610	WS104 (0.5m)		
			670	WS105 (0.3m)		
			700	TP101 (0.5m)		
			720	TP103 (0.3m)		
			580	TP104 (0.6m)		
PAHs						
Benzo(a)pyrene	mg/kg	12	19	WS102 (0.3m)	5	C4SL
			6	WS104 (0.5m)		
			7.2	WS105 (0.3m)		
			9.3	TP101 (0.5m)		
			12	TP101 (1.3m)		
			11	TP102 (0.4m)		
			32	TP103 (0.3m)		
GENERAL						
pH	pH	13	Range 7.1 to 9.3			
SOM	%	12	Range 4.4 to 26			

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.

6.2.3 Direct Contact Risk – Pollutant Linkage 1

Elevated PAHs and metals (arsenic and lead) have been identified on site, given the number and location of elevated samples, the contamination is considered to be site wide.

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

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

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

No asbestos was identified in any of the samples, therefore the probability of asbestos affected site users is considered to be unlikely. With a severe consequence, the risk is moderate / low. At this stage, a low risk is assumed (as no asbestos identified) and

remediation is not required. This will be confirmed following the post demolition investigation. However, as a precaution, construction workers should be and vigilant for any suspected ACM during groundworks (discussed further in Section 8.2).

No elevated cyanide, phenols, TPHCWG, BTEX and MTBE were identified, therefore, the probability of these contaminants posing a risk to site users is considered unlikely. With a medium consequence, the risk is considered to be moderate and, at this stage, no remediation is recommended. This will be confirmed following the post demolition investigation.

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

No visual / olfactory evidence of volatile contaminants was identified during the investigation. The PID did not detect any TVOCs. Confirmatory soil analysis did not detect any VOCs / SVOCs above detection limits.

LKC therefore consider the probability of volatile contaminants affecting site users as unlikely. The consequence is expected to be medium, giving a low risk and no remediation is required with respect to pollutant linkage 2. This will be confirmed following the post demolition investigation.

6.3 **Gas Risk Assessment**

Two gas monitoring visits have been undertaken on the study site. Gas monitoring results in full are presented in Appendix E. Following guidance set out in CIRIA C665³⁷ and BS8485³⁸ 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.

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

³⁷ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

³⁸ 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	Visit	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	H ₂ S (ppm)	CO (ppm)	Flow (l/h)	Groundwater (mbgl)	Pressure (mb)
WS101b	1	<0.1	2.8	19.4	<1	<1	<0.1	Dry	988 (f)
	2	<0.1	2.7	18.4	<1	3	8.4	Dry	1008 (r)
WS102	1	<0.1	1.2	19.2	<1	<1	0.1	Dry	989 (f)
	2	<0.1	4.1	16.2	<1	4	7.4	Dry	1008 (r)
WS103	1	<0.1	1.6	17.9	<1	15	<0.1	Dry	989 (f)
	2	<0.1	3.9	15.6	<1	1	9.2	Dry	1008 (r)
WS104	1	<0.1	0.9	19.1	<1	<1	0.1	Dry	990 (f)
	2	<0.1	4.0	15.2	<1	2	7.2	Dry	1008 (r)
WS105	1	<0.1	6.6 (6.4)	9.0	<1	16	0.1	1.25	990 (f)
	2	<0.1	6.1 (5.6)	11.7	<1	4	6.7	1.75	1009 (r)

Table 6-2: Summary of gas monitoring.

Notes:

If concentrations / flow is zero, then equipment detection limits are assumed.

Table shows peak concentrations of CH₄, CO₂, O₂, H₂S and CO.

Where peak CO₂ differs significantly to the steady, steady is shown in brackets.

Bold where CO₂ exceeds 5%v/v and CH₄ exceeds 1%v/v.

Atmospheric pressure (over past 24hrs): r=rising, f=falling, s=steady

High flow was recorded in all boreholes (max 9.2l/hr) during the second visit only.

Elevated CO₂ concentrations were recorded in WS105 (max 6.6 %v/v) during both visits. These concentrations are expected to be associated with the organic clay between 2.00-3.50mbgl.

Carbon monoxide was >1ppm in all boreholes. The maximum concentration was recorded as 16ppm (WS105). This did not appear to correlate with significant oxygen depletion in WS101b, WS102, WS103 and WS104. However WS105 recorded an oxygen concentration of 9.00%v/v where CO was recorded as 16ppm. This suggests possible bacterial anaerobic processes are taking place within the soils.

Only workplace exposure limits defined by the HSE are available for carbon monoxide and are not fully applicable to a residential setting. A Short-Term Exposure Limit of 200ppm (15-minute period) and Long-Term Exposure Limit of 30ppm have been defined (8-hour period).

Based on the above exposure limits, carbon monoxide is not expected to pose a significant risk to the proposed site receptors.

Given the current data CS₂ gas protection measures may be required. This will be reassessed once all monitoring visits have been completed.

6.4 Controlled Water Assessment

LKC considers the Secondary A Aquifer and Secondary Undifferentiated 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:

- » River Basin District Standards³⁹ and updated Water Framework Directive⁴⁰ for Annual Average / Maximum Allowable Concentration Environmental Quality Standards (AA-MAC-EQS) for priority substances (surface water risk).
- » 2016 private water supply standards (UKDWS potable)⁴¹.
- » 2001 Environment Agency Values for Environmental Quality Standards (EQS) and UK Drinking Water Standard (UKDWS)⁴².
- » Resource Protection Values (RPVs)⁴³.
- » Minimal Reporting Values (MRVs).

No elevated contaminants above detection limits were identified in any water sample.

No free product was noted in any water samples

Based on the above, LKC considers the probability of contaminants on site affecting the Secondary A Aquifer as unlikely. Given the medium consequence, a low risk is anticipated (Pollutant Linkage 4) and no remediation is likely to be required. This is subject to additional risk assessment once post demolition leachate testing has been undertaken.

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-1 AC-1. This will be confirmed following the post demolition investigation.

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 contamination⁴⁴. 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: chlorinated compounds, cresols, ethers, nitrobenzene, ketones, aldehydes and amines.

The following elevated contaminants were identified:

- » Elevated TVOCs (inc. naphthalene) in made ground across the site.

It is likely that barrier pipe will be required in the western and southern area of the site and may be required across the site subject to the depth and location of the water pipes and in consultation with UU.

It should be noted typical pipework depths are 0.75mbgl to 1.35mbgl. The pipework will likely be laid into the underlying natural strata after levels have been reduced.

³⁹ Defra (2010). "The River Basin Districts Typology, Standards and Groundwater Threshold Values". Water Framework Directive (England and Wales) Directions 2010.

⁴⁰ Defra (2015). "Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015".

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."

⁴³ SEPA (2010). "Assigning Groundwater Assessment Criteria for Pollutant Inputs." WAT-PS-10-01.

⁴⁴ UU(2011). "United Utilities Water Supplementary Guidance for the Selection of Water Pipes in Land Potentially Affected by Contamination."

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 risk and remediation (i.e. barrier pipe) is likely to be required (subject to further risk assessment). This will be confirmed following the post demolition investigation.

6.5.3 *Phytotoxicity (Pollutant Linkage 7)*

Soil results were compared to phytotoxic guideline values as outlined in BS3882⁴⁵.

Elevated zinc (maximum concentration 820mg/kg) and copper (maximum concentration 350mg/kg) were identified. The probability of phytotoxic contaminants affecting vegetation is considered to be likely. With a minor consequence, the risk (pollutant linkage 7) is anticipated to be low. Although the risk is low, some remediation is recommended. The remediation associated with PL1 (cover system) will be more than sufficient for PL7.

6.6 **Revised Contamination Conceptual Model**

The preliminary contamination conceptual model (Table 2-3) has been revised following the risk assessments undertaken in Sections 6.1-6.5. The revised contamination conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

The revised contamination conceptual model is presented in Table 6-3.

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 7.

⁴⁵ BS (2015). "Specifications for Topsoil and Requirements for Use." BS3882:2015.

Pollutant Linkage	Pathway	Receptor	Contaminant	Probability	Consequence	Risk	Assessment
PL1	-Dermal contact. -Inhalation of soil, fibres and dust. -Ingestion of soils and dust. -Windblown dust.	-Current residents. -Future residents. -Site users. -Offsite receptors.	-Heavy Metals. -PAHs. -ACM.	Likely	Medium	Moderate	-Likely probability as elevated metals (arsenic and lead) and PAHs identified in the made ground across the site which could come into contact with site users in soft landscaping areas. -Possible ACM in current onsite buildings to be demolished. None identified in soil analysed on site. -Recommendation: Remediation required. Likely to include an environmental cover system in soft landscaping areas. -Pre demolition/major refurbishment asbestos survey recommended.
			-Hydrocarbons. -Other inorganic and organic contaminants.	Unlikely	Medium	Low	-Unlikely probability as no elevated contaminants identified in soils analysed. -No further assessment required. To be confirmed following the post demolition investigation.
PL2	-Inhalation of vapours. -Migration through permeable strata and preferential pathways.	-Current residents. -Future residents. -Site users.	Volatile Contaminants: -None identified.	Unlikely	Medium	Low	-No elevated volatile contaminants across the site. -Recommendation: No remediation required. To be confirmed following the post demolition investigation.
PL3	-Inhalation of gas. -Migration through permeable strata and preferential pathways. -Explosion in confined spaces (methane only).	-Current residents. -Future residents. -Buildings. -Offsite land users.	-Methane, carbon dioxide.	Likely	Severe	High	-Elevated carbon dioxide identified (max. 6.6%v/v) and GSV classified as CS2. -Recommendation: Gas protection measures in line with CS2 likely to be required. To be reassessed once all monitoring visits completed.

Table 6-3: 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 9.2.

*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 9.2.

Pollutant Linkage	Pathway	Receptor	Contaminant	Probability	Consequence	Risk	Assessment
PL4	- Surface Run-off. - Migration through permeable strata and preferential pathways - Perched waters migration.	Groundwater (Secondary Aquifer). A	Mobile contaminants such as metals, PAHs, hydrocarbons, mobile compounds.	Low likelihood	Medium	Moderate / Low	- Low risk at this stage as no elevated contaminants identified in the groundwater sample analysed. - Elevated metals and PAHs identified in the soils across site. Source is likely from ash, clinker, coal and slag in the soils, which are not particularly mobile. - Further investigation required to confirm contamination risk. Recommendation: Post demolition leachate testing required.
PL5	Sulphate attack on concrete.	Building structure.	Sulphate.	Unlikely	Mild	Very Low	- No elevated sulphate identified in soils or groundwater. Recommendation: No remediation required. To be confirmed following the post demolition investigation.
PL6	Ingestion of tainted water supply.	Future site users (via potable water).	Organic Contaminants: Naphthalene.	Likely	Medium	Moderate	- Likely probability as elevated naphthalene encountered which could permeate water pipes and contaminate water supply. Recommendation: UU risk assessment undertaken. Barrier piping likely to be required.
PL7	Direct Contact (plant uptake).	Flora.	Phytotoxic Contaminants: Zinc and copper.	Likely	Minor	Low	- Elevated zinc and copper identified, which may be taken up by flora in soft landscaping / gardens. Recommendation: Given risk to flora, some remediation is recommended. Remediation associated with PL1 will be more than sufficient.

Table 6-3 (continued): 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 9.2.

*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 9.2.

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^{46, 47, 48,49, 50, 51, 52, 53, 54}.

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 I.

⁴⁶ EA (2018). "Guidance on the Classification and Assessment of Waste (1st Edition v1.1)". Technical Guidance WM3.

⁴⁷ CLP Regulation - Regulation 1272/2008/EC of 16 December 2008.

⁴⁸ 1st ATP - Regulation 790/2009/EC of 10 August 2009

⁴⁹ Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

⁵⁰ WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

⁵¹ Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014

⁵² 13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

⁵³ POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004

⁵⁴ 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

8 Conclusions

8.1 Geotechnical

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

Proposed Development	- Residential apartments including soft landscaping and car parking.
General Ground conditions / Geotechnical Testing	- Based on WS103-WS105, TP101-TP104 (location of proposed apartment building). WS101b and WS102 (location of proposed car parking). - Maximum investigation depth 5.45mbgl. - Localised clay WS101b (0.95-3.10mbgl) SV=81-184kPa, WS102 (1.00-2.00mbgl) SV unknown. - SANDSTONE bedrock encountered: WS104 at 2.77mbgl and WS101b & WS103 at 4.00mbgl. - Groundwater encountered across site between 1.20-3.10mbgl.
Allowable Bearing Pressure	- Variable across the site and strata types and therefore a reliable allowable bearing capacity cannot be ascribed to the strata encountered without some form of ground improvement.
Anticipated Foundation Type	- Ground conditions below the proposed extension are variable with varying depths of made ground (0.7-1.9mbgl), sand ranging from loose to medium dense to 2mbgl and localised organic clay strata. - Traditional shallow foundations are not expected to be suitable for the proposed development given the ground conditions encountered. Ground improvement such as vibro stone replacement columns recommended.
Shallow Groundwater	- Shallow groundwater identified on the site at depths of between 1.20-3.10mbgl which will present a constraint to the development.
Concrete Requirements	- Based on BRE Digest 2005 ⁵⁵ – DS-2 AC-2 recommended.
Services	- Services – consideration to the presence of services running through the site. Services may need to re-routed.
Temporary support of excavation	- May be required; trial pits were recorded as having minor spalling with the exception of TP102 which was terminated due to instability.
Plasticity	- Consideration will need to be given to the shrink / swell of the clay strata if it is to be used as founding strata, particularly where trees/hedges are present. Foundations may need to be deepened. A medium and high volume change potential has been calculated for the site.

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 6.6).

Pollutant Linkage		Risk	Recommendations
1	- Contaminants posing a risk to site users, current residents, future residents and offsite receptors via dermal contact, ingestion and inhalation (of soil, dust and fibres).	Moderate (metals, PAHs, ACM)	- Remediation required. Likely to include an environmental cover system in soft landscaping areas. - Pre demolition/major refurbishment asbestos survey recommended.
		Low	- No further assessment required. To be confirmed following the post demolition investigation.

⁵⁵ BRE (2005). "Concrete in Aggressive Ground." Special Digest 1.

		(hydrocarbons, inorganic/organic contaminants)	
2	Volatile contaminants posing a risk to site users to site users, current residents and future residents via the inhalation of vapours.	Low	-No remediation required. To be confirmed following the post demolition investigation.
3	Gas posing a risk to buildings and site users, current residents, future residents and offsite land users via the migration of gas into building causing explosion and asphyxiation.	High	-Gas protection measures in line with CS2 likely to be required. To be reassessed once all monitoring visits completed.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	Moderate / Low	-Post demolition leachate testing required.
5	Sulphate posing a risk to building via direct contact (sulphate attack).	Very Low	-No remediation required. To be confirmed following the post demolition investigation.
6	Organic contaminants posing a risk to water pipes.	Moderate	-UU risk assessment undertaken. Barrier piping likely to be required.
7	Phytotoxic metals posing a risk to flora via root uptake.	Low	-Given risk to flora, some remediation is recommended. Remediation associated with PL1 will be more than sufficient.

