

TACK LEA WORKS BURY

ADDITIONAL SITE INVESTIGATION, RISK ASSESSMENT & REMEDIATION STRATEGY REPORT

Job Number: LKC 20 1043

Date: August 2022

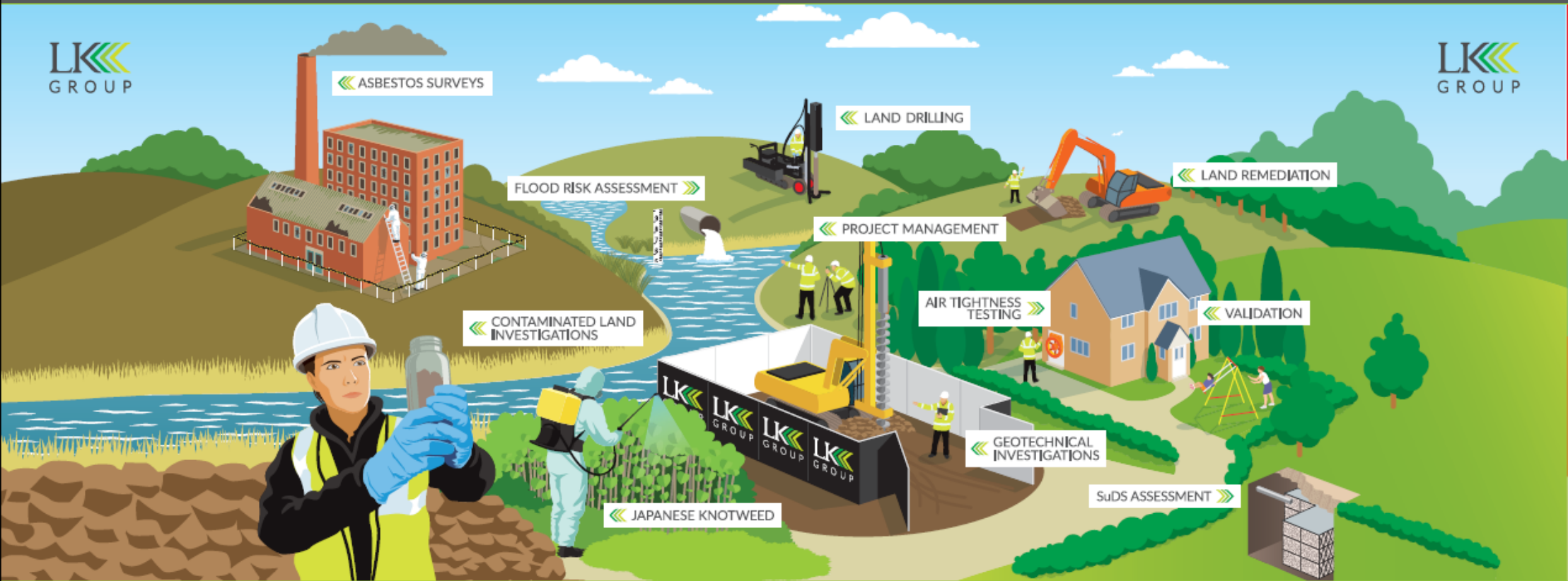
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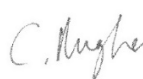
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Document Verification			
Site Address	Tack Lea Works, Bury and Rochdale Old Road, Bury, BL9 7UA		
Report Title	Additional Site Investigation, Risk Assessment and Remediation Strategy Report		
Job Number	LKC 20 1043	Document Ref.	CL-602-LKC 20 1043-02
Date Issued	May 2020	Report Version	R0
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Revision Record			
Revision No.	Date	Nature of Revision	Approved By
R1	18/08/2022	Reassigned report from Ainsworth Projects Ltd to Hall & Co Developments Ltd	C Baranek

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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned to carry out further geo-environmental investigation at Tack Lea Works, Bury.

The following work has previously been undertaken:

- Phase 1 Preliminary Risk Assessment (PRA) and Interpretive Ground Investigation Report, undertaken by LKC (Ref: 16 1018, dated 4th October 2016).

The investigation was undertaken to provide further detailed information on the ground conditions at the site, in order to allow a geotechnical and contamination assessment as recommended in the above report.

The further works was carried out following on from the demolition of the existing building on site allowing an assessment to be carried out in the area which was previously inaccessible.

1.2 Site Details

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

Location	The site is located at the former Tack Lea Works, off Bury & Rochdale Old Road, Bury and is centred at approximate National Grid Reference 383920E 412060N.
Area	1.02ha.
Topography	130-140 metres above ordnance datum (AOD). Site is approximately level. However, the site boundaries are elevated above the site in the southwest of the site and along the northern boundary.
Land Use	<u>Site</u> The site currently comprises a vacant site following demolition of the former Tack Lea Works buildings. <u>Surrounding Area</u> North: Farm land associated with Lower Tack Lea Farm. East: Residential properties. South: Bury and Rochdale Old Road, and Woodland beyond. West: Woodland.
Proposed Development	Residential properties with gardens.

Table 1-1. Summary of site details.

2 Previous Work

2.1 Summary of Existing Information

A PRA report (Ref: CL-602-LKC 16 1018-02, dated 4th October 2016) has previously been undertaken by LKC 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).

2.2 Site History

The site history is summarised in Table 2-1.

Site Features	Location	Map Dates Present	Comments
Tack Lea Bleach Works / Works	Centre	1894 - present	- Extended to north, east and west by 1910 mapping. Extended eastwards prior to 1930 mapping. Denoted as works from 1963 mapping. - Works extended westwards prior to 1992 mapping onto area of former reservoir. - Anecdotally the Works on site have been related to textile processing and more recently plastic and rubber product manufacture.
Reservoir	NW	1894 -1963	- Extended to north and south by 1910 mapping. No longer present by 1992 mapping.
Reservoir	N	1894 - present	- Extended to north, west and south by 1910 mapping.
Tack Lee Brook	S	1894 - present	- Culverted under the site from 1910 mapping.
Filter Beds	S	1910 - 1911	- No longer present by 1930 mapping.
Cutting / Embankment	Centre	1910 - 1963	- Infilled prior to 1992 mapping.
Tanks	SE	1910 - 1930	- No longer denoted by 1937 mapping.
Unreferenced Building	E	1910 only	- No longer present by 1911 mapping.
Chimney	N	1930 - 1963	- No longer present by 1992 mapping.
Chimney	N	1930 - 1963	- No longer present by 1992 mapping.
Sinks	SW	1963	- Tack Lee Brook sinks in the SW of site.
Surrounding Area Features	Distance/ Location	Map Dates Present	Comments
Reservoir	7m NW	1894 - 1984	- No longer present by 1999 mapping.
Reservoir	17m W	1894 - present	
Pond	94m W	1910	- No longer present by 1930 mapping. Pond is not denoted as marshland until 1963 mapping.
Pond	233m NW	1894	- No longer present by 1910 mapping.
Pond	128m S	1851 - 1984	- No longer present by 1999 mapping.
Pond	222m S	1894	- No longer present by 1910 mapping.
Pump	200m S	1894	- No longer present by 1910 mapping.
Well	232m S	1851	- No longer present by 1894 mapping.
Spring	75m SE	1910	- No longer present by 1930 mapping.
Cutting	16m SE	1930 - 1984	- No longer present by 1999 mapping.
Reservoir	233m NW	1894	- No longer present by 1910 mapping.
Reservoir	232m NW	1894	- No longer present by 1910 mapping.

Table 2-1: Summary of significant historical features.

2.3 Additional Historical Information

Based on information available in the public domain, a fire is known to have occurred at the Works onsite in April 2006. At the time of the fire, the Works on site was producing plastic products for the highways industry. It was reported in the local media at the time of the fire that the fire started in the yard of the Works and spread to some of the nearby buildings despite the efforts of firefighters.

It is also understood that the site has been vacant and derelict since 2007 when the plastic product manufacturing company previously occupying the site moved to new premises.

A previous Desk Study Assessment was undertaken by Brownfield Solutions Limited (reference AJH/C1194/485 Rev A dated April 2007) and contains a description of the site and processes at the time of operation. These are summarised below and a plan showing pertinent features of the former Works is presented in Figure 4.

- The main concrete yard in the south of the site contained racking for products awaiting dispatch, a container for inks and thinners, a bunded diesel tank and storage for hydraulic oils, inks and thinners.
- The main building consists of a single storey building with a boiler room, a chimney to the rear and a small cellar.
- The internal floors of the buildings were observed to be predominately concrete and were locally in a poor state of repair.
- Internally there was evidence of old fuel tanks close to the boiler house chimney.
- To the north of the main building is an area which anecdotally contained a tank, but no information was available on the contents of the tank. Storage of unknown liquids in IBCs were also noted in this area.
- Processes on site involved raw materials (plastics and rubber) heated and then shaped in hydraulic presses and spraying of moulded products. Inks and thinners were used in these processes and in several locations of the former Works.

2.4 Environmental Setting

The environmental setting is summarised in Table 2-2.

Categories (data sources)			Details
Geology	Artificial		- None recorded on site.
	Superficial ¹		- Devensian Till
	Bedrock		- Pennine Lower Coal Measures Formation. - Strata dipping to the south. - 1 fault within 500m located 450m east and striking north-south.
	BGS logs		- BH Ref: SD81SW229, 12m SE: made ground to 1.4m, silty clayey sand to 3.5m, clayey sandy cobbles to >4.5mbgl. - BH Ref: SD81SW185, 112m N: topsoil to 0.15m, made ground (backfill) to 0.76m, grey shale (PLCMF) to >60.96mbgl. - BH Ref: SD81SW230, 112m E: made ground to 1.5m, silty clay to 2.0m, sandy silty clay to 5.2m, sand to 5.3m, sandy silty clay to >6.0mbgl.
Hydro-geology	Aquifer Designation	Superficial	- Secondary Undifferentiated.
		Bedrock	- Secondary A.
	Source Protection Zone (SPZ)		- Site is not within an SPZ.
	Groundwater Abstractions		- 6 within 500m. Nearest 112m N at Lower Tack Lea Farm. Groundwater abstraction is utilised for general agricultural use.
Hydrology	Nearest Surface Water		- Tack Lee Brook culverted under the south of the site. - River Roch 600m south, flowing southwest.
	Water Quality Data		- 642m S, River Roch – River Quality C.
	Flooding		- No risk from rivers or sea.
	Surface Water Abstractions		- 3 within 500m: Nearest 59m W at Melba Products Limited. Water is abstracted from four reservoirs fed by spring and surface drainage and utilised for boiler feed and manufacturing.
	Discharge Consent		- 3 within 500m: Nearest 453m NW operated by R A Johnson for release of Sewage discharges (final/treated effluent) to a tributary of the Tack Lee Brook.
	Pollution Incidents		- 3 within 500m: Nearest 404m NW and involved the release of an unknown pollutant to the Tack Lee Brook in October 1995. The incident was recorded as incident severity Category 3 – Minor Incident.
Minerals / Mining	Coal Mining Development High Risk Area		- Not identified on site.
	Coal Report		- Not within a surface area that could be affected by past or present underground mining. - No shafts present within 20m of the site. - No record of mine gas emission.
	Surface Extractions		- 1 within 500m; Nearest 456m SW at Smethurst Wood which involved opencast mining of sandstone. Works have now ceased.
	Cheshire Brine Compensation District		- Not within site area.

Table 2-2: Summary of the environmental setting.

Categories (data sources)		Details
Ground Stability (on-site)	Collapsible Ground	- Very low hazard.
	Compressible Ground	- No hazard.
	Landslide	- Very low hazard.
	Running Sand	- Very low hazard.
	Shrinking / Swelling Clay	- Very low hazard.
	Ground Dissolution	- No hazard.
Landfill sites	Known/Registered	- 1 onsite: 'Bury and Rochdale Old Road' historical landfill registered to Tack Lea Works Limited. Waste stream included inert and industrial waste. Operational between December 1971 and December 1980. - 2 within 250m: - 17m S – 'Lower Elbut Farm'. Waste type not supplied. - 238m S – 'Lower Elbut Farm'. Waste type not supplied.
	Potential	- 1 onsite: Former reservoir in NW of the site potentially infilled by 1992 mapping. - 10 within 250m: - 3 reservoirs located between 7mNW and 232m NW potentially infilled prior to 1999 and 1894 mapping, respectively. - 4 ponds located 94m W and 233m NW potentially infilled between 1910 and 1984 mapping. - Cutting located 16m SE potentially infilled by 1999 mapping. - Well located 232m S potentially infilled by 1894 mapping. - Spring located 75m SE potentially infilled by 1930 mapping.
Radon		- Probability of between 1% and 3% of homes above Action Level. No further action required.
Designated Sites		- Adopted Green Belt onsite. - Area of ancient woodland 66m SE.
Contemporary Trade Directory		- 1 within 100m located on site – Melba Products Ltd (Rubber and Plastic Products – Manufacturers) –entry inactive. .
Fuel Station Entries		- None within 100m.

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

2.5 Site Reconnaissance

A site reconnaissance was carried out on 19th January 2016. Hand dug trial holes were not undertaken as accessible areas were hardstood.

Relevant features identified on site are summarised below:

- A concrete yard area is present in the south of the site and was noted to be in poor condition.
- An open manhole covered by plywood was noted in the centre of the concrete yard.
- An electrical substation was observed on the eastern site boundary.
- The main former Works building is of stone construction with more recent extensions constructed of brick and corrugated metal.
- Only small sections of the former buildings were safely accessible due to damage from the fire and subsequent degradation of the building.
- Potential asbestos containing material including pipe lagging and cement bound tiles was noted to be present within the former buildings. This was noted to be in a poor condition.
- The former hydraulic press and production area was accessible and sumps in the concrete floor were noted to contain significant quantities of hydraulic oil. An overturned plastic fuel tank was also present in this area.
- Tack Lee Brook is culverted below the site and is present in an open section adjacent to the west of the site.
- Land to the rear (north) of the building slopes upwards to the former Works reservoirs and is heavily vegetated.
- Evidence of sheet piling was noted on the sloping ground to the north suggesting that ground is being retained.
- Three reservoirs, the central and eastern ones being significantly silted up, were present on the raised ground to the north with the central reservoir being within the current planning boundary.
- Land immediately to the north of the main former Works building was waterlogged indicating that water was draining from the sloped ground to the north to this area.
- A retaining wall was present in an area to the north east of the main former Works building and evidence of a former tank (concrete tank base) was also noted.
- Himalayan Balsam was noted in several areas of the site.

The surrounding area comprises predominately farmland and woodland with Bury and Rochdale Old Road adjacent to the south and a row of terraced residential properties to the east of the site entrance.

2.6 Contamination Sources / Pathways and Receptors

Potential contamination sources are detailed in Table 2-3.

Source	- Contaminants
Onsite Rubber / Plastic Product Works	- Typical contaminants associated with rubber/plastic manufacturing include solvents (BTEX and chlorinated solvents), PAHs (anthracene, phenanthrene, benzo(a)pyrene), phenols, amines, petroleum hydrocarbons, sodium hydroxide, zinc and iron compounds, rubber crumb, and sulphate¹. - Inks and thinners: solvents, amines, alcohols and BTEX compounds - Asbestos Containing Materials (ACM).
Onsite Current Electricity Sub Station and Old Transformer	- Polychlorinated biphenyl (PCBs) and transistor oils.
Onsite Fire Damage to Previous Buildings	- Firewater contamination is related to heavy metals, oil/fuel hydrocarbons, PAHs and fire retardants such as Perfluorooctane Sulfonate (PFOS)

¹ DoE (1995). "Industry Profile: Chemical works – Rubber Processing Works."

Onsite Bleach Works	- Typical contaminants associated with a bleach works include bleaching agents and dyes such as acids and alkalis, chlorine, and caustic soda. - Other ancillary activities could include coal fired boilers producing large quantities of boiler ash (heavy metals, sulphates and PAHs²).
Onsite Textile Works	- Potential contaminants associated with this land use include metals, other inorganic compounds (e.g. cyanides, sodium compounds, sulphide compounds, chloride compounds, mineral acids, alkalis), chlorinated organic solvents, sizing agents, other organic compounds (e.g. formaldehydes, polyvinyl chloride), water repellents (organo silicon, oxazoline), fire/flame retardants (e.g. borax, ammonium phosphate, brominated organic compounds with metals oxides), soaps and detergents³.
Onsite Made Ground (historic landfill, potentially infilled reservoir, general made ground)	- Ash and clinker (e.g. from hearths and boilers, often historically used for site raising / levelling): Heavy metals, sulphates and PAHs. - Other unknown inorganic / organic contaminants (dependant on fill material source). - If significant depth of organic / putrescible material: Hazardous gas (principally carbon dioxide and methane).
Onsite Former Buildings	- Asbestos Containing Materials (ACM).
Offsite Potentially Infilled Ground within 250m of site	- Hazardous gas (principally carbon dioxide and methane).
Surrounding Area	- Not expected to be as significant as sources identified on site.

Table 2-3: Potential contamination sources

Potential receptors are detailed in Table 2-4.

Receptors	
Human Health	- Future site users (including residents, visitors and site workers). - Offsite land users.
Controlled Waters	- Secondary A Aquifer. - Tack Lea Brook onsite.
Buildings and structures.	
Potable water pipes.	
Flora within future gardens/landscaping.	

Table 2-4: Potential receptors

Potential pathways are detailed in Table 2-5.

Pathways		
Soil	Human Health ⁴ (residential land use: houses with private gardens)	- Ingestion of soil. - Ingestion of soil-derived indoor dust. - Ingestion of contaminated vegetables. - Ingestion of soil attached to vegetables - 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.
		- Windblown dust / fibres to adjacent receptors.
		- Direct contact with receptors (building foundations, services).
		- Root uptake.

² Defra (2002). "Potential Contaminants for the Assessment of Land." R&D Publication CLR 8.