Table 8-2: 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.

The remediation recommendations may need to be revised following the proposed post demolition investigation.

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	1, 2, 5, 6, 7	<u>Post-demolition Trial Pitting</u> This is recommended to confirm ground conditions below the current buildings and allow delineation of areas of concern. 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	<u>Earthworks Inspections / Unexpected Contamination</u> 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 ⁵⁶ .	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work.

⁵⁶ CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.

Build-Phase Construction	1 and 7	As the made ground is relatively shallow in places, the following options are given: <u>Option 1</u> Removal of all reworked topsoil / made ground from garden and soft landscaping and raise levels (as required) with suitably chemically validated subsoil and topsoil. <u>Option 2</u> If all or some of the made ground remains in place in soft landscaping areas, an environmental cover system will be required. The environmental cover system should be as follows: Shared Landscaping: 300mm thick environmental cover system comprising: <u>Either</u> 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 200mm comprising clean inert fill and sufficient topsoil for a growing medium. <u>Or</u> geotextile membrane and at least 300mm comprising clean inert fill and sufficient topsoil for a growing medium. The subsoil layer can be replaced by additional topsoil. A diagram of a typical environmental cover system is shown in Appendix J.	<u>Option 1</u> Consignment notes confirming the removal of made ground. Photographic evidence of natural strata. Chemical validation of imported soils: See Table 9-2. <u>Option 2</u> Measuring depth of environmental cover system using a staff and providing photographic evidence. Photographic evidence of the granular physical break or geotextile layer will also be collected. Chemical validation of imported soils: See Table 9-2.
	3	<u>Gas Protection Measures (TBC following completion of gas monitoring programme)</u> In line with CS2 as per UK guidance^{57,58}. This is likely to / should include: • Passive subfloor or active subfloor ventilation system. • Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions. • Minimum penetration of ground slab by services. • All joints and penetrations to be sealed. Depending on the type of building and foundation design the protection measures can vary. The gas protection measures will be detailed and approved with the Local Authority once the foundation design has been confirmed.	Supply and review of foundation designs. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735⁵⁹
	4	<u>Controlled Waters</u> Post demolition leachate testing to be undertaken to confirm risk to controlled waters receptors.	
	6	<u>Potable Water Pipes</u>	Delivery Notes of Pipe Material.

⁵⁷ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

⁵⁸ BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

⁵⁹ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

		It is recommended that a United Utilities Water Pipeline Assessment is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required.	Photographs of the Installed Pipe.
	2, 5	No remediation anticipated with respect to PL2 (inhalation of vapours) and PL5 (sulphate), however, this needs to be confirmed once additional work has been completed.	TBC
Other Considerations	Grubbing Out of In-Ground Structures It is recommended that in-ground structures are grubbed out as part of the groundworks. In-ground structures expected in east of the site associated with the current buildings to be demolished.		
	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 ⁶⁰): 5,000 tonnes (c. 2,500m³) treatment of crushed concrete / stone. 1,000 tonnes (c. 500³) use of non-hazardous soil 5,000 tonnes (c. 2,500m³) use of clays, sand, gravel, brick, concrete, stone etc. 50,000 tonnes (c. 25,000m³) use of bitumous 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.		
	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 guidance⁶¹) should be adopted by all workers involved with site enabling and construction works.		
	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.		
	Further information has been requested with regards to the former gas works adjacent north of the site. This will be included in the final report.		

Table 9-1: Further work, remediation and validation requirements

Notes: See Table 6-3 for pollutant linkage (PL) details.

9.2 Validation of Subsoil / Topsoil

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

⁶⁰ <https://www.gov.uk/guidance/waste-exemptions-using-waste>

⁶¹ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

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 50m³
	Brownfield / Unknown	Suite B	
Subsoil	Brownfield / Unknown	Suite B	1 sample per 150m³
	Site won natural material / greenfield	Suite A	
	First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.	
Physical Stone Break Layer	Recycled Stone (6F2 / screened)	Suite B	1 sample per 500m³

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 BS3882⁶²). LKC advise this information is provided by the supplier before material is imported onto site.

Imported material to be used in gardens will be compared against residential with plant uptake criteria (as used in the contamination risk assessment (Section 6-1)). Appropriate remedial target criteria are presented in Appendix G.

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:

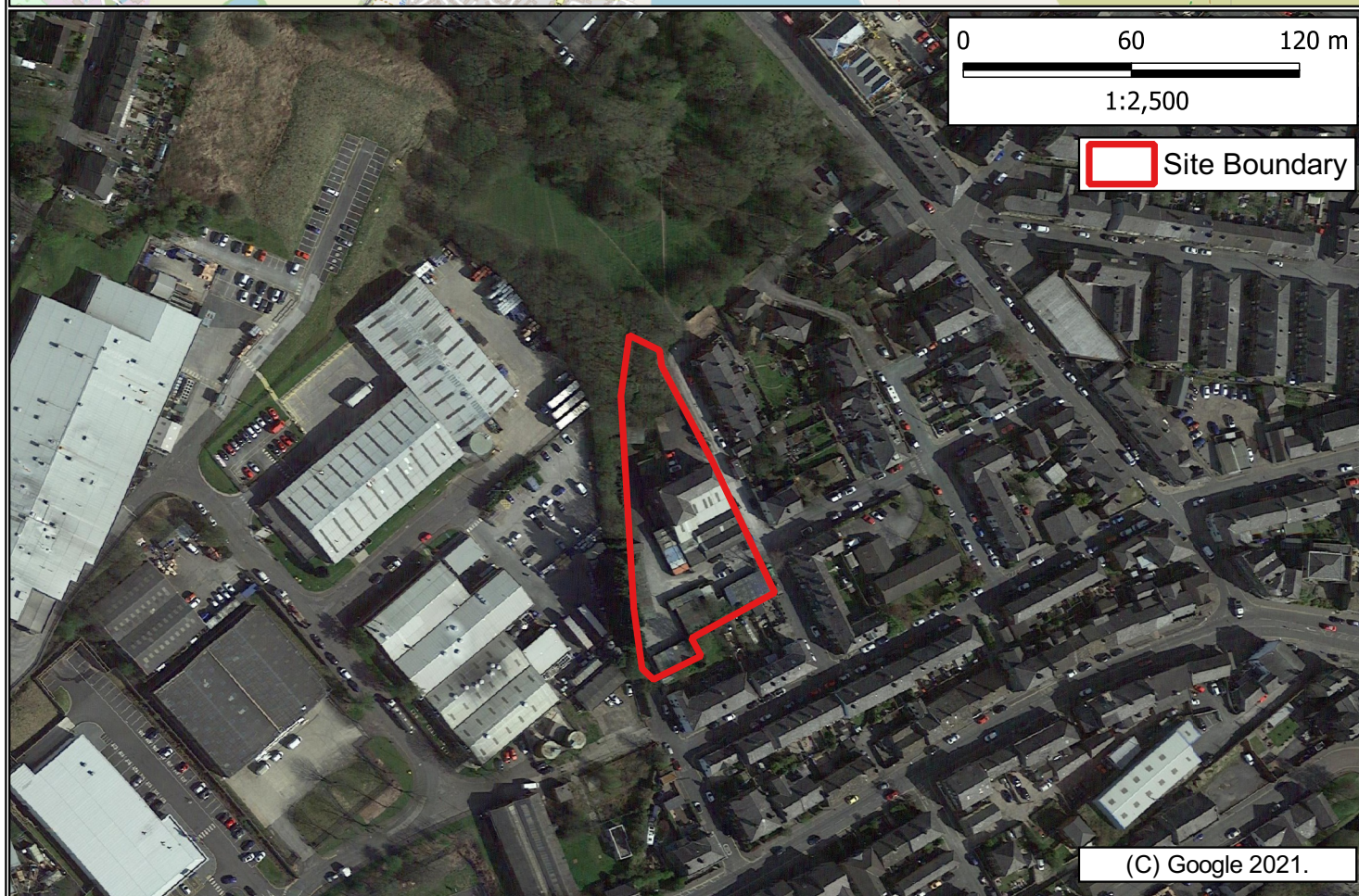
- » Details of the demolition of the current farm buildings within a Pre-Demolition and Major Refurbishment Asbestos Survey.
- » Validation of gas protection measures installed or assessment of the gas risk after monitoring.
- » If option 1 (source removal): Validation of any made ground removal (photographic evidence that natural strata was reached).
- » If option 2 (environmental capping layer): Validation of environmental cover system.
- » Verification testing of all imported soil for garden and soft landscaping areas.
- » Information on the installation of protective pipes and / or sterile trenches.
- » Provision of waste transfer documents.

⁶² BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

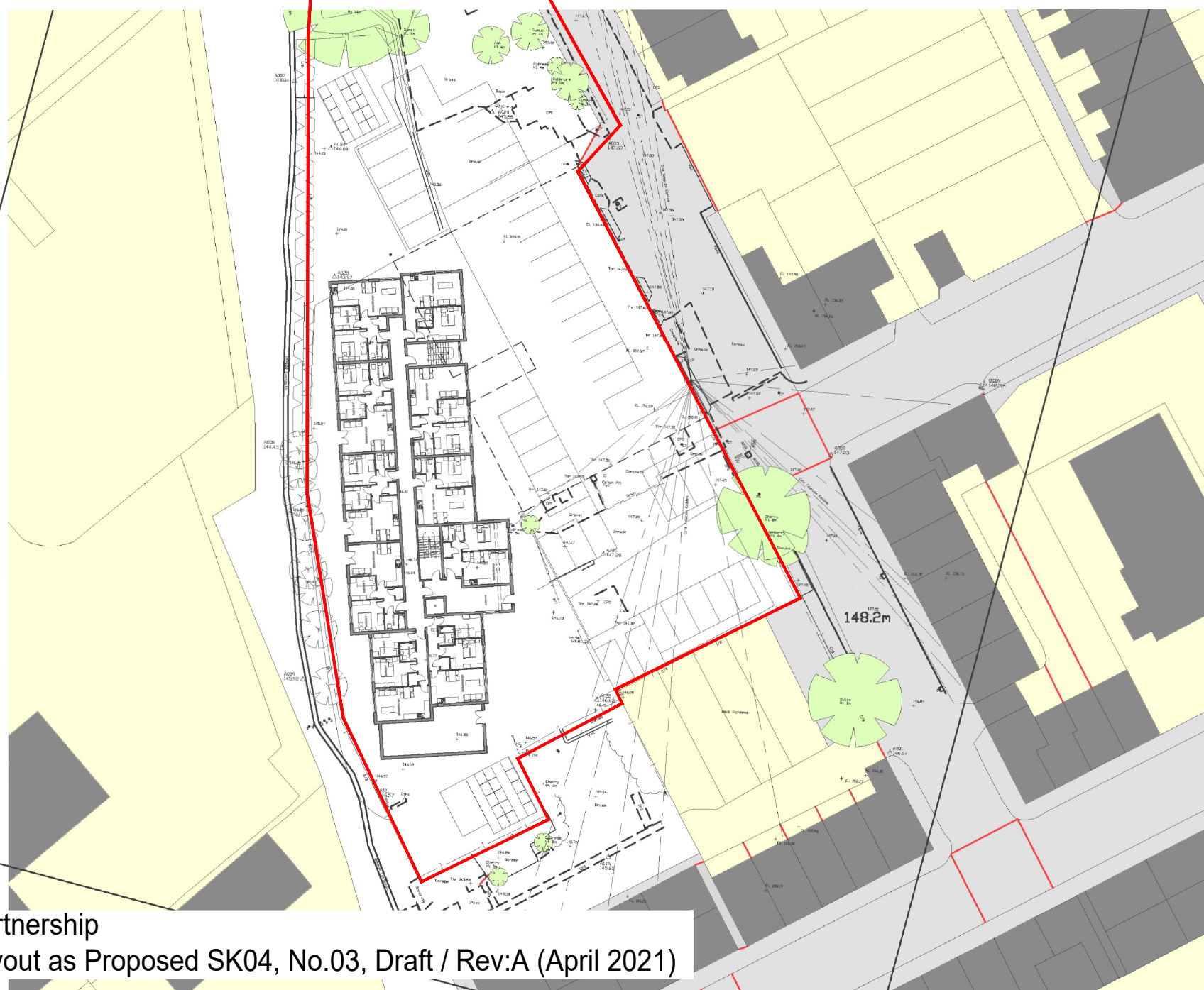
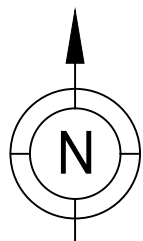
- » Details of any unexpected contamination identified onsite, suitably risk assessed and / or validated.

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



Client: Casey Group Ltd				Title: Site Location & Boundary Plan			
Site: Brown Street, Littleborough				Scale (see scale bar): 1:25,000 & 1:2,000 @ A4			
Job No.: LKC 21 1470	Drawn By: AC ¹	Checked By: BS	Drawn: September 2021	Figure: 1	Revision:		



Extract from: CJP Partnership
Drawing Ref: Site Layout as Proposed SK04, No.03, Draft / Rev:A (April 2021)

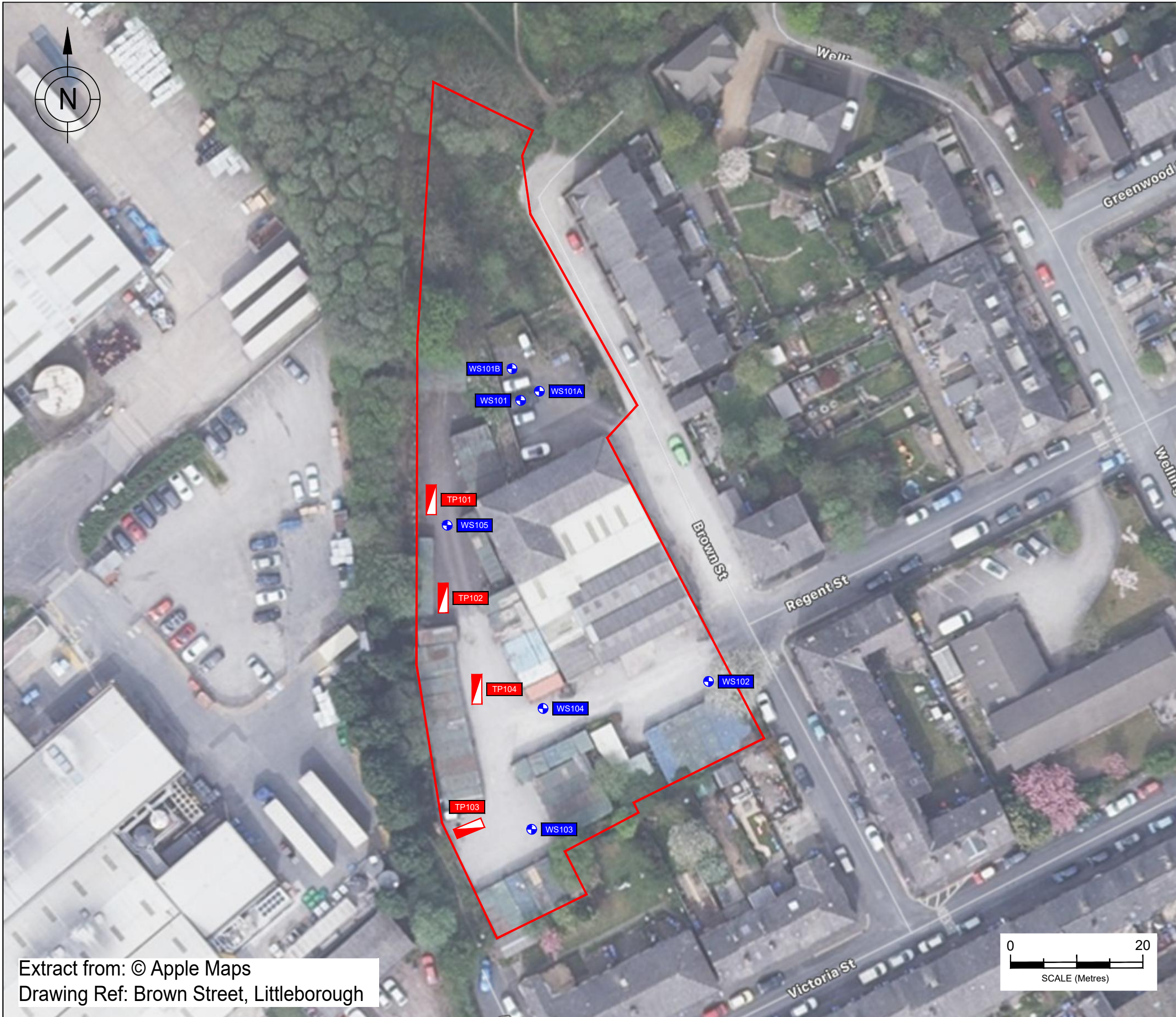
KEY

 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.



Client: NJA Pension Scheme			
Site: Brown Street, Littleborough			
Title: Proposed Site Use			
Job No.: LKC 21 1470	Scale (See Scale Bar): See Scale Bar	Figure: 2	Revision:
Drawn By: AC	Checked By: BR	Drawn: Sep 2021	



KEY

-  Site Boundary
-  Window Sample Borehole (WS)
-  Trial Pit (TP)

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



Client: NJA Pension Scheme			
Site: Brown Street, Littleborough			
Title: Site Investigation Location Plan			
Job No.: LKC 21 1470	Scale (See Scale Bar): See Scale Bar	Figure: 3	Revision:
Drawn By: AC	Checked By: AC	Drawn: Sep 2021	

Extract from: © Apple Maps
Drawing Ref: Brown Street, Littleborough

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 552⁶³. It involves the classification of the:

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

Consequence (Severity)		
Classification	Definition	Example
Severe	- Short term (acute) risk to human health likely to result 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.

⁶³ 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 severe harm to a designated receptor is currently happening. - This risk, if realised, is likely to result 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 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

Trial Pit Logs

Excavation Method

Excavator

Dimensions

2.10m x 1.00m x 2.90m

Ground Level (mOD)
Client

Casey Group Ltd

**Job
Number**

LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	ES1				(0.30) 0.30	MADE GROUND: Grey GRAVEL of tarmacadam.		
0.90	ES2				(1.30)	MADE GROUND: Grey brown ashy slightly clayey sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising brick, cinder, glass, ceramics, slate and slag. Cobbles angular comprising brick and sandstone. Contains fragments of plastic Brick foundation encountered between 0.50m to 1.50m bgl. Soil contains mild organic odour and sheen between 1.30 to 1.80mbgl.		
1.10	D3 PID <0.1ppm				1.60 (0.20)	MADE GROUND: Dark grey gravelly slightly sandy CLAY with low cobble content and occasional timber pieces. Sand is fine to coarse. Gravel is fine to coarse, angular comprising brick, cinder, glass, slate and slag. Cobbles angular comprising brick and sandstone.		
1.30	ES4				1.80			
1.70	D5		Water strike(1) at 1.80m.		(1.10)	Low strength soft brown mottled grey sandy slightly organic CLAY. Sand is fine to medium. Grey staining to 2.70m bgl and organic odour.		
1.90	D6				2.90	Complete at 2.90m		
2.00	SV 28kPa							
2.00	D7 PID <0.1ppm							
2.70	SV 30kPa							

Remarks

Trial pit stable with minor spalling from top 2.00m.
Groundwater encountered at 1.80m bgl.
Mild organic odour and oily sheen noted between 1.30-1.80mbgl.


Scale (approx)

1:50

Logged By

ACV

Figure No.

LKC 21 1470.TP101

Excavation Method

Excavator

Dimensions

2.30m x 1.30m x 1.60m

Ground Level (mOD)
Client

Casey Group Ltd

**Job
Number**

LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40	ES1		PID <0.1ppm		(0.20) 0.20	MADE GROUND: Grey GRAVEL of tarmacadam.		
0.60	D2				(1.40)	MADE GROUND: Greyish brown slightly clayey slightly sandy gravelly COBBLES. Sand is fine to coarse. Gravel is fine to coarse, angular to subround comprising brick, concrete, tarmac, cinder, ceramics, slate and sandstone. Cobbles angular comprising brick and sandstone. Contains fragments of plastic and metal.		
					1.60	Complete at 1.60m		


Remarks

Trial pit unstable, trial pit terminated at 1.60m bgl due to instability. Groundwater not encountered.

Scale (approx)

1:50

Logged By

ACV

Figure No.

LKC 21 1470.TP102

Excavation Method

Excavator

Dimensions

2.00m x 0.80m x 3.00m

Ground Level (mOD)
Client

Casey Group Ltd

**Job
Number**

LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES1				0.10	MADE GROUND: Light grey GRAVEL. Gravel fine to medium, angular to subangular of limestone.		
0.50	D2		PID <0.1ppm		(1.00)	MADE GROUND: Dark brown slightly gravelly clayey SAND with low cobble content and occasional fragments of plastic and metal. Sand is fine to coarse. Gravel is fine to coarse, angular comprising brick, concrete, glass and sandstone. Cobbles angular comprising brick, concrete and sandstone.		
1.20	D4				1.10	Yellowish brown mottled orange clayey slightly sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel fine to coarse, angular to subround of sandstone. Cobbles angular comprising sandstone.		
1.20	ES3				(0.60)			
1.30	D5				1.70	Yellowish brown slightly sandy gravelly COBBLES. Sand is fine to coarse. Gravel fine to coarse angular to subround comprising sandstone.		
1.80	D6				(1.30)			
					3.00	Complete at 3.00m		

Remarks

Trial pit complete at 3.00mbgl.
Trial pit stable stable, minor spalling throughout.
Groundwater not encountered.


Scale (approx)

1:50

Logged By

ACV

Figure No.

LKC 21 1470.TP103

Excavation Method

Trial Pit

Dimensions

3.10m x 1.00m x 2.90m

Ground Level (mOD)
Client

Casey Group Ltd

**Job
Number**
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.60	ES1				(0.15) (0.15) (0.30) 0.40	MADE GROUND: Light grey GRAVEL. Gravel fine to medium, angular to subangular comprising limestone.		
					(0.50)	MADE GROUND: Tarmacadam.		
1.20	D2				0.90	MADE GROUND: Reinforced CONCRETE posts and SANDSTONE cobbles. Sandstone cobbles to 0.60m bgl.		
2.10	D3				(2.00)	MADE GROUND: Dark brown mottled dark grey sandy GRAVEL with frequent concrete and brick fragments. Sand is fine to coarse. Gravel fine to coarse, angular comprising sandstone.		
					2.90	Orangish brown slightly clayey gravelly SAND with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular comprising sandstone. Cobbles angular comprising sandstone.		
						Complete at 2.90m		


Remarks

Trial pit stable with minor spalling in top 1.00mbgl.
Groundwater not encountered.
Reinforced concrete posts and sandstone cobbles 0.40-0.60mbgl.

Scale (approx)

1:50

Logged By

ACV

Figure No.

LKC 21 1470.TP104

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job
Number
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	ES1				(0.11) 0.11	MADE GROUND: Dark grey sandy GRAVEL. Sand is fine to medium. Gravel is fine to medium, angular to subrounded of mixed lithologies, comprising sandstone, granite and basalt. (Hardcore).		
0.40	D3		PID <0.1ppm		(0.59)	MADE GROUND: Brown sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded comprising brick, concrete, tarmac and sandstone. Cobbles angular of concrete and brick. Contains fragments of metal throughout.		
0.50	ES2				0.70	Complete at 0.70m		

Remarks

Groundwater not encountered.
Hand dug pit to 0.50mbgl, followed by windowless sample to 0.70mbgl.
Sampler refusal at 0.70mbgl in gravel made ground. Borehole repositioned (ref. 101a).

Scale
(approx)

1:25

Logged
By

ACV

Figure No.

LKC 21 1470.WS101

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job Number
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	ES1				(0.14) 0.14	MADE GROUND: Dark grey sandy GRAVEL. Sand is fine to medium. Gravel is fine to medium, angular to subround of mixed lithologies, comprising sandstone, granite and basalt. (Hardcore)		
0.30	D2				(0.56) 0.70	MADE GROUND: Brown sandy GRAVEL with medium cobble content., frequent metal fragments and occasional brick, concrete, tarmac fragments. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded comprising sandstone. Cobbles angular of concrete and brick.		
						Complete at 0.70m		

Remarks

Hand dug pit to 0.5mbgl, followed by windowless sampler to 0.70mbgl.
Sampler refusal at 0.70mbgl in gravel made ground.
Groundwater not encountered.

Scale (approx)

1:25

Logged By

ACV

Figure No.

LKC 21 1470.WS101A

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job Number
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40	ES1				(0.14) 0.14	MADE GROUND: Dark grey sandy GRAVEL. Sand is fine to medium. Gravel is fine to medium, angular to subround of mixed lithologies, comprising sandstone, granite and basalt (Hardcore)		
					(0.81)	MADE GROUND: Dark brown gravelly slightly clayey SAND with frequent cinder and brick fragments. Sand is fine to medium. Gravel is fine to coarse, angular comprising sandstone.		
1.10 1.20-1.65 1.20 1.30 1.40	D2 SPT N=15 D3 D4 PP6 81kPa		3,3/3,4,4,4		0.95	High Strength stiff orangish brown mottled dark grey sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded comprising sandstone and coal. Possible concrete cobble between 0.90-0.95mbgl. Rootlets noted above 1.00mbgl.		
1.80	PP7 184kPa							
2.00-2.45	SPT N=24		2,4/7,7,7,3		(2.15)			
2.50	PP8 86kPa							
3.00-3.45	SPT N=22		4,4/5,5,6,6			Possible sandstone cobble at 2.90mbgl.		
3.20	D5				3.10	Medium dense yellowish brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising sandstone.		
					(0.90)			
4.00-4.35	SPT 50/200		8,5/6,6,38		4.00	Yellowish brown SANDSTONE. (PENNINE LOWER COAL MEASURES)		
					(0.35)			
					4.35	Complete at 4.35m		

Remarks

Borehole Stable
Groundwater not encountered.
Sampler refusal at 4.00mbgl, SPT refusal at 4.35mbgl in probable SANDSTONE.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 4.00mbgl.

Scale (approx)

1:25

Logged By

ACV

Figure No.

LKC 21 1470.WS101B

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job
Number

LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES1				0.05	MADE GROUND: Light grey GRAVEL. Gravel is fine to medium angular to subangular of limestone. (Hardcore)		
0.50	D2		PID <0.1ppm		(0.95)	MADE GROUND: Brown gravelly SAND with low cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subround comprising brick, cinder, concrete, sandstone and mudstone.		
1.20-1.65	SPT N=9 D3 D4		2,2/1,1,3,4		1.00	Firm consistency brown mottled grey gravelly CLAY. Gravel fine to coarse, angular comprising sandstone and coal.		
1.50	D5				(1.00)			
1.70-2.15	SPT N=33		8,7/5,14,8,6		2.00	Very dense light yellowish grey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising sandstone.		
2.10	D6				(1.02)			
2.80-3.02	SPT 25*/50 50/170		25/28,15,7		3.02	Complete at 3.02m		

Remarks

Borehole stable.
Groundwater not encountered.
Sampler refusal at 2.80mbgl. SPT refusal at 3.20mbgl in very dense gravel.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 2.80mbgl.

Scale
(approx)

1:25

Logged
By

ACV

Figure No.

LKC 21 1470.WS102

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job
Number
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40	ES1				(0.10)	MADE GROUND: Light grey GRAVEL. Gravel is fine to medium, angular to subangular comprising limestone. (Hardcore).		
0.50	D2 PID <0.1ppm		PID <0.1ppm		(0.10)			
					(0.15)			
					0.25	MADE GROUND: Red and light grey mottled sandy GRAVEL with frequent brick and concrete fragments. Sand is fine to coarse. Gravel if fine to coarse, angular to subrounded comprising sandstone.		
					(0.45)			
					0.70	MADE GROUND: Medium strength firm becoming high strength stiff dark grey mottled orange gravelly slightly sandy organic CLAY with frequent brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising coal and sandstone. Contains fragments of timber and roots. Slight organic odour noted..		
0.80	D3							
0.80	PP10 47kPa							
1.10	D4							
1.20-1.65	SPT N=29		5,8/11,7,6,5					
1.20	D5							
1.50	PP11 92kPa							
					(2.00)			
2.00-2.45	SPT N=17		4,4/3,4,4,6					
2.00	D6							
2.00	PP12 123kPa							
2.50	PP13 113kPa							
					2.70			
2.80	D7					Dense light brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded comprising sandstone.		
3.00-3.45	SPT N=20		5,4/5,5,5,5					
3.00	D8				(1.30)			
4.00-4.40	SPT 50/250		5,8/13,15,12,10		4.00	Yellowish brown SANDSTONE (PENNINE LOWER COAL MEASURES)		
4.00	D9				(0.40)			
					4.40	Complete at 4.40m		

Remarks

Sampler refusal at 4.00mbgl, SPT refusal at 4.40mbgl in SANDSTONE.
Borehole stable.
Groundwater not encountered.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 4.00mbgl.