³ Department of the Environment. Industry Profile. Textile Works and Dye Works. 1995

⁴ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

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. - Bedrock (mudstone, siltstone, sandstone) likely to be variably permeable. - Preferential pathways: services.
Gas	- Migration through potentially permeable strata and preferential pathways. - Superficial (Till) likely to be low permeability. - Bedrock (mudstone, siltstone, sandstone) likely to be variably permeable. - Preferential pathways: services.
	- Migration into buildings (e.g. via services) and accumulation of gases in confined spaces (potentially causing explosion if methane is present).

Table 2-5: Potential pathways

2.7 LKC Preliminary Contamination Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in CLR11⁵ has been summarised in Table 2-6.

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

The preliminary contamination conceptual model has identified 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 C552⁶.

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.

⁵ EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.

⁶ CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.

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 guidance⁷) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

2.8 Recommendations

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

⁷ 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
PL1	- Dermal contact. - Inhalation of soil, fibres and dust. - Ingestion of soils, dust, vegetables, soil attached to vegetables. - Windblown dust.	- Future residents. - Site users. - Offsite receptors.	- ACM (former buildings, potentially in made ground).	Likely	Severe	High	- Likely probability from ACM due to age of former buildings and condition of ACM observed during the site reconnaissance.
			- Heavy metals and PAHs (ash made ground).	Likely	Medium	Moderate	- Likely probability of heavy metals and PAHs given identified ashy made ground on site and extensive industrial land use.
			- Hydrocarbons (fuel tanks).	Likely	Medium	Moderate	- Likely probability of hydrocarbons due to the presence of tanks at the site and significant contamination sources from historic industrial land use.
PL2	- Inhalation of vapours. - Migration through permeable strata and preferential pathways.	- Future residents. - Site users.	- Volatile Contaminants (made ground, fuels & solvents from onsite Works).	Likely	Medium	Moderate	- Contamination could come into contact with receptors in future soft landscaping / gardens. - Recommendation: Intrusive investigation required.
PL3	- Inhalation of gas. - Migration through permeable strata and preferential pathways. - Explosion in confined spaces.	- Future residents. - Buildings. - Offsite land users.	- Methane, carbon dioxide. (infilling onsite, landfill on site and potentially infilled features within 250m of the site).	Likely	Severe	High	- Likely probability as rubber/plastic works, bleach works and textile works formerly present at the site which likely utilised solvents, fuels and other volatiles in the manufacturing processes. - Recommendation: Intrusive investigation required.
PL4	- Surface Run-off. - Migration through permeable strata and preferential pathways - Perched waters migration.	- Groundwater (Secondary A Aquifer). - Surface water (Tack Lee Brook)	- Mobile contaminants (made ground, solvents, fuels, oils, bleaching agents and dyes from onsite Works)	Likely	Medium	Moderate	- Likely probability due to viable sources of gas identified and sensitive nature of development (residential). - Recommendation: Gas monitoring required.
PL5	- Sulphate attack on concrete.	- Building structure.	- Sulphate (made ground).	Likely	Mild	Moderate / Low	- Likely probability as contamination source from historic bleach works, rubber/plastic manufacturing works and textile works at the site. - Tack Lee Brook is culverted below the site and is therefore likely to be impacted from historical industrial land uses onsite. - Recommendation: Intrusive investigation required including both groundwater and surface water sampling.
PL6	- Ingestion of tainted water supply.	- Future site users.	- Organic Contaminants (made ground, tanks).	Likely	Medium	Moderate / Low	- Likely probability of elevated sulphate in made ground due to extensive former industrial land use onsite which may be in contact with concrete used in future buildings. - Moderate risk assumed at this stage. - Recommendation: Intrusive investigation required.
PL7	- Direct Contact (plant uptake).	- Flora.	- Phytotoxic Contaminants (made ground).	Likely	Minor	Low	- Likely probability as significant contamination and made ground anticipated at pipeline depth (0.75-1.35m). - Risk is considered moderate at this stage due to unknown depth of made ground. - Recommendation: Sampling required if made ground present at pipeline installation depths.
							- Likely 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. Preliminary Contamination Conceptual Model.

3 Previous Ground Investigation

In order to assess the ground conditions at the site and to investigate the potential pollutant linkages identified in the preliminary contamination conceptual model LKC undertook an intrusive investigation (Phase 1 Preliminary Risk Assessment (PRA) and Interpretive Ground Investigation Report, undertaken by LKC Ref: 16 1018, dated 4th October 2016).

The investigation was carried out on 15th July 2016 and comprised the following:

- 6no. window sample boreholes drilled to 2.45 and 5.44 metres below ground level (mbgl) (ref. WS101 to WS105).
- 6no. trial pits (using JCB 3CX) excavated to 2.6-3.5mbgl (ref. TP101 to TP106).

The site investigation was undertaken in accessible areas outside of the former Works building and within buildings that were deemed safe to enter for investigation staff and plant. Additional investigation was recommended following demolition of the buildings and chimney on site.

The previous investigation locations are shown on Figure 5. Table 3-1 details the targeted and general coverage (non-targeted) site investigation locations.

Site Investigation Locations	Rationale
TP101	Hydraulic oil storage area.
TP102	Historic landfill.
TP103	Historic landfill.
TP104	Hydraulic oil storage area.
TP105	General site coverage.
TP106	Historic landfill / car park.
WS101	Hydraulic oil storage area.
WS102	Visual evidence of contamination during walkover / infilled ground.
WS103	Ink and thinners container.
WS104	Historic landfill / diesel fuel tank.
WS105	General site coverage.
WS106	Electrical sub-station.

Table 3-1: Summary of sampling locations.

Elevated and pertinent results from the first phase of investigation are presented in Table 3-3 below.

Contaminant		Units	No. of samples	Elevated Results	Sample Location	Criteria (1%/2.5%/6%)	Source of Criteria
Metals	Arsenic	mg/kg	12	42	TP101 (0.2m)	37 (2.5%)	C4SL
				120	TP105 (0.5m)	37 (6%)	
	Lead			520	TP101 (0.2m)	200 (2.5%)	
				230	TP105 (0.5m)	200 (6%)	
PAHs	Benzo(a)pyrene	mg/kg	11	4.1	TP106 (0.3m)	2.7 (2.5%)	C4SL
	8.9			TP105 (0.5m)			
	Naphthalene			280	WS103 (2.8m)	13 (6%)	S4UL
General	pH	pH	13	Range 7.8 to 11.6			
	SOM	%	13	Range 0.79 to 21			
	Asbestos	-	15	Amosite Fibres / Clumps (1.3% asbestos/dried weight of soil sample) identified in TP102 at 0.3m.			

Table 3-3: 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.

To establish the condition of shallow groundwater LKC undertook four groundwater samples during the previous investigation phase. Two surface water samples were collected from the Tack Lee Brook both upstream and downstream for the site in order to give an indication of the impact, if any, the site is having upon the surface water receptor. No midstream sample was possible as the brook is culverted below the site and there are no accessible sampling points.

Elevated heavy metals and TPH were identified within the groundwater samples. However, the report concluded that it is likely that the groundwater at the site is perched within the made ground and is therefore unlikely to directly impact the underlying aquifer within the bedrock at depth. Further investigation was recommended.

Exceedances of heavy metals were also identified in the surface water samples taken from Tack Lea Brook. Further investigation was recommended to confirm the risk.

All the installed boreholes were monitoring for gas. A total of six monitoring visits were undertaken over three months. Elevated carbon dioxide and methane were identified, and the site was characterised as Characteristic Situation 2 (CS2).

The ground conditions encountered during the 2016 investigation comprised made ground underlain by natural sandy gravelly clay. Additional information on ground conditions:

- » The made ground generally consisted of gravelly sandy clay / clayey gravelly sand / clayey gravelly sand with brick, coal, ash and clinker. Made ground was variable across the site with depths between 0.95m and 4.8m identified.
- » Visual / olfactory evidence of hydrocarbon identified in TP102 at 0.3-0.6mbgl, WS102 at 0.9-1.5mbgl, WS103 at 2.8m and 3.8mbgl, and WS106 at 0.4-0.7mbgl.
- » Visual / olfactory evidence of oil identified in WS102 at 0.5-0.9mbgl.
- » No visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations.
- » Localised peaty clay was identified within WS101 in the west of the site at 1.2-3.00mbgl.

The summary contamination assessment following the initial investigation phase is shown in Table 3-3.