Scale
(approx)

1:25

Logged
By

ACV

Figure No.

LKC 21 1470.WS103

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job
Number
LKC 21 1470

Location
Dates

17/09/2021

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	ES1				0.05 0.10 (0.30)	MADE GROUND: Light grey GRAVEL. Gravel fine to medium, angular to subangular comprising limestone. (Hardcore). MADE GROUND: Concrete COBBLE.		
0.80	D2				0.40 (0.25)	MADE GROUND: Yellowish grey gravelly SAND. Sand is fine to coarse. Gravel is fine to medium, angular comprising brick and sandstone.		
1.20-1.65 1.20 1.20	SPT N=22 D3 D4		6,7/4,5,6,7		0.65 (0.25) 0.90	MADE GROUND: Dark brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to medium, angular comprising brick and sandstone. MADE GROUND: Firm dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, angular of sandstone and coal.		
2.00-2.45 2.00	SPT N=16 D5		5,3/4,3,4,5		(1.80)	Medium dense brown mottled yellow slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subround comprising sandstone.		
2.70-2.77 2.70	SPT 25*/20 50/50 D6		17,8/29,21		2.70 (0.07) 2.77	Yellowish brown SANDSTONE (PENNINE LOWER COAL MEASURES). Complete at 2.77m		

Remarks

Borehole stable.
Groundwater not encountered.
Sampler refusal at 2.70mbgl, SPT refusal at 2.77mbgl in SANDSTONE.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 2.70mbgl.

Scale
(approx)

1:25

Logged
By

ACV

Figure No.

LKC 21 1470.WS104

Excavation Method

Drive-in Windowless Sampler

Dimensions

101mm to 1.00m

Ground Level (mOD)
Client

Casey Group Ltd

Job
Number
LKC 21 1470

Location
Dates

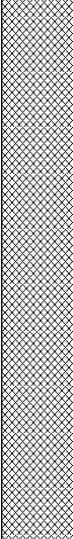
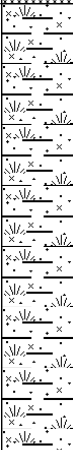
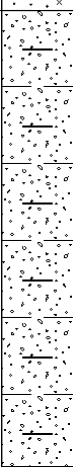
17/09/2021

Engineer

LKC

Sheet

1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES1				(0.20) 0.20	MADE GROUND: Grey GRAVEL of tarmacadam.		
0.80	D2		PID <0.1ppm		(1.80)	MADE GROUND: Dark grey mottled yellow slightly sandy clayey GRAVEL with frequent ash and clay pockets. Sand is fine to coarse. Gravel is fine to coarse, angular comprising cinder, slag, coal, brick and sandstone. Clay in pockets.		
1.20-1.65 1.20	SPT N=6 D3		2,2/1,2,1,2		2.00	Low strength soft grey sandy silty organic CLAY with occasional wood fragments and rootlets. Sand is fine to medium.		▽1
2.00 2.00-2.45 2.10 2.10	PP10 7.36kPa SPT N=5 D5 ES4		Water strike(1) at 2.00m. 1,0/1,1,1,2		(1.50)	Medium dense grey slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising sandstone.		
2.50	PP11 5.07kPa							
2.80	D6							
3.00-3.45 3.00 3.00	SPT N=29 D7 PP12 5.72kPa		5,10/11,7,6,5		3.50			
3.90	D8							
4.00-4.45 4.00	SPT N=17 D9		5,6/5,4,4,4		(1.95)			
5.00-5.45	SPT N=25		5,6/7,6,6,6					

Remarks

Borehole stable.
Groundwater encountered at 2.00mbgl.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 4.00mbgl.
Borehole complete at 5.45mbgl.

Scale (approx)

1:25

Logged By

ACV

Figure No.

LKC 21 1470.WS105

Excavation Method Drive-in Windowless Sampler	Dimensions 101mm to 1.00m	Ground Level (mOD)	Client Casey Group Ltd	Job Number LKC 21 1470
	Location	Dates 17/09/2021	Engineer LKC	Sheet 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					5.45	Complete at 5.45m		

Remarks

Remarks
Borehole stable.
Groundwater encountered at 2.00mbgl.
Installed 50mm plain standpipe to 1.00mbgl and slotted standpipe to 4.00mbgl.
Borehole complete at 5.45mbgl.

Scale (approx)

1:25

Logged
By

ACV

Figure No.

LKC 21 1470.WS105

Appendix C

Certificates of Analysis – Soil



Amended Report

Report No.:	21-32730-2		
Initial Date of Issue:	30-Sep-2021	Date of Re-Issue:	06-Oct-2021
Client	LK Consult		
Client Address:	Unit 29 Eton Business Park Eton Hill Road Radcliffe Manchester Lancashire M26 2ZS		
Contact(s):	Beth Ryder Contaminated Land		
Project	LKC 21 1470 Brown Street, Littleborough		
Quotation No.:		Date Received:	21-Sep-2021
Order No.:	739050	Date Instructed:	24-Sep-2021
No. of Samples:	13		
Turnaround (Wkdays):	5	Results Due:	30-Sep-2021
Date Approved:	30-Sep-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-32730	21-32730	21-32730	21-32730	21-32730	21-32730	21-32730	21-32730	21-32730
Quotation No.:	Chemtest Sample ID.:				1283205	1283207	1283208	1283209	1283210	1283211	1283212	1283213	1283215
	Sample Location:				WS101	WS101B	WS102	WS103	WS104	WS105	WS105	TP101	TP101
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.10	0.30	0.40	0.50	0.30	2.10	0.50	1.30
	Date Sampled:				17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	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	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	10	12	7.5	18	21	21	21	16	33
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	None	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Clay	Sand	Sand
Chromatogram (TPH)	N			N/A				See Attached					See Attached
pH	M	2010		4.0	9.3	8.3	8.4	7.8	8.2	7.1	7.4	7.8	7.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				1.2					2.5
Magnesium (Water Soluble)	N	2120	g/l	0.010									
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.055	< 0.010	< 0.010	0.012	< 0.010	0.030	< 0.010	< 0.010	0.63
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				< 0.50					< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50				0.80					14
Arsenic	M	2450	mg/kg	1.0	12	48	50	19	68	68	18	44	23
Cadmium	M	2450	mg/kg	0.10	0.33	0.78	0.57	1.4	0.68	0.98	0.18	1.5	1.0
Chromium	M	2450	mg/kg	1.0	26	76	34	41	49	43	52	45	29
Copper	M	2450	mg/kg	0.50	52	180	200	220	200	350	94	330	120
Mercury	M	2450	mg/kg	0.10	0.26	1.3	0.63	0.25	0.45	0.77	< 0.10	0.46	0.49
Nickel	M	2450	mg/kg	0.50	22	44	57	36	55	84	64	78	38
Lead	M	2450	mg/kg	0.50	490	1100	300	430	610	670	59	700	310
Selenium	M	2450	mg/kg	0.20	< 0.20	0.71	0.56	0.66	0.93	1.8	0.37	0.87	0.60
Vanadium	U	2450	mg/kg	5.0	33	51	60	38	76	89	52	87	38
Zinc	M	2450	mg/kg	0.50	820	360	190	600	280	420	130	630	340
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	4.4	19	23	8.6	26	31	3.8	25	16
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				5.3					< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0				24					< 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				29					< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				< 1.0					< 1.0

Results - Soil

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-32730	21-32730	21-32730	21-32730	21-32730	21-32730	21-32730	21-32730
Quotation No.:	Chemtest Sample ID.:				1283205	1283207	1283208	1283209	1283210	1283211	1283212	1283213
	Sample Location:				WS101	WS101B	WS102	WS103	WS104	WS105	WS105	TP101
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.10	0.30	0.40	0.50	0.30	2.10	0.50
	Date Sampled:				17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021	17-Sep-2021
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
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				30				20
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0				150				140
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0				< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0				180				160
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				210				160
Benzene	M	2760	µg/kg	1.0				< 1.0				< 1.0
Toluene	M	2760	µg/kg	1.0				< 1.0				< 1.0
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
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0				< 1.0				< 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	0.32	12	0.33	0.71	0.73	< 0.10	0.56
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	0.13	0.53	0.38	0.39	0.49	< 0.10	0.69
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	0.27	8.8	0.14	0.14	0.32	< 0.10	0.27
Fluorene	M	2800	mg/kg	0.10	< 0.10	0.15	5.5	0.26	0.25	0.51	< 0.10	0.28
Phenanthrene	M	2800	mg/kg	0.10	1.7	2.2	39	3.8	3.5	7.0	< 0.10	5.5
Anthracene	M	2800	mg/kg	0.10	0.46	0.41	6.7	0.67	0.76	1.5	< 0.10	1.3
Fluoranthene	M	2800	mg/kg	0.10	4.6	5.2	42	8.2	8.3	12	0.22	13
Pyrene	M	2800	mg/kg	0.10	3.9	4.5	34	7.1	7.2	10	0.19	11
Benzo[a]anthracene	M	2800	mg/kg	0.10	2.3	2.6	20	4.0	4.5	5.8	0.10	5.9
Chrysene	M	2800	mg/kg	0.10	2.2	2.7	19	4.5	4.9	5.7	0.10	7.0
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	3.4	4.4	22	6.1	6.8	8.5	< 0.10	12
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	1.1	1.3	7.6	2.1	2.3	2.8	< 0.10	3.6
Benzo[a]pyrene	M	2800	mg/kg	0.10	3.1	3.6	19	5.1	6.0	7.2	< 0.10	9.3
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	2.1	2.5	10	3.4	3.6	5.4	< 0.10	7.1
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.40	0.47	2.2	0.65	0.76	1.1	< 0.10	1.2
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	1.7	2.2	8.9	2.9	3.2	4.6	< 0.10	6.2
Total Of 16 PAH's	N	2800	mg/kg	2.0	27	33	260	50	53	74	< 2.0	85
Total Phenols	M	2920	mg/kg	0.10				< 0.10				< 0.10

Results - Soil

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-32730	21-32730	21-32730	21-32730
Quotation No.:	Chemtest Sample ID.:				1283216	1283217	1283218	1283219
	Sample Location:				TP102	TP103	TP103	TP104
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.40	0.30	1.20	0.60
	Date Sampled:				17-Sep-2021	17-Sep-2021	17-Sep-2021	07-Sep-2021
	Asbestos Lab:				DURHAM	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		No Asbestos Detected
Moisture	N	2030	%	0.020	12	48	14	12
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand
Chromatogram (TPH)	N			N/A				
pH	M	2010		4.0	8.1	7.2	7.4	8.0
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.025	0.11	< 0.010	0.67
Chloride (Water Soluble)	M	2220	g/l	0.010			< 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 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	17	36		24
Cadmium	M	2450	mg/kg	0.10	0.57	0.82		0.67
Chromium	M	2450	mg/kg	1.0	33	42		240
Copper	M	2450	mg/kg	0.50	88	230		100
Mercury	M	2450	mg/kg	0.10	0.23	0.46		0.20
Nickel	M	2450	mg/kg	0.50	36	37		37
Lead	M	2450	mg/kg	0.50	280	720		580
Selenium	M	2450	mg/kg	0.20	0.41	0.76		0.40
Vanadium	U	2450	mg/kg	5.0	41	40		43
Zinc	M	2450	mg/kg	0.50	180	310		200
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50
Organic Matter	M	2625	%	0.40	9.8	21		12
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 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-32730	21-32730	21-32730	21-32730
Quotation No.:	Chemtest Sample ID.:				1283216	1283217	1283218	1283219
	Sample Location:				TP102	TP103	TP103	TP104
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.40	0.30	1.20	0.60
	Date Sampled:				17-Sep-2021	17-Sep-2021	17-Sep-2021	07-Sep-2021
	Asbestos Lab:				DURHAM	DURHAM		DURHAM
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				
Benzene	M	2760	µg/kg	1.0				
Toluene	M	2760	µg/kg	1.0				
Ethylbenzene	M	2760	µg/kg	1.0				
m & p-Xylene	M	2760	µg/kg	1.0				
o-Xylene	M	2760	µg/kg	1.0				
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0				
Naphthalene	M	2800	mg/kg	0.10	0.34	1.7		0.49
Acenaphthylene	N	2800	mg/kg	0.10	0.24	2.1		0.38
Acenaphthene	M	2800	mg/kg	0.10	0.78	2.4		0.19
Fluorene	M	2800	mg/kg	0.10	0.73	1.9		0.18
Phenanthrene	M	2800	mg/kg	0.10	9.7	39		3.4
Anthracene	M	2800	mg/kg	0.10	2.0	8.0		0.90
Fluoranthene	M	2800	mg/kg	0.10	20	70		7.5
Pyrene	M	2800	mg/kg	0.10	16	58		7.0
Benzo[a]anthracene	M	2800	mg/kg	0.10	10	28		2.8
Chrysene	M	2800	mg/kg	0.10	9.7	31		2.9
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	14	39		3.7
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	4.7	13		1.3
Benzo[a]pyrene	M	2800	mg/kg	0.10	11	32		3.0
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	6.6	20		2.1
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	1.6	4.0		0.49
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	5.8	18		1.8
Total Of 16 PAH's	N	2800	mg/kg	2.0	110	370		38
Total Phenols	M	2920	mg/kg	0.10				

TPH Chromatogram on Soil Sample: 1283209

\\NM-FILESERVER\Job Paperwork\SampData\SOIL\1283209.PDF

TPH Chromatogram on Soil Sample: 1283215

\\NM-FILESERVER\Job Paperwork\SampData\SOIL\1283215.PDF

TPH Interpretation

Job	Sample	Matrix	Location	Sample Ref	Sample ID	Sample Depth (m)	Gasoline / Diesel Present	TPH Interpretation
21-32730	1283209	S	WS103			0.40	No	PAH
21-32730	1283215	S	TP101			1.30	No	PAH

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 measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easily liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline 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–C44 Aromatics: >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.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and Trimethylphenols Note: 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



Final Report

Report No.: 21-33555-1
Initial Date of Issue: 01-Oct-2021
Client LK Consult
Client Address: Unit 29 Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS
Contact(s): Beth Ryder
Project LKC 21 1470 Brown Street,
Littleborough

Quotation No.:		Date Received:	28-Sep-2021
Order No.:	739050	Date Instructed:	28-Sep-2021
No. of Samples:	2		
Turnaround (Wkdays):	5	Results Due:	04-Oct-2021
Date Approved:	01-Oct-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-33555	21-33555
Quotation No.:	Chemtest Sample ID.:				1287403	1287404
	Client Sample ID.:				WS102	WS103
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.2	2.0
	Date Sampled:				17-Sep-2021	17-Sep-2021
Determinand	Accred.	SOP	Units	LOD		
Moisture	N	2030	%	0.020	12	3.8
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	None	Stones
Soil Texture	N	2040		N/A	Clay	Gravel
pH	M	2010		4.0	8.4	8.2
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.058	0.019
Chloride (Water Soluble)	M	2220	g/l	0.010	< 0.010	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010

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
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.