Pollutant Linkage		Risk	Recommendations
1	Contaminants posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	High (ACM)	- ACM (amosite) identified in made ground. - Recommendations: Further investigation and remediation required in garden areas.
		Moderate (metals, PAHs)	- Elevated arsenic, lead and PAHs identified across the site. - Recommendations: Remediation required in garden areas.
		Moderate	- No elevated petroleum hydrocarbons identified. Further investigation required in the northern half of the site. - Recommendations: No remediation required at present. Further investigation and potential remediation required.
2	Volatile contaminants posing a risk to site users via the inhalation of vapours.	Moderate	- Volatile contamination identified in the centre of the site. - Recommendations: Further investigation and assessment required.
3	Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation.	High	- GSV based on gas monitoring results places the site within a CIRIA C665 CS2 at this stage. - Recommendations: Further gas monitoring required.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	Moderate	- Elevated mercury and TPH identified within groundwater. - Elevated mercury and copper identified within sample from Tack Lee Brook downstream of site. - Recommendations: Further investigation and potential remediation required
5	Sulphate posing a risk to building via direct contact (sulphate attack).	Moderate	- No elevated sulphate identified in soils or groundwater. - Recommendation: No remediation required.
6	Organic contaminants posing a risk to water pipes.	Moderate	- Organic contamination identified at potable pipe depth of 0.75-1.35mbgl. - Recommendations: UU risk assessment to be completed. The site will likely require barrier piping.
7	Phytotoxic metals posing a risk to flora via root uptake.	Very Low	- No phytotoxic metals above generic criteria. - Recommendations: No remediation required.

Table 3-3: Summary Risk Table.

4 Additional Works Ground Investigation

4.1 Site Investigation Design and Methodology

In order to further assess the ground conditions in areas that were previously inaccessible prior to the demolition of previous building and chimney, and to further investigate the potential pollutant linkages identified in the preliminary contamination conceptual model, a phase of further intrusive investigation was undertaken.

The additional investigation was carried out on 1st February to 9th March 2020 and comprised the following:

- 3no. cable percussion boreholes drilled to 7.61-12.50mbgl (ref. CP101 to CP103).
- 7no. trial pits (using 10t tracked machine) excavated to 2.00-3.00mbgl (ref. TP201 to TP207).
- 3no. Dynamic Probes driven to maximum 8mbgl (ref. DP1-DP3).

Due to deep made ground / contamination identified in the window sample boreholes (to 5-6mbgl), cable percussion boreholes were carried out to allow an assessment of the deeper ground conditions for geotechnical purposes and to allow deeper groundwater samples to be collected.

All site investigation locations are shown in Figure 5.

The locations were chosen to fill in gaps from the previous investigation following the demolition of buildings on site and also to delineate previously identified contamination.

Overall, including the initial phase of investigation, the number of site investigation points corresponds to approximately one location per 20m square centres. This is considered to be a conservative sampling density and is in line with BS10175⁸ for a 'main investigation'.

All profile logs are provided in Appendix B and are in line with BS14688-1⁹ and BS5930¹⁰.

4.2 Well Installations

All of the new boreholes were installed with monitoring wells for groundwater monitoring and groundwater sampling. Monitoring wells were installed in accordance with BS10175 and CIRIA C665¹¹ and generally comprised approximately 4-6m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

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

⁸ British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2017.

⁹ British Standards (2002) Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description. BS EN ISO 14688-1:2002.

¹⁰ British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

¹¹ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

4.3 Sampling Protocol

4.3.1 Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation¹².

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds (TVOCs) using a PhoCheck 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 C665¹³ 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 4-1 shows the soil testing undertaken.

Suites and Contaminants	No. Samples	Location & Depth	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	3	TP203 0.4-1.0m TP205 0.0-1.0m TP207 0.0-0.4m	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.	5	TP201 0.0-0.4m TP204 1.9-2.0m CP1 0.0-0.3m CP2 0.1-1.0m CP3 1.0m	Evidence of hydrocarbon contamination (visual / olfactory) identified in or close to locations therefore detailed suite undertaken to confirm contamination risk and extent.
TPHCWG, BTEX, MTBE and SOM.	4	TP201 1.4-2.0m TP204 2.3-2.5m CP2 5.4-6.5m CP2 10.5m	Samples tested to confirm the extent of hydrocarbon contamination observed.

Table 4-1. Summary of soil sample testing undertaken.

Notes:

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

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

¹² EA (2000). "Technical Aspects of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.

¹³ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

4.3.2 Groundwater Sampling

To establish the condition of deeper groundwater, LKC collected 3 groundwater samples from the additional cable percussive boreholes.

The groundwater samples were collected a minimum of 1 week after drilling had finished and following well development. Sample collection was undertaken using a disposable bailer. 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 BS10175¹⁴ guidelines.

All water samples were placed in glass bottles, plastic bottles and septum topped vials and stored in ice packed cool boxes. The samples were sent to Chemtest on the same day for analysis.

Sampling was carried out in accordance with BS5930¹⁵ and BS5667-11¹⁶.

Many of the tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix E. Table 4-2 shows the groundwater / leachate testing undertaken.

Suites and Contaminants	No. Samples	Location	Justification
Metals / metalloids, pH, sulphate, cyanide suite, TPHCWG, BTEX, MTBE, speciated PAHs, phenol and hardness.	2	CP1 East (G) CP3 West (G)	Detailed suite undertaken to confirm the absence of contamination.
Metals / metalloids, pH, sulphate, cyanide suite, TPHCWG, BTEX, MTBE, speciated PAHs, phenol, VOCs, SVOCs and hardness.	1	CP2 South (G)	Detailed suite undertaken in CP2 due to evidence of hydrocarbons identified during the investigation

Table 4-2. 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.

4.4 Gas Monitoring

Gas monitoring was carried out during the previous investigation; therefore, no gas monitoring was undertaken during the additional investigation.

¹⁴ British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2017.

¹⁵ British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

¹⁶ British Standard (2009). "Water Quality – Sampling. Part 11: Guidance on Sampling of Groundwaters". BS ISO 5667-11:2009.

4.5 Geotechnical Testing

4.5.1 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 cable percussion boreholes at approximately 1m intervals, generally within the natural strata.
- Continuous equivalent SPTs were performed in the dynamic probes (strata not determined).

The SPT are provided within the profile logs (Appendix B).

4.5.2 Laboratory Geotechnical Testing

Soil samples taken during the investigation were collected in tubs, bulk bags and sealed U100 tubes and sent to Murray Rix Laboratories for geotechnical testing.

Many of the tests are UKAS accredited and further details are given in the laboratory report presented in Appendix D. Table 4-3 shows the geotechnical testing undertaken.

Suites and Contaminants	No. Samples	Location	Justification
Single Stage Triaxial	1	CP101 U 5.0-5.45m	Undertaken to confirm the strength of the clay strata.
Particle Size Distribution (PSD)	5	CP101 1.3-1.6m CP102 1.4-1.7m CP102 6.0-6.3m CP103 1.3-1.6m CP103 4.5-4.8m	PSD undertaken to confirm grading of granular material.
Oedometer Testing (One Dimensional Consolidation Test)	1	CP101 U 5.0-5.45m	Determination of swell pressure and coefficient of volume compressibility for settlement characterisation of the natural formation.

Table 4-3. Summary of geotechnical testing undertaken.

5 Ground Conditions

5.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground underlain by natural sandy gravelly clay. A summary section of the logs is provided in Plate 5-1, with additional comments below.



Plate 5-1: Summary of ground conditions.

Additional information on ground conditions:

- Made ground was recorded from depths of 0.60-11.20mbgl and generally consisted of gravelly sandy clay / gravelly clayey sand / sandy clayey gravel with brick, ash, clinker, glass, wood fragments and metal. Exceptions to this were:
 - Masonry fragments noted in TP203 0.40-1.10mbgl, TP204 0.0-1.90mbgl and TP205 0.00-2.10mbgl.
- Visual / olfactory evidence of hydrocarbons was identified in TP201 at 0.00-0.40mbgl, TP204 1.90-2.10mbgl and CP2 10.00-11.20mbgl.
- A black oily sheen was noted in the inflow of water in TP202 at 1.00mbgl.
- Peat was identified in TP205 between 2.10-2.80mbgl.
- Bedrock (mudstone) was recorded in CP101-CP103 from depths of 6.20-11.20mbgl.

5.2 Groundwater

5.2.1 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 one separate occasion. 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 5-1.

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		
TP201	0.3	-	-	N/A			N	Y ¹
TP202	1.0	-	-				N	Y ¹
TP203	0.6	-	-				N	N
TP204	Dry	-	-				N	Y ¹
TP205	Dry	-	-				N	N
TP206	0.6	-	-				N	N
TP207		-	-				N	N
CP1	Dry	4.0-7.3 (C/MS)	1	8.42	8.42	10.3	Y (G)	N
CP2	10.5	6.0-9.2 (MG)	1	9.45	9.45	11.22	Y (G)	Y ¹
CP3	Dry	6.5-7.5 (MS)	1	6.69	6.69	7.21	Y (G)	N

Table 5-1: Summary of water strike depths within boreholes and trial pits.

Response Zones:

MG=Made Ground; MS = Mudstone; C=Clay

Notes:

G=Groundwater Sample

¹ Hydrocarbons odour and sheen noted during trial pitting / drilling

5.3 In-Situ Geotechnical Testing

5.3.1 Standard Penetration Tests

In-situ standard penetration tests (SPTs) were undertaken, predominantly in the natural ground. The results are summarised in Table 5-2 and provided within the profile logs in Appendix B.

Approximate Depth (mbgl)	SPT 'N' Values		
	CP1	CP2	CP3
1-2	5 (MG)	5 (MG)	7 (MG)
2-3	12 (MG)	37 (MG)	50 (MG)
3-4	15 (MG)	10 (MG)	4 (MG)
4-5	18 (MG)	50 (MG)	4 (MG)
5-6	-	-	4 (MG)
6-7	50 (C/MS)	5 (MG)	50 (MG)
7-8	50 (MS)	5 (MG)	50 (MS)
8-9	-	6 (MG)	-
10-11	-	8(MG)	-
11-12	-	50 (MG/MS)	-
12-13	-	50 (MS)	-
GW Level	Dry	10.5	Dry

Table 5-2: Summary of SPT (N) values.

Notes:

Mg=Made Ground; MS=Mudstone; C=Clay.

Groundwater level based on strikes during investigation and monitoring data.

5.3.2 Dynamic Probing

Dynamic probing (DP) was carried out from ground level to between 7.4-9.8mbgl. These recorded equivalent 'N' values (3 DP blows = 1 'N' values). Results are provided in Appendix B.

5.4 Geotechnical Laboratory Testing

5.4.1 Single Stage Triaxial Test

Single stage triaxial testing has been undertaken on one sample of the natural clay strata. The results are presented in Appendix D and summarised in Table 5-3.

Location	Depth (mbgl)	Material Description	Undrained Shear strength (kPa)
CP1	5.0-5.45	Firm brown silty sandy clay with occasional gravel	52

Table 5-3: Summary of single stage triaxial results.

5.4.2 Particle Size Distribution

Particle size distribution (PSDs) tests were carried out on granular strata to confirm the material type. Full results are presented in Appendix D and summarised below in Table 5-4.

Location	Depth (mbgl)	Material	Percent passing through sieve		
			63mm	2mm	0.063mm
CP2	1.4-1.7	Brown clayey SAND and GRAVEL	100%	67%	32%
CP2	6.0-6.3	Black silty SAND and GRAVEL	100%	55%	18%
CP3	1.3-1.6	Brown clayey SAND and GRAVEL	100%	47%	26%
CP3	4.5-4.8	Black silty SAND and GRAVEL	100%	68%	28%

Table 5-4: Summary of particle size distribution results.

Notes:

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

5.4.3 Oedometer Test (One Dimensional Consolidation Testing)

Oedometer testing was undertaken on 1no. sample for consolidation / compressibility characterisation of the natural clay. Full results are presented in Appendix B and summarised below in Table 5-5.

Location	Depth (mbgl)	Material	Pressure Interval (kPa)	Void Ratio	m_v (m ² /MN)
CP1	5.0-5.45	Firm brown silty sandy CLAY with occasional gravel	50	0.385	0.65
			100	0.369	0.24
			200	0.345	0.18
			400	0.317	0.11
			50	0.336	0.04

Table 5-5: Oedometer Results. **Notes:** m_v = coefficient of volume compressibility

5.4.4 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 5-6.

Strata	pH		Sulphate	
	Soil	Groundwater	Soil (g/l)	Groundwater (mg/l)
Made Ground	7.7-8.9	7.7-7.8	0.097-0.85	27-320

Table 5-6: Summary of pH and sulphate results.

6 Geotechnical Assessment

Final foundation design will need to be confirmed once loadings of proposed buildings are known and details of ground works (i.e. potential cut and fill exercises) are known.

An outline geotechnical assessment is summarised in Table 6-1.

Proposed Development	- Construction of 14no. residential plots with gardens and access road, footpaths and parking.
General Ground conditions / Geotechnical Testing	- Maximum investigation depth 12.5mbgl. - Made Ground to 0.6-11.2mbgl. SPT 'N' values variable in made ground, N=5-7 at 1-2mbgl, 4-50 at 2-4mbgl and 4-50 at 4-6mbgl. - Stiff to very stiff brown gravelly CLAY with occasional cobbles in CP101 at 3.4-6.2mbgl. - Soft to firm slightly gravelly sandy silty CLAY in trial pits from 0.6-2.1mbgl. - Localised clayey peat between 2.1-2.8mbgl in centre of site. - Mudstone bedrock encountered at between 6.2-11.2mbgl. - Very little groundwater encountered, predominately localised perched water.
Geotechnical Constraints	- There are site-wide deposits of made ground of variable strength & thickness both vertically and laterally. These deposits are potentially highly compressible when loaded under foundations, roads and utilities and therefore carry a risk of unacceptable total and differential settlements to structures if measures are not taken to mitigate these risks. The maximum thickness of made ground recorded (CP102) was 11.2m coinciding to the infilled natural gorge (Tack Lee Brook) that existed prior to the site's development. - Deposits of peat and soft organic clays possibly associated with former mill ponds as recorded in TP205 and WS101 (and potentially WS104/105/106). These soils are potentially compressible and pose risks of unacceptable total and differential settlements to foundations/structures, roads and services. - Several levels and sub-footprints of made ground and relic structures associated with various phases of development since early Victorian times. For instance, as recorded in TP105, there is a potential for buried relic structures such as walls and floors which are obstruction hazards and also pose potential risks of differential settlements to foundations laid over them if they are not grubbed out or mitigated. Obstructions pose hazards to piling operations. - The surface footprint of the infilled gorge of Tack Lee Brook and the alignment of the culvert is in the zone of deepest fill and potentially the most difficult ground to pile or 'improve' because it contains the culvert which requires either diverting or protection and access for maintenance into the long term. - The site requires careful consideration before the configuration and positioning of structures can be finalised. A detailed foundation plan will be required which will depend on type of foundations, piling methods, ground improvement & remediation options taken forward. - A piling platform will be required if a piling option is taken forward. - The amount of surcharge and increased loading on the existing culvert has to be taken into consideration, in both temporary works conditions and the long term post development conditions. - It is recommended that advice from suitably qualified and experienced piling and remediation contractors be sought at the earliest juncture.

Table 6-1: Geotechnical assessment.

Concrete Requirements	- Based on BRE Digest 2005 ¹⁷ – DS-2 AC-2 recommended.
Services	- Consideration to the presence of services running through the site. Services may need to re-routed.
Temporary support of excavation	- May be required; however, trial pits were generally recorded as stable.
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 low volume change potential has been calculated for the site.

Table 6-1 (continued): Geotechnical assessment.

¹⁷ BRE (2005). "Concrete in Aggressive Ground." Special Digest 1.

7 Generic Risk Assessment

7.1 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 (CLR11¹⁸). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 7.6.

7.2 Soil Risk Assessment

7.2.1 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^{19,20}. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))²¹ 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 S4ULs²². 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^{23,24,25,26}.

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs²⁷. 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

¹⁸ EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.

¹⁹ Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."

²⁰ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

²¹ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

²² LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."

²³ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

²⁴ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

²⁵ EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.

²⁶ EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

²⁷ CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

PAHs^{28,29} and naphthalene the most volatile and soluble³⁰. 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 negligible³¹. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)³² and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

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

All criteria have been generated using the CLEA V1.06 model³³ 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.

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.*³⁴, 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 7-1 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.

²⁸ EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

²⁹ USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

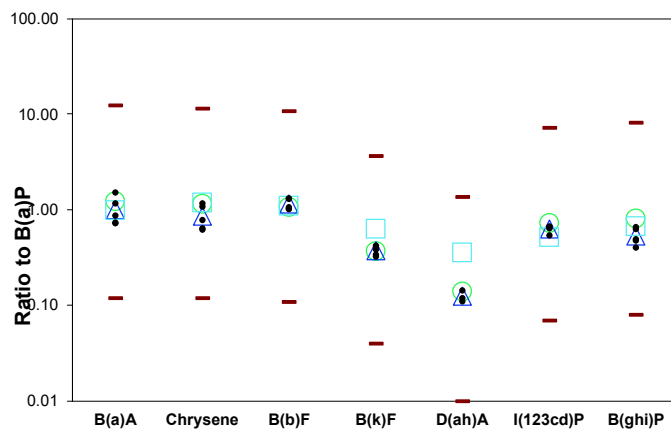
³⁰ EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5-079/TR1.

³¹ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

³² HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

³³ EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.

³⁴ 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.



Graph 7-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 5 samples (where values were >LOD to allow the calculation of a ratio).

Notes:

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

7.2.2 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 is presented in Appendix G. Elevated and pertinent results are presented in Table 7-1. It should be noted that these are in addition to elevated results identified from the initial phase of investigation.