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
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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 D

Certificates of Analysis - Geotechnical

TEST REPORT

Client LK Consult Ltd

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

Contract LKC 21 1470 -
Brown Street, Littleborough

Job Number MRN 4066/188
Date of Issue 21 October 2021
Pages 1 of 6

Approved Signatories

S J Hutchings, O P Davies

Notes

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



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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

MURRAY RIX

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



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

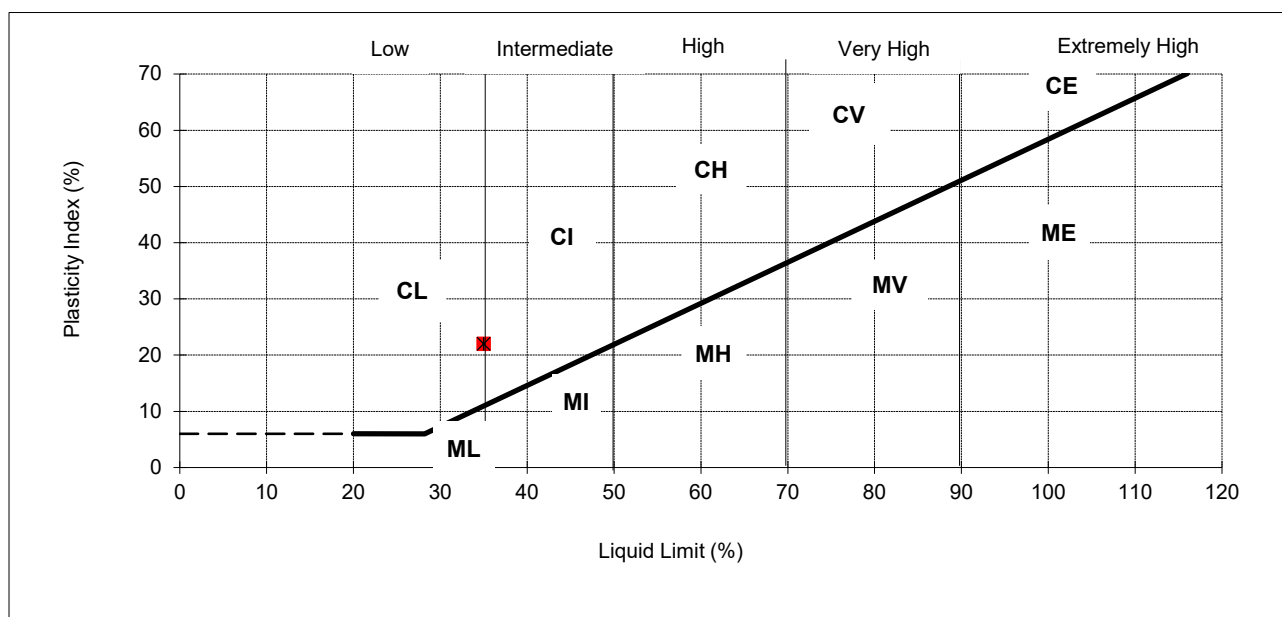
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Ltd
SITE	LKC 21 1470 - Brown Street, Littleborough
JOB NUMBER	MRN 4066/188

SAMPLE LABEL	WS101B 1.10m	DATE SAMPLED	Not advised
SAMPLE No.	104973	DATE RECEIVED	27-Sep-21
DATE TESTED	06-Oct-21	SAMPLED BY	Client

MATERIAL	Stiff orange grey brown silty sandy CLAY with occasional gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	35	13	22	83



REMARKS

Sample tested after wet sieving

SIGNED

NAME

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

DATE

21-Oct-21

MURRAY RIX

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



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

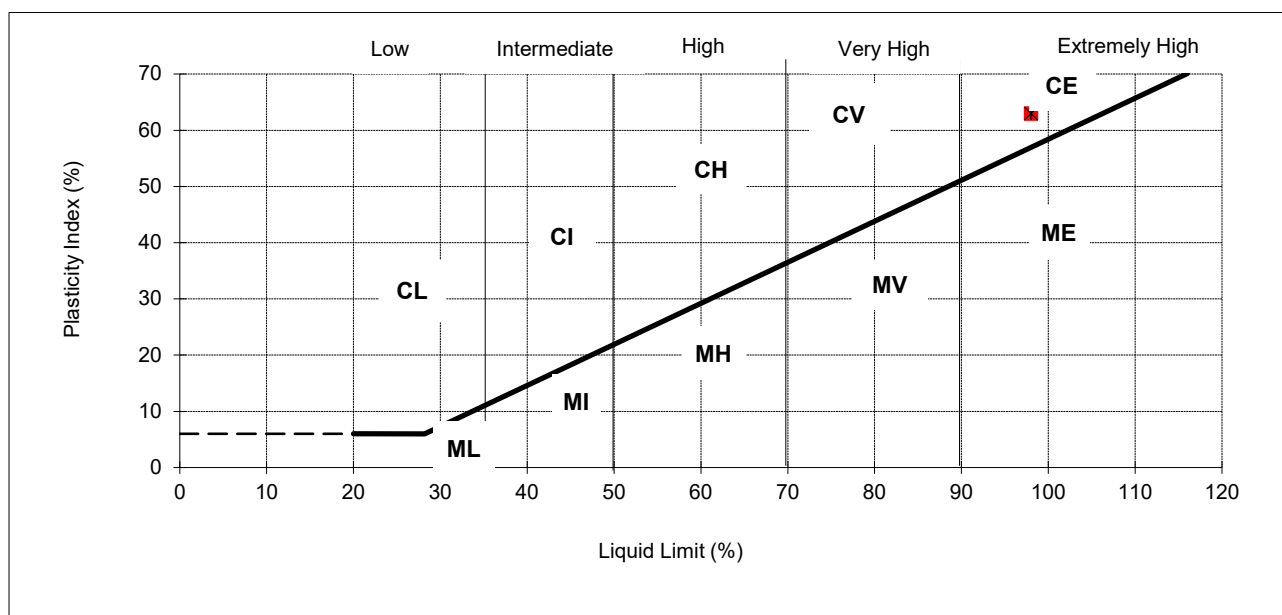
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Ltd
SITE	LKC 21 1470 - Brown Street, Littleborough
JOB NUMBER	MRN 4066/188

SAMPLE LABEL	WS105 2.80m	DATE SAMPLED	Not advised
SAMPLE No.	104974	DATE RECEIVED	27-Sep-21
DATE TESTED	06-Oct-21	SAMPLED BY	Client

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

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
85	98	35	63	92



REMARKS

Sample tested after wet sieving

SIGNED

NAME

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

DATE

21-Oct-21

MURRAY RIX

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



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

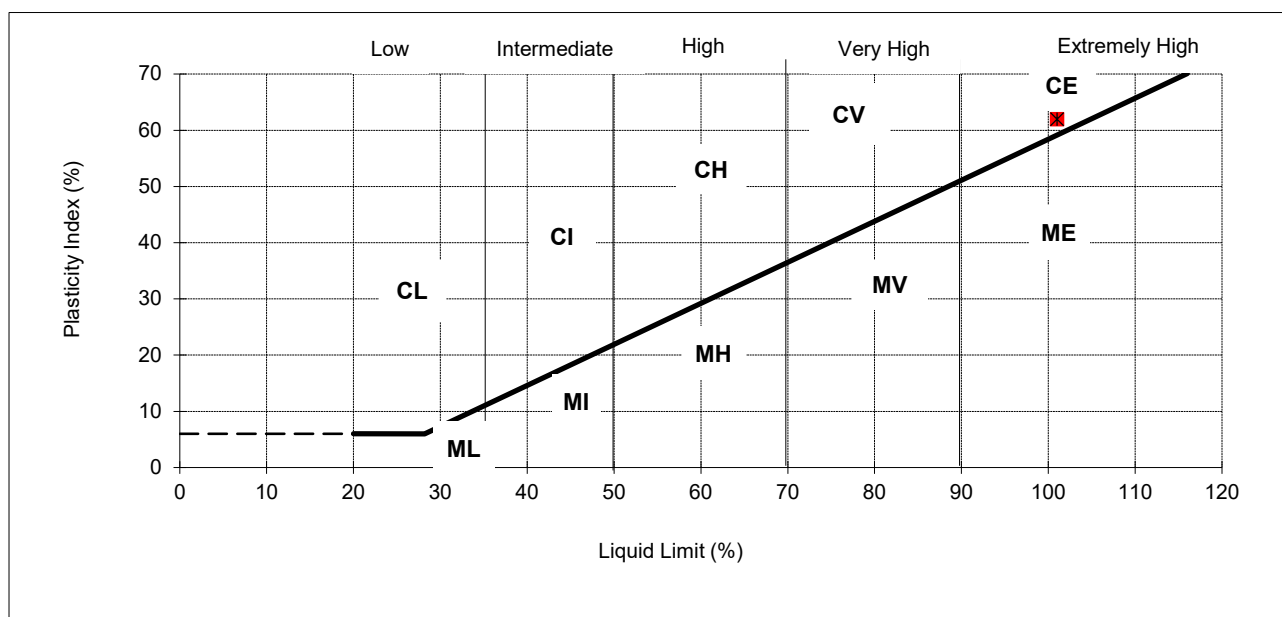
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Ltd
SITE	LKC 21 1470 - Brown Street, Littleborough
JOB NUMBER	MRN 4066/188

SAMPLE LABEL	TP101 1.90m	DATE SAMPLED	Not advised
SAMPLE No.	104975	DATE RECEIVED	27-Sep-21
DATE TESTED	06-Oct-21	SAMPLED BY	Client

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

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
71	101	39	62	89



REMARKS

Sample tested after wet sieving

SIGNED

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

DATE 21-Oct-21

MURRAY RIX

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



TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

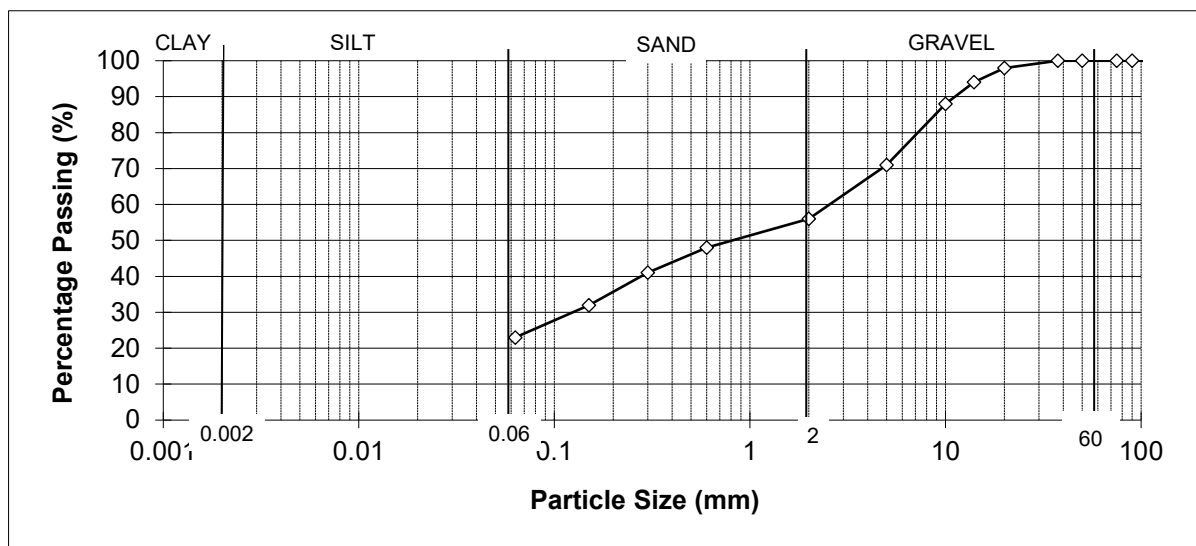
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 21 1470 - Brown Street, Littleborough
JOB NUMBER	MRN 4066/188

SAMPLE LABEL	TP103 1.30m	DATE SAMPLED	Not advised
LAB SAMPLE No	104976	DATE RECEIVED	27-Sep-21
DATE TESTED	06-Oct-21	SAMPLED BY	Client

MATERIAL	Brown silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	88	
90	100		5	71	
75	100		2	56	
50	100		0.6	48	
37.5	100		0.3	41	
20	98		0.15	32	
14	94		0.063	23	



REMARKS

SIGNED

NAME

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

DATE

21-Oct-21

MURRAY RIX

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



TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

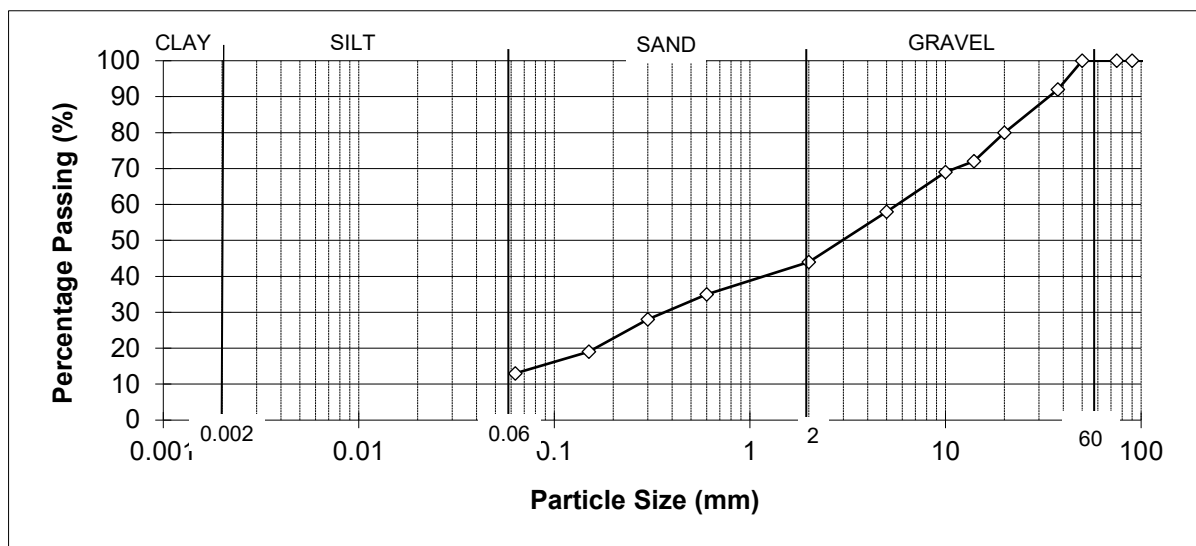
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 21 1470 - Brown Street, Littleborough
JOB NUMBER	MRN 4066/188