Contaminant	Units	No. of samples	Elevated Results	Sample Location	Criteria (1%/2.5%/6%)	Source of Criteria
Metals						
Arsenic	mg/kg	12	49	CP1 (0.0-0.3m)	37	C4SL
			55	CP3 (1.0m)		
			130	TP203 (0.4-1.0m)		
			52	TP204 (1.9-2.0m)		
			46	TP205 (0.0-1.0m)		
Lead	mg/kg	12	220	TP203 (0.4-1.0m)	200	C4SL
			440	TP204 (1.9-2.0m)		
			210	TP207 (0.0-0.4m)		
Chromium VI	mg/kg	12	29	TP203 (0.4-1.0m)	21	C4SL
			200	TP204 (1.9-2.0m)		
			35	TP207 (0.0-0.4m)		
			26	CP1 (0.0-0.3m)		
			25	CP2 (0.1-1.0m)		
			61	CP3 (1.0m)		
PAHs						
Benzo(a)pyrene	mg/kg	12	27	CP1 (0.0-0.3m)	5	C4SL
TPHs						
Aromatic C12-16	mg/kg	12	860	CP1 (0.0-0.3m)	140/330/660	S4UL
Aromatic C16-21	mg/kg	12	1200	CP1 (0.0-0.3m)	260/540/930	S4UL
Aromatic C21-35	mg/kg	12	2700	CP1 (0.0-0.3m)	1100/1500/1700	S4UL
GENERAL						
pH	pH	12	Range 7.5 to 9.3			
SOM	%	12	Range 2.1 to 21			
Asbestos	N/A	2	Detected (see Table 7-2)			

Table 7-1: 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.

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

Sample Location	ID	Type	Total Asbestos (%)
TP205 (0.0-1.0m)	Chrysotile	Fibres/Clumps	<0.001
CP2 (10.5m)	Amosite / Chrysotile	Board	0.014

Table 7-2: Details of asbestos identified.

7.2.3 Hazard Quotient

To examine the potential additivity of toxicological effects between the petroleum hydrocarbon fractions, a Hazard Index (HI) as described by the Environment Agency³⁵ technical report was calculated for the samples. This should be undertaken when there are no elevated petroleum hydrocarbons, when compared to assessment criteria of individual fractions. A HI was calculated for TP204 1.9-2.0m, TP201 0.4-1.0m and CP2 0.1-1.0m (See Appendix H) and are summarised in Table 7-3. A HI was not calculated for the remaining samples as no or minimal petroleum hydrocarbons fractions were present.

HI results are presented in Table 7-3.

³⁵ EA (2005). "The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils." Science report P5-080/TR3.

Sample Location	Hazard Index	Further consideration required?
TP204 (1.9-2.0m)	0.66	N
TP201 (0.4-1.0m)	0.37	N
CP2 (0.1-1.0m)	0.95	N

Table 7-3: Hazard indices summary.

Notes

Bold where HI is >1

7.2.4 Direct Contact Risk – Pollutant Linkage 1

Metals and PAHs

Elevated PAHs and metals (arsenic, lead and chromium VI) have been identified on site based on results from both the additional site investigation and previous investigation. 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 and coal noted in the made ground.

The chromium VI identified in made ground across the site is likely to be related to the previous use of the site for textile processing.

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 / in contact with vegetables. The principal pathways are the ingestion pathways (soil, dust and vegetables) 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.

Petroleum Hydrocarbons

Elevated aromatic C12-16, C16-21 and C21-35 were identified in CP101 0.0-0.3m.

Visual / olfactory evidence of hydrocarbon contamination was also identified in CP102, TP201 and TP204 during the additional investigation. Samples taken from these locations identified heavy end hydrocarbons, but none were above assessment criteria. Traces of heavy end hydrocarbons (not above assessment criteria) were also identified in CP3 where no visual / olfactory evidence of hydrocarbons were observed. The hazard index of all these samples were less than one, and no further consideration is required.

The hydrocarbon contamination risk appears to be isolated to the area around CP101. However, given the nature of the ground conditions encountered across the site, further small pockets of hydrocarbon contamination could be present.

The contamination in CP101 is heavy-end petroleum hydrocarbons (Aromatic C12-16, C16-21 and C21-35) which is likely to be associated with weathered diesel. The principal pathways associated with these hydrocarbon fractions are ingestion (of soil, dust and homegrown produce), dermal contact (indoor and outdoor) and to a lesser degree the inhalation of indoor vapours (C12-16 only).

LKC considers the probability of hydrocarbon contamination affecting site users (via ingestion and dermal contact) as likely in the southeast of the site. Given a medium consequence a moderate risk is considered appropriate and localised remediation is recommended.

Asbestos

Asbestos (chrysotile) was identified in TP205 at 0.0-1.0mbgl as fibres/clumps, and in CP102 at 10.5mbgl (amosite / chrysotile) in the form of board. The source of the asbestos is likely to be from demolished buildings. The previous investigation also identified asbestos (amosite) in TP102 (0.30mbgl) in the southwest corner of the site as free fibres/clumps (1.3%).

Given the depth that asbestos was identified at in CP2 (10.5mbgl), this location is not considered to pose a significant risk as dermal contact is considered unlikely at such depth.

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

Additional consideration should also be given to the risk to workers and offsite receptors during groundworks and construction.

7.2.5 Risk from Inhalation of Vapours – Pollutant Linkage 2

Elevated naphthalene was identified in the previous investigation in WS103 (2.80mbgl) at a concentration of 280mg/kg. Therefore, further investigation was recommended.

No visual / olfactory evidence of volatile contaminants was identified during the additional 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 across the majority of the site. The consequence is expected to be medium, giving a low risk across the majority of the site and no remediation is required with respect to pollutant linkage 2.

However, given the elevated result identified in the previous investigation, there is a localised likely probability in the centre of the site of volatile contaminants affecting site users. The consequence is expected to be medium, giving a localised moderate risk in the centre of the site and local remediation is required with respect to pollutant linkage 2.

7.3 Gas Risk Assessment

Gas monitoring was not undertaken during the additional site investigation as 3 gas monitoring visits were undertaken on WS101-106 during the previous investigation (see Section 3).

In accordance with CIRIA C665³⁶, a Gas Screening Value (GSV) may be calculated. Assuming worst-case scenario maximum gas concentrations and flow for each

³⁶ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS).

Table 7-4 shows the maximum GSV for each borehole and the appropriate characteristic situation (based on GSV only). An overall site assessment (WS101-WS106) has also been included (worst case values across the site).

Boreholes	Max GSV (l/hr)	CS / TL
WS101	0.0069	CS1 / Green
WS102	0.192	CS2 / Amber 1
WS103	0.0044	CS1 / Green
WS104	0.0082	CS1 / Green
WS105	0.0002	CS1 / Green
WS106	0.0034	CS1 / Green
WS101-106	0.16 (CH ₄) / 0.656 (CO ₂)	CS2 / Amber 1

Table 7-4: Summary of worst-case Gas Screening Values (GSV).

Notes:

CS – Characteristic Situation; TL= Traffic Light.

In addition, in accordance with CIRIA C665³⁷, if carbon dioxide and methane are recorded above 5%v/v and 1%v/v respectively, you should consider upgrading the characteristic situation from CS1 to CS2.

Based on the findings, LKC considered that the site should be treated as CS2 due to the number of visits with relatively high carbon dioxide (>5%) and methane (>1%). It was concluded that the probability of carbon dioxide and methane affecting site users as likely. Assuming a severe consequence, there is a high risk and gas protection measures are required.

Detectable levels of carbon monoxide (maximum concentration of 23ppm) were also recorded during the gas monitoring. The Health and Safety Executive workplace exposure limits for carbon monoxide are 200ppm for short term exposure limit (STEL) based on a 15 minute reference period and 30ppm for a long term exposure limit (LTEL) based on an 8 hour reference period. As the maximum recorded concentrations at the site are below the LTEL for carbon monoxide the risk from carbon monoxide is considered to be low. Gas protection measures required for carbon dioxide and methane will further reduce the risk from carbon monoxide.

7.4 Controlled Water Assessment

LKC considers Tack Lee Brook as the primary receptor as it is culverted below the site. Surface water samples were collected during the previous investigation (see Section 3) and the risk to Tack Lee Brook was considered in the previous report. No further risk assessment for Tack Lee Brook was deemed necessary in this report.

However, to assess the potential risk to the underlying bedrock Secondary A Aquifer, LKC collected groundwater samples from deeper monitoring wells installed as part of the additional investigation.

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:

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

- 2001 Environment Agency Values for Environmental Quality Standards (EQS) and UK Drinking Water Standard (UKDWS)³⁸.
- 2009 UK Drinking Water Standard (UKDWS)³⁹.
- Resource Protection Values (RPVs)⁴⁰.
- Minimal Reporting Values (MRVs).

Elevated contaminants identified in deeper groundwater are summarised in Table 7-5.

Contaminant	Units	No. of samples	Elevated Result	Location	Assessment Criteria	Source of Criteria
Metals						
Boron	µg/l	3	100	CP102 (South)	1	UKDWS
			97	CP103 (West)		
Manganese	µg/l	3	1400	CP101 (East)	50	UKDWS
General						
pH	pH	3	Range 7.5 to 7.8			
Hardness	mg/l CaCO ₃	3	400 to 590			

Table 7-5: Summary of elevated groundwater results.

Elevated results have been identified for boron and manganese, but these were in comparison to stringent drinking water assessment criteria. The site is not within a Source Protection Zone with regards to drinking water and no groundwater abstractions other than for agricultural use were recorded within 500m of the site.

No concentrations of petroleum hydrocarbons or hexavalent chromium above laboratory detection limits were recorded in the deeper groundwater samples. No free product was noted in any water samples. Therefore, it is considered likely that the significant thickness of impermeable clay encountered across a majority of the site is preventing or inhibiting the vertical migration of contaminants from made ground to the underlying aquifer.

The previous investigation also identified elevated mercury in shallow groundwater samples and in the downstream samples from Tack Lee Brook. However, no mercury was recorded in the deeper groundwater samples or in the surface water samples taken as part of the further investigation.

The proposed development of the site will reduce the infiltration of rainwater into made ground meaning a reduction in the likelihood of contaminants being leached from the underlying soils and entering surface waters.

Based on the above and results of the previous investigation work, LKC considers the probability of contaminants on site the underlying Secondary A Aquifer and adjacent Tack Lea Brook as unlikely. Given the medium consequence, a low risk is anticipated (Pollutant Linkage 4) and no specific groundwater remediation is required.

³⁸ EA (2002). "Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the Environment Protection Act 1990."

³⁹ Statutory Instruments (2009). "The Private Water Supplies Regulation 2009." No. 3101

⁴⁰ SEPA (2010). "Assigning Groundwater Assessment Criteria for Pollutant Inputs." WAT-PS-10-01.

7.5 Additional Risk Assessments

7.5.1 Concrete (Pollutant Linkage 5)

The concentrations of soluble sulphate in the soil when contrasted to BRE Digest 2005⁴¹ categorise the concrete requirement as DS-2 AC-2.

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

7.5.2 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 contamination⁴². 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: speciated petroleum hydrocarbons, chlorinated compounds, BTEX compounds, phenols, cresols, ethers, nitrobenzene, ketones, aldehydes and amines.

The following elevated contaminants were identified in both the previous and additional investigations:

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

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

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

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

7.5.3 Phytotoxicity (Pollutant Linkage 7)

Soil results were compared to phytotoxic guideline values as outlined in BS3882⁴³.

Elevated zinc (maximum concentration 890mg/kg) and copper (maximum concentration 760mg/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.

7.6 Revised Contamination Conceptual Model

The preliminary contamination conceptual model (Table 2-6) has been revised following the risk assessments undertaken in Sections 7.1-7.5. The revised

⁴¹ BRE (2005). "Concrete in Aggressive Ground." Special Digest 1.

⁴² UU(2011). "United Utilities Water Supplementary Guidance for the Selection of Water Pipes in Land Potentially Affected by Contamination."

⁴³ BS (2015). "Specifications for Topsoil and Requirements for Use." BS3882:2015.

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 7-6.

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 10.

Pollutant Linkage	Pathway	Receptor	Contaminant	Probability	Consequence	Risk	Assessment
PL1	-Dermal contact. -Inhalation of soil, fibres and dust. -Ingestion of soils, dust, vegetables, soil attached to vegetables. -Windblown dust.	-Future residents. -Site users. -Offsite receptors.	ACM: -Chrysotile Heavy metals: -Arsenic, lead and chromium VI PAHs: -BaP and naphthalene	Likely	Medium	Moderate	-ACM (amosite and chrysotile) identified in made ground in the southwest and east of the site which could pose a risk to future site residents / users via the inhalation of fibres. Given the heritage of the site there is a likely possibility of asbestos present within the made ground / other areas of site. -Elevated heavy metals and PAHs identified in made ground across site. -Recommendation*1: Remediation required. Likely to include an 750mm environmental cover system in gardens / soft landscaping areas. Root protection areas to be considered in capping layer design.
			Hydrocarbons (SE area only): -Aro C16-21, C21-35	Likely	Medium	Moderate (Localised)	-Elevated hydrocarbons in SE of site (localised area only). -Recommendation: Excavation and removal of impacted material or clean capping layer as above.
PL2	-Inhalation of vapours. -Migration through permeable strata and preferential pathways.	-Future residents. -Site users.	Volatile Contaminants (Centre): -Naphthalene. -Aro C12-C16.	Likely	Medium	Moderate (Localised)	-Elevated naphthalene identified in centre of site. -Elevated lighter end hydrocarbons in SE of site. -Recommendation: Delineation, excavation and removal of material impacted with volatile contamination.
			Volatile Contaminants (remainder of site): -None identified.	Unlikely	Medium	Low	-No elevated volatile contaminants across remainder of the site. -Recommendation: No remediation required.
PL3	-Inhalation of gas. -Migration through permeable strata and preferential pathways. -Explosion in confined spaces (methane only).	-Current residents. -Future residents. -Buildings. -Offsite land users.	-Carbon dioxide -Methane	Likely	Severe	High	-Elevated carbon dioxide identified (max. 8.2%v/v) and GSV classified as CS2. -Elevated methane concentrations identified (max. 2.0%v/v) and elevated flow (max. 8.0/hr). -Recommendation: Gas protection measures required.

Table 7-6: Revised Contamination Conceptual Model.

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 A Aquifer).	Mobile contaminants: - Metals and PAHs.	Unlikely	Medium	Low	- Although slightly elevated metals and PAHs identified, given the environmental settings and ground conditions encountered not considered to pose a significant risk to groundwater. Recommendation: No specific groundwater remediation required.
		Tack Lee Brook		Unlikely	Medium	Low	- Unlikely probability as no elevated contaminants identified in recent surface water sampling and proposed development of the site will reduce infiltration and leaching from made ground. Recommendation: No specific groundwater remediation.
PL5	Sulphate attack on concrete.	Building structure.	Sulphate	Likely	Mild	Moderate / Low	- Elevated sulphate identified (max. 850mg/l) therefore moderate risk considered appropriate. Recommendation: Sulphate resistant concrete in line with DS-2 AC-2. Consultation with structural engineer advised.
PL6	Ingestion of tainted water supply.	Future site users (via potable water).	Organic Contaminants: - Naphthalene, metals, TPH.	Likely	Medium	Moderate	- Likely probability as elevated naphthalene and TPH 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, 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 7-6 continued: Revised Contamination Conceptual Model.

8 Waste Disposal Assessment

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

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

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

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

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

The output sheet is presented in Appendix I and summarised in Table 8-1.

Sampling Location	Hazardous Waste Y/N	LoW Code	Hazard (Risk Phrase)	Contaminants
CP1 0.0-0.3m	Y	17 05 03	HP7 (Carcinogenic) HP11 (Mutagenic)	TPH C6-C40 petroleum group
CP2 0.1-1.0m	N	17-05-04	N/A	N/A
CP3 1.0m	N	17-05-04	N/A	N/A
CP2 5.4-5.6m	N	17-05-04	N/A	N/A
CP2 10.5m	N	17-05-04	N/A	N/A
TP201 0.4-1.0m	Y	17 05 03	HP7 (Carcinogenic) HP11 (Mutagenic)	TPH C6-C40 petroleum group
TP203 0.4-1.0m	N	17-05-04	N/A	N/A
TP204 1.9-2.0m	N	17-05-04	N/A	N/A
TP204 2.3-2.5m	N	17-05-04	N/A	N/A
TP205 0.0-1.0m	N	17-05-04	N/A	N/A
TP207 0.0-0.4m	N	17-05-04	N/A	N/A

Table 8-1: Summary of Hazwaste Online™ findings.

Based on the assessment of soil from individual locations, potentially hazardous waste has been identified if the soil from these locations was to be excavated. The soil in all other locations was classified as non-hazardous waste based on the soil samples tested.

⁴⁴ EA (2018). "Guidance on the Classification and Assessment of Waste (1st Edition v1.1)". Technical Guidance WM3.

⁴⁵ CLP Regulation - Regulation 1272/2008/EC of 16 December 2008.

⁴⁶ 1st ATP - Regulation 790/2009/EC of 10 August 2009

⁴⁷ Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

⁴⁸ WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

⁴⁹ Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014

⁵⁰ 13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

⁵¹ POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004

⁵² 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

Further testing of soils, including Waste Acceptance Criteria (WAC) testing, may be required during the groundworks phase if any surplus soils are due to be disposed of offsite.

9 Conclusions

9.1 Geotechnical

Traditional shallow foundations are likely to be unsuitable for a majority of the site.

There are site-wide deposits of made ground of variable strength & thickness both vertically and laterally. These deposits are potentially highly compressible when loaded under foundations, roads and utilities and therefore carry a risk of unacceptable total and differential settlements to structures if measures are not taken to mitigate these risks.

Deposits of peat and soft organic clays possibly associated with former mill ponds were recorded in some locations which are potentially compressible and pose risk of unacceptable total and differential settlements to foundations/structures, roads and services.

Potential for buried and relic foundations in some areas which will need to be grubbed out if they are in areas of proposed foundations.

The infilled gorge of Tack Lee Brook and the alignment of the culvert is in the zone of deepest fill and will be potentially the most difficult ground to improve or pile as it contains the current culverted brook which will need to be either diverted or protected.

Temporary supports of excavations may be required.

Detailed foundation design should be carried out by structural engineer.

9.2 Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 9-1 below (more detailed model provided in Section 7).