SAMPLE LABEL	TP104 2.10m	DATE SAMPLED	Not advised
LAB SAMPLE No	104977	DATE RECEIVED	27-Sep-21
DATE TESTED	06-Oct-21	SAMPLED BY	Client

MATERIAL	Brown silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	69	
90	100		5	58	
75	100		2	44	
50	100		0.6	35	
37.5	92		0.3	28	
20	80		0.15	19	
14	72		0.063	13	



REMARKS

SIGNED

NAME

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

DATE

21-Oct-21

Appendix E

Certificate of Analysis – Water



2183

Final Report

Report No.: 21-35728-1
Initial Date of Issue: 20-Oct-2021
Client LK Consult
Client Address: Unit 29 Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS
Contact(s): Beth Ryder
Contaminated Land
Project LKC 21 1470 Brown Street,
Littleborough

Quotation No.:		Date Received:	14-Oct-2021
Order No.:	739125	Date Instructed:	14-Oct-2021
No. of Samples:	1		
Turnaround (Wkdays):	5	Results Due:	20-Oct-2021
Date Approved:	20-Oct-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-35728
Quotation No.:	Chemtest Sample ID.:				1298322
	Client Sample ID.:				WS105
	Sample Type:				WATER
	Date Sampled:				13-Oct-2021
Determinand	Accred.	SOP	Units	LOD	
Diesel Present	N	1670		N/A	False
pH	U	1010		N/A	6.9
Sulphate	U	1220	mg/l	1.0	21
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	43
Total Hardness as CaCO3	U	1270	mg/l	15	120
Arsenic (Dissolved)	U	1455	µg/l	0.20	1.3
Boron (Dissolved)	U	1455	µg/l	10.0	44
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	1.6
Nickel (Dissolved)	U	1455	µg/l	0.50	2.5
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	0.93
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	50
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
Benzene	U	1760	µg/l	1.0	< 1.0
Toluene	U	1760	µg/l	1.0	< 1.0

Results - Water

Project: LKC 21 1470 Brown Street, Littleborough

Client: LK Consult	Chemtest Job No.:				21-35728
Quotation No.:	Chemtest Sample ID.:				1298322
	Client Sample ID.:				WS105
	Sample Type:				WATER
	Date Sampled:				13-Oct-2021
Determinand	Accred.	SOP	Units	LOD	
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
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0
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
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
21-35728	1298322	W			WS105		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-diphenylcarbazine.
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.
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; Dibenzo[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

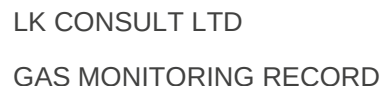


Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Falling
Weather Conditions	Wet, raining
Ground Conditions	Wet

[illegible]

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).	



Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Rising
Weather Conditions	No rain, low wind speed
Ground Conditions	Wet

[illegible]

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

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.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel (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.

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

NOTES

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

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

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

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

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

NOTES

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

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

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

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

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

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

NOTES

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

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

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

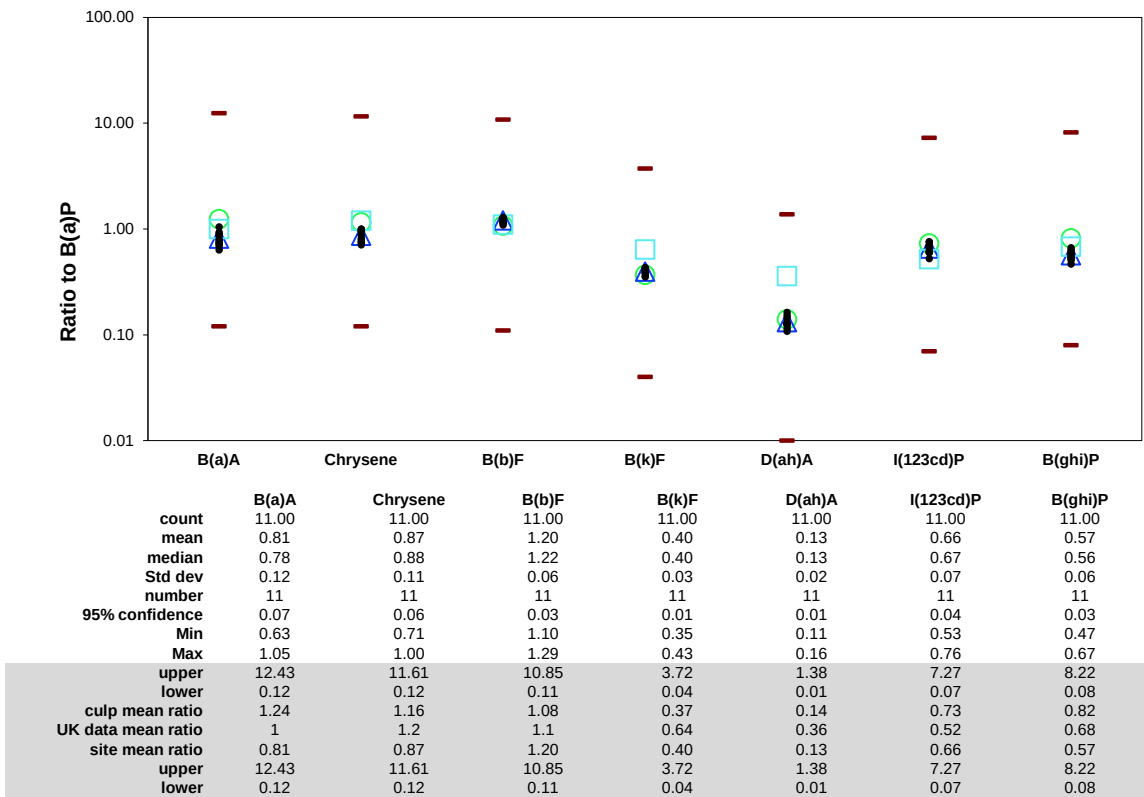
CATEGORY 4 SCREENING LEVELS

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

Appendix H

B(a)P Justification



Appendix I

HazWaste Online Output Sheet

Waste Classification Report

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

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



3P5MH-S7TZO-6Q6CJ

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

Job name

LKC 21 1470

Description/Comments

Project

LKC 21 1470

Site

Brown Street, Littleborough

Classified by

Name: **Colin Crompton**
Date: **20 Oct 2021 15:19 GMT**
Telephone: **0161 763 7200**

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

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

HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification

Date

08 Oct 2020

Next 3 year Refresher due by Oct 2023

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS101-17/09/2021-0.50	0.50	Non Hazardous		2
2	WS101B-17/09/2021-0.10	0.10	Non Hazardous		4
3	WS102-17/09/2021-0.30	0.30	Non Hazardous		6
4	WS103-17/09/2021-0.40	0.40	Non Hazardous		8
5	WS104-17/09/2021-0.50	0.50	Non Hazardous		11
6	WS105-17/09/2021-0.30	0.30	Non Hazardous		13
7	WS105-17/09/2021-2.10	2.10	Non Hazardous		15
8	TP101-17/09/2021-0.50	0.50	Non Hazardous		17
9	TP101-17/09/2021-1.30	1.30	Non Hazardous		19
10	TP102-17/09/2021-0.40	0.40	Non Hazardous		22
11	TP103-17/09/2021-0.30	0.30	Non Hazardous		24
12	TP103-17/09/2021-1.20	1.20	Non Hazardous		26
13	TP104-07/09/2021-0.60	0.60	Non Hazardous		27

Related documents

#	Name	Description
1	HWOL_21-32730-20211020 154120.hwol	.hwol file used to create the Job
2	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: Colin Crompton

Created date: 20 Oct 2021 15:19 GMT

Appendices

	Page
Appendix A: Classifier defined and non CLP determinands	29
Appendix B: Rationale for selection of metal species	30
Appendix C: Version	31

Classification of sample: WS101-17/09/2021-0.50

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

Sample details

Sample name:	LoW Code:
WS101-17/09/2021-0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
10%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				12	mg/kg	1.32	14.26	mg/kg	0.00143 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.33	mg/kg	1.142	0.339	mg/kg	0.0000339 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				26	mg/kg	1.462	34.2	mg/kg	0.00342 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
		024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				52	mg/kg	1.126	52.692	mg/kg	0.00527 %	✓	
		029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	490	mg/kg	1.56	687.878	mg/kg	0.0441 %	✓	
		082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				0.26	mg/kg	1.353	0.317	mg/kg	0.0000317 %	✓	
		080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				22	mg/kg	2.976	58.93	mg/kg	0.00589 %	✓	
		028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		<LOD
		028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc oxide }				820	mg/kg	1.245	918.599	mg/kg	0.0919 %	✓	
		030-013-00-7	215-222-5	1314-13-2								
11	pH				9.3	pH		9.3	pH	9.3 pH		
12	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8								
14	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-469-6	83-32-9								
15	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7								
16	phenanthrene				1.7	mg/kg		1.53	mg/kg	0.000153 %	✓	
			201-581-5	85-01-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		0.46 mg/kg		0.414 mg/kg	0.0000414 %	✓	
18	fluoranthene	205-912-4	206-44-0		4.6 mg/kg		4.14 mg/kg	0.000414 %	✓	
19	pyrene	204-927-3	129-00-0		3.9 mg/kg		3.51 mg/kg	0.000351 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		2.3 mg/kg		2.07 mg/kg	0.000207 %	✓	
21	chrysene	601-048-00-0	205-923-4		2.2 mg/kg		1.98 mg/kg	0.000198 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		3.4 mg/kg		3.06 mg/kg	0.000306 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		1.1 mg/kg		0.99 mg/kg	0.000099 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		3.1 mg/kg		2.79 mg/kg	0.000279 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		2.1 mg/kg		1.89 mg/kg	0.000189 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.4 mg/kg		0.36 mg/kg	0.000036 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		1.7 mg/kg		1.53 mg/kg	0.000153 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		33 mg/kg	1.785	53.02 mg/kg	0.0053 %	✓	
Total:								0.16 %		

Key

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

Classification of sample: WS101B-17/09/2021-0.10

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

Sample details

Sample name:	LoW Code:
WS101B-17/09/2021-0.10	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.10 m	
Moisture content:	
12%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				48	mg/kg	1.32	55.771	mg/kg	0.00558 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.78	mg/kg	1.142	0.784	mg/kg	0.0000784 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				76	mg/kg	1.462	97.749	mg/kg	0.00977 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
		024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				180	mg/kg	1.126	178.341	mg/kg	0.0178 %	✓	
		029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	1100	mg/kg	1.56	1509.901	mg/kg	0.0968 %	✓	
		082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				1.3	mg/kg	1.353	1.548	mg/kg	0.000155 %	✓	
		080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				44	mg/kg	2.976	115.241	mg/kg	0.0115 %	✓	
		028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				0.71	mg/kg	2.554	1.596	mg/kg	0.00016 %	✓	
		028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc oxide }				360	mg/kg	1.245	394.325	mg/kg	0.0394 %	✓	
		030-013-00-7	215-222-5	1314-13-2								
11	pH				8.3	pH		8.3	pH	8.3 pH		
12	naphthalene				0.32	mg/kg		0.282	mg/kg	0.0000282 %	✓	
		601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.13	mg/kg		0.114	mg/kg	0.0000114 %	✓	
			205-917-1	208-96-8								
14	acenaphthene				0.27	mg/kg		0.238	mg/kg	0.0000238 %	✓	
			201-469-6	83-32-9								
15	fluorene				0.15	mg/kg		0.132	mg/kg	0.0000132 %	✓	
			201-695-5	86-73-7								
16	phenanthrene				2.2	mg/kg		1.936	mg/kg	0.000194 %	✓	
			201-581-5	85-01-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		0.41 mg/kg		0.361 mg/kg	0.0000361 %	✓	
18	fluoranthene	205-912-4	206-44-0		5.2 mg/kg		4.576 mg/kg	0.000458 %	✓	
19	pyrene	204-927-3	129-00-0		4.5 mg/kg		3.96 mg/kg	0.000396 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		2.6 mg/kg		2.288 mg/kg	0.000229 %	✓	
21	chrysene	601-048-00-0	205-923-4		2.7 mg/kg		2.376 mg/kg	0.000238 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		4.4 mg/kg		3.872 mg/kg	0.000387 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		1.3 mg/kg		1.144 mg/kg	0.000114 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		3.6 mg/kg		3.168 mg/kg	0.000317 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		2.5 mg/kg		2.2 mg/kg	0.00022 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.47 mg/kg		0.414 mg/kg	0.0000414 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		2.2 mg/kg		1.936 mg/kg	0.000194 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		51 mg/kg	1.785	80.119 mg/kg	0.00801 %	✓	
Total:								0.192 %		

Key

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

Classification of sample: WS102-17/09/2021-0.30

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

Sample details

Sample name:	LoW Code:
WS102-17/09/2021-0.30	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.30 m	
Moisture content:	
7.5%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 7.5% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				50	mg/kg	1.32	61.065	mg/kg	0.00611 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.57	mg/kg	1.142	0.602	mg/kg	0.0000602 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				34	mg/kg	1.462	45.966	mg/kg	0.0046 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
		024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				200	mg/kg	1.126	208.289	mg/kg	0.0208 %	✓	
		029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	300	mg/kg	1.56	432.849	mg/kg	0.0277 %	✓	
		082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				0.63	mg/kg	1.353	0.789	mg/kg	0.0000789 %	✓	
		080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				57	mg/kg	2.976	156.924	mg/kg	0.0157 %	✓	
		028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				0.56	mg/kg	2.554	1.323	mg/kg	0.000132 %	✓	
		028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc oxide }				190	mg/kg	1.245	218.758	mg/kg	0.0219 %	✓	
		030-013-00-7	215-222-5	1314-13-2								
11	pH				8.4	pH		8.4	pH	8.4 pH		
12	naphthalene				12	mg/kg		11.1	mg/kg	0.00111 %	✓	
		601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.53	mg/kg		0.49	mg/kg	0.000049 %	✓	
			205-917-1	208-96-8								
14	acenaphthene				8.8	mg/kg		8.14	mg/kg	0.000814 %	✓	
			201-469-6	83-32-9								
15	fluorene				5.5	mg/kg		5.088	mg/kg	0.000509 %	✓	
			201-695-5	86-73-7								
16	phenanthrene				39	mg/kg		36.075	mg/kg	0.00361 %	✓	
			201-581-5	85-01-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		6.7 mg/kg		6.198 mg/kg	0.00062 %	✓	
18	fluoranthene	205-912-4	206-44-0		42 mg/kg		38.85 mg/kg	0.00389 %	✓	
19	pyrene	204-927-3	129-00-0		34 mg/kg		31.45 mg/kg	0.00314 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		20 mg/kg		18.5 mg/kg	0.00185 %	✓	
21	chrysene	601-048-00-0	205-923-4		19 mg/kg		17.575 mg/kg	0.00176 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		22 mg/kg		20.35 mg/kg	0.00204 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		7.6 mg/kg		7.03 mg/kg	0.000703 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		19 mg/kg		17.575 mg/kg	0.00176 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		10 mg/kg		9.25 mg/kg	0.000925 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		2.2 mg/kg		2.035 mg/kg	0.000204 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		8.9 mg/kg		8.233 mg/kg	0.000823 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		60 mg/kg	1.785	99.078 mg/kg	0.00991 %	✓	
Total:								0.131 %		

Key

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

Classification of sample: WS103-17/09/2021-0.40

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

Sample details

Sample name:	LoW Code:
WS103-17/09/2021-0.40	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.40 m	
Moisture content:	
18%	
(wet weight correction)	

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
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				19	mg/kg	1.32	20.571	mg/kg	0.00206 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	boron { diboron trioxide; boric oxide }				1.2	mg/kg	3.22	3.168	mg/kg	0.000317 %	✓	
	005-008-00-8	215-125-8	1303-86-2									
3	cadmium { cadmium oxide }				1.4	mg/kg	1.142	1.311	mg/kg	0.000131 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				41	mg/kg	1.462	49.138	mg/kg	0.00491 %	✓	
		215-160-9	1308-38-9									
5	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
6	copper { dicopper oxide; copper (I) oxide }				220	mg/kg	1.126	203.11	mg/kg	0.0203 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead chromate }			1	430	mg/kg	1.56	549.991	mg/kg	0.0353 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
8	mercury { mercury dichloride }				0.25	mg/kg	1.353	0.277	mg/kg	0.0000277 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel chromate }				36	mg/kg	2.976	87.859	mg/kg	0.00879 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { nickel selenate }				0.66	mg/kg	2.554	1.382	mg/kg	0.000138 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
11	zinc { zinc oxide }				600	mg/kg	1.245	612.399	mg/kg	0.0612 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group		TPH		210	mg/kg		172.2	mg/kg	0.0172 %	✓	
13	confirm TPH has NOT arisen from diesel or petrol				☒							
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
15	benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
16	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
17	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %			<LOD
	601-023-00-4	202-849-4	100-41-4								
18	xylene				<0.002 mg/kg		<0.002 mg/kg	<0.0000002 %			<LOD
	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]								
19	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 }				0.8 mg/kg	1.884	1.236 mg/kg	0.000124 %	✓		
	006-007-00-5										
20	pH		PH		7.8 pH		7.8 pH	7.8 pH			
21	naphthalene				0.33 mg/kg		0.271 mg/kg	0.0000271 %	✓		
	601-052-00-2	202-049-5	91-20-3								
22	acenaphthylene				0.38 mg/kg		0.312 mg/kg	0.0000312 %	✓		
		205-917-1	208-96-8								
23	acenaphthene				0.14 mg/kg		0.115 mg/kg	0.0000115 %	✓		
		201-469-6	83-32-9								
24	fluorene				0.26 mg/kg		0.213 mg/kg	0.0000213 %	✓		
		201-695-5	86-73-7								
25	phenanthrene				3.8 mg/kg		3.116 mg/kg	0.000312 %	✓		
		201-581-5	85-01-8								
26	anthracene				0.67 mg/kg		0.549 mg/kg	0.0000549 %	✓		
		204-371-1	120-12-7								
27	fluoranthene				8.2 mg/kg		6.724 mg/kg	0.000672 %	✓		
		205-912-4	206-44-0								
28	pyrene				7.1 mg/kg		5.822 mg/kg	0.000582 %	✓		
		204-927-3	129-00-0								
29	benzo[a]anthracene				4 mg/kg		3.28 mg/kg	0.000328 %	✓		
	601-033-00-9	200-280-6	56-55-3								
30	chrysene				4.5 mg/kg		3.69 mg/kg	0.000369 %	✓		
	601-048-00-0	205-923-4	218-01-9								
31	benzo[b]fluoranthene				6.1 mg/kg		5.002 mg/kg	0.0005 %	✓		
	601-034-00-4	205-911-9	205-99-2								
32	benzo[k]fluoranthene				2.1 mg/kg		1.722 mg/kg	0.000172 %	✓		
	601-036-00-5	205-916-6	207-08-9								
33	benzo[a]pyrene; benzo[def]chrysene				5.1 mg/kg		4.182 mg/kg	0.000418 %	✓		
	601-032-00-3	200-028-5	50-32-8								
34	indeno[123-cd]pyrene				3.4 mg/kg		2.788 mg/kg	0.000279 %	✓		
		205-893-2	193-39-5								
35	dibenz[a,h]anthracene				0.65 mg/kg		0.533 mg/kg	0.0000533 %	✓		
	601-041-00-2	200-181-8	53-70-3								
36	benzo[ghi]perylene				2.9 mg/kg		2.378 mg/kg	0.000238 %	✓		
		205-883-8	191-24-2								
37	vanadium { divanadium pentaoxide; vanadium pentoxide }				38 mg/kg	1.785	55.626 mg/kg	0.00556 %	✓		
	023-001-00-8	215-239-8	1314-62-1								
38	monohydric phenols		P1186		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
Total:									0.16 %		

Key

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

TPH (C6 to C40) petroleum group: (conc.: 0.0172%)

Classification of sample: WS104-17/09/2021-0.50

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

Sample details

Sample name:	LoW Code:
WS104-17/09/2021-0.50	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.50 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
21%	
(wet weight correction)	

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
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				68	mg/kg	1.32	70.928	mg/kg	0.00709 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.68	mg/kg	1.142	0.614	mg/kg	0.0000614 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				49	mg/kg	1.462	56.577	mg/kg	0.00566 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
5	copper { dicopper oxide; copper (I) oxide }				200	mg/kg	1.126	177.89	mg/kg	0.0178 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	610	mg/kg	1.56	751.675	mg/kg	0.0482 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.45	mg/kg	1.353	0.481	mg/kg	0.0000481 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				55	mg/kg	2.976	129.319	mg/kg	0.0129 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { nickel selenate }				0.93	mg/kg	2.554	1.876	mg/kg	0.000188 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
10	zinc { zinc oxide }				280	mg/kg	1.245	275.331	mg/kg	0.0275 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				8.2	pH		8.2	pH	8.2 pH		
12	naphthalene				0.71	mg/kg		0.561	mg/kg	0.0000561 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.39	mg/kg		0.308	mg/kg	0.0000308 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				0.14	mg/kg		0.111	mg/kg	0.0000111 %	✓	
		201-469-6	83-32-9									
15	fluorene				0.25	mg/kg		0.198	mg/kg	0.0000198 %	✓	
		201-695-5	86-73-7									
16	phenanthrene				3.5	mg/kg		2.765	mg/kg	0.000276 %	✓	
		201-581-5	85-01-8									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		0.76 mg/kg		0.6 mg/kg	0.00006 %	✓	
18	fluoranthene	205-912-4	206-44-0		8.3 mg/kg		6.557 mg/kg	0.000656 %	✓	
19	pyrene	204-927-3	129-00-0		7.2 mg/kg		5.688 mg/kg	0.000569 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	4.5 mg/kg		3.555 mg/kg	0.000356 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	4.9 mg/kg		3.871 mg/kg	0.000387 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	6.8 mg/kg		5.372 mg/kg	0.000537 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	2.3 mg/kg		1.817 mg/kg	0.000182 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	6 mg/kg		4.74 mg/kg	0.000474 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		3.6 mg/kg		2.844 mg/kg	0.000284 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.76 mg/kg		0.6 mg/kg	0.00006 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		3.2 mg/kg		2.528 mg/kg	0.000253 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1	76 mg/kg	1.785	107.183 mg/kg	0.0107 %	✓	
Total:								0.135 %		

Key

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

Classification of sample: WS105-17/09/2021-0.30

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

Sample details

Sample name:	LoW Code:
WS105-17/09/2021-0.30	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
21%	
(wet weight correction)	

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
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				68	mg/kg	1.32	70.928	mg/kg	0.00709 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.98	mg/kg	1.142	0.884	mg/kg	0.0000884 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				43	mg/kg	1.462	49.649	mg/kg	0.00496 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
5	copper { dicopper oxide; copper (I) oxide }				350	mg/kg	1.126	311.308	mg/kg	0.0311 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	670	mg/kg	1.56	825.61	mg/kg	0.0529 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.77	mg/kg	1.353	0.823	mg/kg	0.0000823 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				84	mg/kg	2.976	197.505	mg/kg	0.0198 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { nickel selenate }				1.8	mg/kg	2.554	3.632	mg/kg	0.000363 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
10	zinc { zinc oxide }				420	mg/kg	1.245	412.996	mg/kg	0.0413 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				7.1	pH		7.1	pH	7.1 pH		
			PH									
12	naphthalene				0.73	mg/kg		0.577	mg/kg	0.0000577 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.49	mg/kg		0.387	mg/kg	0.0000387 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				0.32	mg/kg		0.253	mg/kg	0.0000253 %	✓	
		201-469-6	83-32-9									
15	fluorene				0.51	mg/kg		0.403	mg/kg	0.0000403 %	✓	
		201-695-5	86-73-7									
16	phenanthrene				7	mg/kg		5.53	mg/kg	0.000553 %	✓	
		201-581-5	85-01-8									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
17	●	anthracene				1.5	mg/kg		1.185	mg/kg	0.000119 %	✓	
			204-371-1	120-12-7									
18	●	fluoranthene				12	mg/kg		9.48	mg/kg	0.000948 %	✓	
			205-912-4	206-44-0									
19	●	pyrene				10	mg/kg		7.9	mg/kg	0.00079 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				5.8	mg/kg		4.582	mg/kg	0.000458 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				5.7	mg/kg		4.503	mg/kg	0.00045 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				8.5	mg/kg		6.715	mg/kg	0.000672 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				2.8	mg/kg		2.212	mg/kg	0.000221 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				7.2	mg/kg		5.688	mg/kg	0.000569 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25	●	indeno[123-cd]pyrene				5.4	mg/kg		4.266	mg/kg	0.000427 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				1.1	mg/kg		0.869	mg/kg	0.0000869 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27	●	benzo[ghi]perylene				4.6	mg/kg		3.634	mg/kg	0.000363 %	✓	
			205-883-8	191-24-2									
28	🚫	vanadium { divanadium pentaoxide; vanadium pentoxide }				89	mg/kg	1.785	125.516	mg/kg	0.0126 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
Total:											0.176 %		

Key

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

Classification of sample: WS105-17/09/2021-2.10

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

Sample details

Sample name:	LoW Code:
WS105-17/09/2021-2.10	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
2.10 m	
Moisture content:	
21%	
(wet weight correction)	

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
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				18	mg/kg	1.32	18.775	mg/kg	0.00188 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.18	mg/kg	1.142	0.162	mg/kg	0.0000162 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				52	mg/kg	1.462	60.041	mg/kg	0.006 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
5	copper { dicopper oxide; copper (I) oxide }				94	mg/kg	1.126	83.608	mg/kg	0.00836 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	59	mg/kg	1.56	72.703	mg/kg	0.00466 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				64	mg/kg	2.976	150.48	mg/kg	0.015 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { nickel selenate }				0.37	mg/kg	2.554	0.746	mg/kg	0.0000746 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
10	zinc { zinc oxide }				130	mg/kg	1.245	127.832	mg/kg	0.0128 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				7.4	pH		7.4	pH	7.4 pH		
			PH									
12	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		205-917-1	208-96-8									
14	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-469-6	83-32-9									
15	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7									
16	phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-581-5	85-01-8									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
17	anthracene	204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
18	fluoranthene	205-912-4	206-44-0		0.22 mg/kg		0.174 mg/kg	0.0000174 %	✓		
19	pyrene	204-927-3	129-00-0		0.19 mg/kg		0.15 mg/kg	0.000015 %	✓		
20	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.1 mg/kg		0.079 mg/kg	0.0000079 %	✓		
21	chrysene	601-048-00-0	205-923-4	218-01-9	0.1 mg/kg		0.079 mg/kg	0.0000079 %	✓		
22	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
23	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1	52 mg/kg	1.785	73.335 mg/kg	0.00733 %	✓		
Total:									0.0565 %		

Key

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

Classification of sample: TP101-17/09/2021-0.50

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

Sample details

Sample name:	LoW Code:
TP101-17/09/2021-0.50	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.50 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
16%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				44	mg/kg	1.32	48.799	mg/kg	0.00488 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				1.5	mg/kg	1.142	1.439	mg/kg	0.000144 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				45	mg/kg	1.462	55.247	mg/kg	0.00552 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
5	copper { dicopper oxide; copper (I) oxide }				330	mg/kg	1.126	312.096	mg/kg	0.0312 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	700	mg/kg	1.56	917.171	mg/kg	0.0588 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.46	mg/kg	1.353	0.523	mg/kg	0.0000523 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				78	mg/kg	2.976	195.005	mg/kg	0.0195 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { nickel selenate }				0.87	mg/kg	2.554	1.866	mg/kg	0.000187 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
10	zinc { zinc oxide }				630	mg/kg	1.245	658.703	mg/kg	0.0659 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				7.8	pH		7.8	pH	7.8 pH		
12	naphthalene				0.56	mg/kg		0.47	mg/kg	0.000047 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.69	mg/kg		0.58	mg/kg	0.000058 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				0.27	mg/kg		0.227	mg/kg	0.0000227 %	✓	
		201-469-6	83-32-9									
15	fluorene				0.28	mg/kg		0.235	mg/kg	0.0000235 %	✓	
		201-695-5	86-73-7									
16	phenanthrene				5.5	mg/kg		4.62	mg/kg	0.000462 %	✓	
		201-581-5	85-01-8									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
17	●	anthracene				1.3	mg/kg		1.092	mg/kg	0.000109 %	✓	
			204-371-1	120-12-7									
18	●	fluoranthene				13	mg/kg		10.92	mg/kg	0.00109 %	✓	
			205-912-4	206-44-0									
19	●	pyrene				11	mg/kg		9.24	mg/kg	0.000924 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				5.9	mg/kg		4.956	mg/kg	0.000496 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				7	mg/kg		5.88	mg/kg	0.000588 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				12	mg/kg		10.08	mg/kg	0.00101 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				3.6	mg/kg		3.024	mg/kg	0.000302 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				9.3	mg/kg		7.812	mg/kg	0.000781 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25	●	indeno[123-cd]pyrene				7.1	mg/kg		5.964	mg/kg	0.000596 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				1.2	mg/kg		1.008	mg/kg	0.000101 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27	●	benzo[ghi]perylene				6.2	mg/kg		5.208	mg/kg	0.000521 %	✓	
			205-883-8	191-24-2									
28	🧪	vanadium { divanadium pentaoxide; vanadium pentoxide }				87	mg/kg	1.785	130.461	mg/kg	0.013 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
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 Determinand - 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: TP101-17/09/2021-1.30

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

Sample details

Sample name:	LoW Code:
TP101-17/09/2021-1.30	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.30 m	
Moisture content:	
33%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 33% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				23	mg/kg	1.32	20.346	mg/kg	0.00203 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	boron { diboron trioxide; boric oxide }				2.5	mg/kg	3.22	5.393	mg/kg	0.000539 %	✓	
	005-008-00-8	215-125-8	1303-86-2									
3	cadmium { cadmium oxide }				1	mg/kg	1.142	0.765	mg/kg	0.0000765 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				29	mg/kg	1.462	28.398	mg/kg	0.00284 %	✓	
		215-160-9	1308-38-9									
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
6	copper { dicopper oxide; copper (I) oxide }				120	mg/kg	1.126	90.521	mg/kg	0.00905 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead chromate }			1	310	mg/kg	1.56	323.974	mg/kg	0.0208 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
8	mercury { mercury dichloride }				0.49	mg/kg	1.353	0.444	mg/kg	0.0000444 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel chromate }				38	mg/kg	2.976	75.776	mg/kg	0.00758 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { nickel selenate }				0.6	mg/kg	2.554	1.027	mg/kg	0.000103 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
11	zinc { zinc oxide }				340	mg/kg	1.245	283.546	mg/kg	0.0284 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group				160	mg/kg		107.2	mg/kg	0.0107 %	✓	
			TPH									
13	confirm TPH has NOT arisen from diesel or petrol				☑							
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
15	benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
16	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
17	ethylbenzene 601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
18	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
19	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				14	mg/kg	1.884	17.672	mg/kg	0.00177 %	✓	
20	pH		PH		7.5	pH		7.5	pH	7.5 pH		
21	naphthalene 601-052-00-2	202-049-5	91-20-3		0.76	mg/kg		0.509	mg/kg	0.0000509 %	✓	
22	acenaphthylene 205-917-1	208-96-8			1.1	mg/kg		0.737	mg/kg	0.0000737 %	✓	
23	acenaphthene 201-469-6	83-32-9			0.34	mg/kg		0.228	mg/kg	0.0000228 %	✓	
24	fluorene 201-695-5	86-73-7			0.95	mg/kg		0.637	mg/kg	0.0000637 %	✓	
25	phenanthrene 201-581-5	85-01-8			15	mg/kg		10.05	mg/kg	0.00101 %	✓	
26	anthracene 204-371-1	120-12-7			2	mg/kg		1.34	mg/kg	0.000134 %	✓	
27	fluoranthene 205-912-4	206-44-0			27	mg/kg		18.09	mg/kg	0.00181 %	✓	
28	pyrene 204-927-3	129-00-0			22	mg/kg		14.74	mg/kg	0.00147 %	✓	
29	benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		8.3	mg/kg		5.561	mg/kg	0.000556 %	✓	
30	chrysene 601-048-00-0	205-923-4	218-01-9		12	mg/kg		8.04	mg/kg	0.000804 %	✓	
31	benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		15	mg/kg		10.05	mg/kg	0.00101 %	✓	
32	benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		5	mg/kg		3.35	mg/kg	0.000335 %	✓	
33	benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		12	mg/kg		8.04	mg/kg	0.000804 %	✓	
34	indeno[123-cd]pyrene 205-893-2	193-39-5			7.3	mg/kg		4.891	mg/kg	0.000489 %	✓	
35	dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		1.3	mg/kg		0.871	mg/kg	0.0000871 %	✓	
36	benzo[ghi]perylene 205-883-8	191-24-2			6.1	mg/kg		4.087	mg/kg	0.000409 %	✓	
37	vanadium { divanadium pentaoxide; vanadium pentoxide } 023-001-00-8	215-239-8	1314-62-1		38	mg/kg	1.785	45.451	mg/kg	0.00455 %	✓	
38	monohydric phenols P1186				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
Total:										0.0977 %		

Key

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

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

Classification of sample: TP102-17/09/2021-0.40

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

Sample details

Sample name:	LoW Code:
TP102-17/09/2021-0.40	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.40 m	
Moisture content:	
12%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				17	mg/kg	1.32	19.752	mg/kg	0.00198 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.57	mg/kg	1.142	0.573	mg/kg	0.0000573 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				33	mg/kg	1.462	42.444	mg/kg	0.00424 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
		024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				88	mg/kg	1.126	87.189	mg/kg	0.00872 %	✓	
		029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	280	mg/kg	1.56	384.338	mg/kg	0.0246 %	✓	
		082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				0.23	mg/kg	1.353	0.274	mg/kg	0.0000274 %	✓	
		080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				36	mg/kg	2.976	94.288	mg/kg	0.00943 %	✓	
		028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				0.41	mg/kg	2.554	0.921	mg/kg	0.0000921 %	✓	
		028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc oxide }				180	mg/kg	1.245	197.163	mg/kg	0.0197 %	✓	
		030-013-00-7	215-222-5	1314-13-2								
11	pH				8.1	pH		8.1	pH	8.1 pH		
12	naphthalene				0.34	mg/kg		0.299	mg/kg	0.0000299 %	✓	
		601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.24	mg/kg		0.211	mg/kg	0.0000211 %	✓	
			205-917-1	208-96-8								
14	acenaphthene				0.78	mg/kg		0.686	mg/kg	0.0000686 %	✓	
			201-469-6	83-32-9								
15	fluorene				0.73	mg/kg		0.642	mg/kg	0.0000642 %	✓	
			201-695-5	86-73-7								
16	phenanthrene				9.7	mg/kg		8.536	mg/kg	0.000854 %	✓	
			201-581-5	85-01-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		2 mg/kg		1.76 mg/kg	0.000176 %	✓	
18	fluoranthene	205-912-4	206-44-0		20 mg/kg		17.6 mg/kg	0.00176 %	✓	
19	pyrene	204-927-3	129-00-0		16 mg/kg		14.08 mg/kg	0.00141 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		10 mg/kg		8.8 mg/kg	0.00088 %	✓	
21	chrysene	601-048-00-0	205-923-4		9.7 mg/kg		8.536 mg/kg	0.000854 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		14 mg/kg		12.32 mg/kg	0.00123 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		4.7 mg/kg		4.136 mg/kg	0.000414 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		11 mg/kg		9.68 mg/kg	0.000968 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		6.6 mg/kg		5.808 mg/kg	0.000581 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		1.6 mg/kg		1.408 mg/kg	0.000141 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		5.8 mg/kg		5.104 mg/kg	0.00051 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		41 mg/kg	1.785	64.409 mg/kg	0.00644 %	✓	
Total:								0.0854 %		

Key

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

Classification of sample: TP103-17/09/2021-0.30

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

Sample details

Sample name:	LoW Code:
TP103-17/09/2021-0.30	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.30 m	
Moisture content:	
48%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 48% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				36	mg/kg	1.32	24.716	mg/kg	0.00247 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.82	mg/kg	1.142	0.487	mg/kg	0.0000487 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				42	mg/kg	1.462	31.92	mg/kg	0.00319 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
		024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				230	mg/kg	1.126	134.656	mg/kg	0.0135 %	✓	
		029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	720	mg/kg	1.56	583.995	mg/kg	0.0374 %	✓	
		082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				0.46	mg/kg	1.353	0.324	mg/kg	0.0000324 %	✓	
		080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				37	mg/kg	2.976	57.263	mg/kg	0.00573 %	✓	
		028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				0.76	mg/kg	2.554	1.009	mg/kg	0.000101 %	✓	
		028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc oxide }				310	mg/kg	1.245	200.648	mg/kg	0.0201 %	✓	
		030-013-00-7	215-222-5	1314-13-2								
11	pH				7.2	pH		7.2	pH	7.2 pH		
12	naphthalene				1.7	mg/kg		0.884	mg/kg	0.0000884 %	✓	
		601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				2.1	mg/kg		1.092	mg/kg	0.000109 %	✓	
			205-917-1	208-96-8								
14	acenaphthene				2.4	mg/kg		1.248	mg/kg	0.000125 %	✓	
			201-469-6	83-32-9								
15	fluorene				1.9	mg/kg		0.988	mg/kg	0.0000988 %	✓	
			201-695-5	86-73-7								
16	phenanthrene				39	mg/kg		20.28	mg/kg	0.00203 %	✓	
			201-581-5	85-01-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		8 mg/kg		4.16 mg/kg	0.000416 %	✓	
18	fluoranthene	205-912-4	206-44-0		70 mg/kg		36.4 mg/kg	0.00364 %	✓	
19	pyrene	204-927-3	129-00-0		58 mg/kg		30.16 mg/kg	0.00302 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		28 mg/kg		14.56 mg/kg	0.00146 %	✓	
21	chrysene	601-048-00-0	205-923-4		31 mg/kg		16.12 mg/kg	0.00161 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		39 mg/kg		20.28 mg/kg	0.00203 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		13 mg/kg		6.76 mg/kg	0.000676 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		32 mg/kg		16.64 mg/kg	0.00166 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		20 mg/kg		10.4 mg/kg	0.00104 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		4 mg/kg		2.08 mg/kg	0.000208 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		18 mg/kg		9.36 mg/kg	0.000936 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		40 mg/kg	1.785	37.132 mg/kg	0.00371 %	✓	
Total:								0.106 %		

Key

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

Classification of sample: TP103-17/09/2021-1.20



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

Sample details

Sample name:	LoW Code:
TP103-17/09/2021-1.20	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.20 m	
Moisture content:	
14%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	pH		PH		7.4 pH		7.4	pH	7.4 pH		
Total:									0%		

Key

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

Classification of sample: TP104-07/09/2021-0.60

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

Sample details

Sample name:	LoW Code:
TP104-07/09/2021-0.60	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.60 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
12%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				24	mg/kg	1.32	27.885	mg/kg	0.00279 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				0.67	mg/kg	1.142	0.674	mg/kg	0.0000674 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				240	mg/kg	1.462	308.681	mg/kg	0.0309 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
	024-017-00-8											
5	copper { dicopper oxide; copper (I) oxide }				100	mg/kg	1.126	99.078	mg/kg	0.00991 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	580	mg/kg	1.56	796.13	mg/kg	0.051 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.2	mg/kg	1.353	0.238	mg/kg	0.0000238 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				37	mg/kg	2.976	96.907	mg/kg	0.00969 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { nickel selenate }				0.4	mg/kg	2.554	0.899	mg/kg	0.0000899 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
10	zinc { zinc oxide }				200	mg/kg	1.245	219.07	mg/kg	0.0219 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				8	pH		8	pH	8pH		
			PH									
12	naphthalene				0.49	mg/kg		0.431	mg/kg	0.0000431 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.38	mg/kg		0.334	mg/kg	0.0000334 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				0.19	mg/kg		0.167	mg/kg	0.0000167 %	✓	
		201-469-6	83-32-9									
15	fluorene				0.18	mg/kg		0.158	mg/kg	0.0000158 %	✓	
		201-695-5	86-73-7									
16	phenanthrene				3.4	mg/kg		2.992	mg/kg	0.000299 %	✓	
		201-581-5	85-01-8									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
17	anthracene	204-371-1	120-12-7		0.9 mg/kg		0.792 mg/kg	0.0000792 %	✓	
18	fluoranthene	205-912-4	206-44-0		7.5 mg/kg		6.6 mg/kg	0.00066 %	✓	
19	pyrene	204-927-3	129-00-0		7 mg/kg		6.16 mg/kg	0.000616 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	2.8 mg/kg		2.464 mg/kg	0.000246 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	2.9 mg/kg		2.552 mg/kg	0.000255 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	3.7 mg/kg		3.256 mg/kg	0.000326 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	1.3 mg/kg		1.144 mg/kg	0.000114 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	3 mg/kg		2.64 mg/kg	0.000264 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		2.1 mg/kg		1.848 mg/kg	0.000185 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.49 mg/kg		0.431 mg/kg	0.0000431 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		1.8 mg/kg		1.584 mg/kg	0.000158 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1	43 mg/kg	1.785	67.551 mg/kg	0.00676 %	✓	
Total:								0.137 %		

Key

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

Appendix A: Classifier defined and non CLP determinands

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

Description/Comments: Data from C&L Inventory Database

Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>

Data source date: 17 Jul 2015

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

• **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

• **confirm TPH has NOT arisen from diesel or petrol**

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

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

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - 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**

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

• **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: Acute Tox. 3 H301 , Acute Tox. 3 H311 , Acute Tox. 3 H331 , Skin Corr. 1B H314 , Skin Corr. 1B H314 >= 3 % , Skin Irrit. 2 H315 1 E conc. < 3 % , Eye Irrit. 2 H319 1 E conc. < 3 % , Muta. 2 H341 , STOT RE 2 H373 , 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 chromate}

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

mercury {mercury dichloride}

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

nickel {nickel chromate}

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

selenium {nickel selenate}

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

zinc {zinc oxide}

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

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 v1.1, May 2018

HazWasteOnline Classification Engine Version: 2021.246.4869.9247 (05 Sep 2021)

HazWasteOnline Database: 2021.246.4869.9247 (05 Sep 2021)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

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

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

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

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

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

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

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

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

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

Revised List of 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 2019 - UK: 2019 No. 720 of 27th March 2019

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

POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Appendix J

Environmental Cover System Construction

Shared Landscaping

SHARED LANDSCAPING:

Either (physical break layer) or (geotextile membrane)

GROUND LEVEL

↑ 0.3m (min) ↓		GROUND LEVEL
	150mm (minimum) chemically validated TOPSOIL	
	50mm chemically validated SUBSOIL	
	100mm (minimum) PHYSICAL BREAK LAYER	
	Existing MADE GROUND	

↑ 0.3m (min) ↓		GROUND LEVEL
	150mm (minimum) chemically validated TOPSOIL	
	150mm chemically validated SUBSOIL	
	GEOTEXTILE MEMBRANE (at base of subsoil)	
	Existing MADE GROUND	

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