Pollutant Linkage		Risk	Recommendations
1	Contaminants posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	Moderate (ACM, heavy metals, PAHs)	Recommendations: Remediation required in garden areas. Likely to include an 750mm environmental cover system in gardens / soft landscaping areas.
		Moderate – localised (heavy end hydrocarbons)	Elevated heavy end hydrocarbons in south east of site. Recommendations: Excavation and removal of impacted material or clean capping layer in gardens/soft landscaping.
2	Volatile contaminants posing a risk to site users via the inhalation of vapours.	Moderate – localised	Volatile contamination identified in centre and south east of site. Recommendations: Delineation, excavation and removal of material impacted with volatile contamination.
3	Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation.	High	Recommendations: Gas protection measures required.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	Low	Recommendations: No specific groundwater remediation required.
5	Sulphate posing a risk to building via direct contact (sulphate attack).	Moderate	Recommendations: Sulphate resistant concrete (DS-2 AC-2) required.
6	Organic contaminants posing a risk to water pipes.	Moderate	Recommendations: UU risk assessment to be completed. The site will likely require barrier piping.
7	Phytotoxic metals posing a risk to flora via root uptake.	Low	Recommendations: Clean capping layer as per PL1.

Table 9-1: Summary Risk Table.

Remedial recommendations are presented in Section 10.

10 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.

10.1 Remediation and Validation Recommendations

Table 10-1 details the further works and remedial recommendations / requirements. The table shows work required pre-construction (i.e. during earthworks) and during / post construction.

Phase	PL	Remediation Requirements	Validation Requirements
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.	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work.
	2	<u>Hydrocarbon Hotspot Removal (south east of site)</u> Impacted soils (based on visual / olfactory evidence and the use of a PID) should be excavated and removed. Impacted soils should be placed on an impermeable surface to await removal from site (this may be subject to chemical testing to confirm suitable waste facility). The work should be done under the supervision and instruction of an environmental consultant. If all impacted ground cannot be removed and contamination remains on the ground, further remediation may need to be considered.	Details of work undertaken including photographs. Confirmatory samples of the remaining in-situ soils. Consignment notes confirming the removal of impacted soil
	2	<u>Naphthalene Hotspot Removal (centre of site)</u> Impacted soils (based on visual / olfactory evidence and the use of a PID) should be excavated and removed. Impacted soils should be placed on an impermeable surface to await removal from site (this may be subject to chemical testing to confirm suitable waste facility). The work should be done under the supervision and instruction of an environmental consultant. If all impacted ground cannot be removed and contamination remains on the ground, further remediation may need to be considered.	Details of work undertaken including photographs. Confirmatory samples of the remaining in-situ soils. Consignment notes confirming the removal of impacted soil
	1 and 7	<u>Environmental Cover System</u> As made ground is relatively deep, it is unlikely to be viable to remove the contaminated soils.	Measuring depth of environmental cover system

		Therefore, an environmental cover system is recommended. The environmental cover system should be as follows: Private Back Gardens: 750mm thick environmental cover system comprising: Either 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 650mm comprising clean inert fill and sufficient topsoil for a growing medium. Private Front Garden / Shared Landscaping: 450mm thick environmental cover system comprising: Either 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 350mm comprising clean inert fill and sufficient topsoil for a growing medium. A number of root protection areas (RPAs) are present on the site (see JB Consulting Drawing Ref. 20/005.3 in Figures) and where these are present within soft landscaped areas it will not be possible to install a full capping layer as above. It is envisaged for RPAs that up to 100mm depth of sandy topsoil can be spread to enable the establishment of grass or other vegetation. No other additions should be made without the permission of the Arboricultural Consultant. A diagram of a typical environmental cover system is shown in Appendix J. The subsoil layer can be replaced by additional topsoil.	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 10-2.
	3	Gas Protection Measures In line with CS2 as per UK guidance^{53,54}. 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. • Ventilation of confined spaces within the building. • Well-constructed reinforced suspended, raft or cast in situ ground slab. • 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	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 735⁵⁵

⁵³ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

⁵⁴ BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

⁵⁵ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

		with the Local Authority once the foundation design has been confirmed.	
	4	<u>Controlled Waters</u> Further risk assessment to be undertaken once the surface water results are available.	TBC
	5	<u>Sulphate Resistant Concrete</u> Sulphate Resistant Concrete in line with DS-2 AC-2 recommended.	N/A
	6	<u>Potable Water Pipes</u> It is recommended that a 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.
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.		
	<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 ⁵⁶): 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> bituminous material to be used in roadways. A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered <u>before</u> 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 10-2.		

⁵⁶ <https://www.gov.uk/guidance/waste-exemptions-using-waste>

	Asbestos Management Plan Due to the presence of asbestos containing material, it is recommended that additional precautions are taken during site clearance, earthworks and construction in the area of concern. The presence of asbestos in the made ground at the site presents a potential risk of generation of airborne fibres if this material is disturbed, such as for excavations to construct new foundations. This risk can be managed by careful procedures and site monitoring to reduce the risk of airborne fibres, and it is recommended that an appropriate 'Asbestos Management Strategy' is developed and adopted for all intrusive ground works which disturb the made ground in the area of concern. This should be carried out in line with CIRIA C733⁵⁷. This may include asbestos awareness training for all site staff, provision of suitable personal and respiratory protective equipment and air monitoring. With regards to cement bound asbestos, this can be handpicked, doubled bagged and disposed of appropriately to a licenced landfill. Guidance on removing asbestos cement is described in HSE (2012)⁵⁸. If ACM is identified in soil arisings then soil should be placed directly into covered skips and disposed of at a suitable licenced landfill, after further testing to quantify the extent of asbestos contamination of the soils. It should be considered that blue asbestos is notifiable and must be removed by a licenced contractor. 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 guidance⁵⁹) should be adopted by all workers involved with site enabling and construction works. Piling in Contaminated Land It is understood that the building will be piled into the bedrock. This may provide a preferential pathway for contaminants to the Secondary B Aquifer. Once the method of piling has been determined, good practice for the drilling of piles on contaminated sites should be adhered to, such as guidance provided by the Environment Agency⁶⁰.
--	--

Table 10-1: Further work, remediation and validation requirements

Notes: See Table 7-6 for pollutant linkage (PL) details.

10.2 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.

A summary of the required imported material sampling requirements is presented in Table 10-2. Ideally, the material should be sampled at source to prevent double handling if soil fails, with confirmatory sampling undertaken on importation to site. However, where this is not possible then material imported should be segregated

⁵⁷ CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.

⁵⁸ HSE (2012). "Removing Asbestos Cement (AC) Debris." A11 Asbestos Essential – Non-licenced Tasks.

⁵⁹ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

⁶⁰ Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.

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	Recvcld Stone (6F2 / screened)	Suite B	1 sample per 500m³

Table 10-2: 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.

Imported material to be used in gardens will be compared against residential with plant uptake criteria (as used in the contamination risk assessment (Section 7-1)). Appropriate remedial target criteria are presented in Appendix G.

10.3 Site Completion Report

All the remediation and validation work should be documented in a Site Completion Report. The following Completion Reports will be provided to satisfy the outstanding contaminated land planning conditions:

- » **Pre-construction Phase Completion Report:** Delineation and removal of hydrocarbon and naphthalene impacted material, offsite disposal information, validation testing of site won subsoil to be used in gardens.
- » **Build-phase Construction Completion Report:** Gas membrane validation, validation testing of any imported topsoil, completion of UU potable water supply document and/or discussion with UU.

The aim of the completion reports will be to demonstrate to the Local Authority that the site has been suitably remediated to the extent that construction works may commence and, in accordance with the National Planning Policy Framework (NPPF)⁶¹:

- » The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- » After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990⁶²; and,

⁶¹ DCL (2018). "National Planning Policy Framework." Department of Communities and Local Government.

⁶² Defra (2006). "Environmental Protection Act 1990: Part 2A Contaminated land." Defra Circular 01/2006.

- » Adequate site investigation information, prepared by a competent person, is presented.

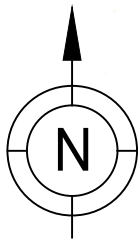
Once the above is satisfied the Local Authority should be able to discharge all the relevant contaminated land conditions.

Figures



Figure 1: Site Location Plan, Tack Lea Works, Bury

Drawn: August 2022 Scale: 1:25,000 @ A4 (see scale bar)



KEY



Water

Works

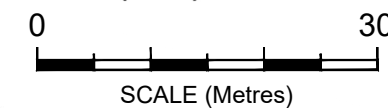
65

71

B 6222

Ward Bdy
BURY AND ROCHDALE OLD ROAD

Tack Lee Wood



SCALE (Metres)

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.



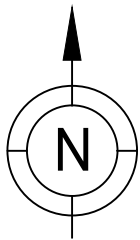
Client:
Hall & Co Developments Ltd

Site:
Tack Lea Works, Bury

Title:
Site Layout Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 20 1043	See Scale Bar	2	
Drawn By:	Checked By:	Drawn:	
AC	CB	Aug 2022	

Extract from: Homelife Architects
Drawing Ref: Site Boundary Plan



KEY



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.



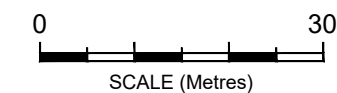
Client:
Hall & Co Developments Ltd

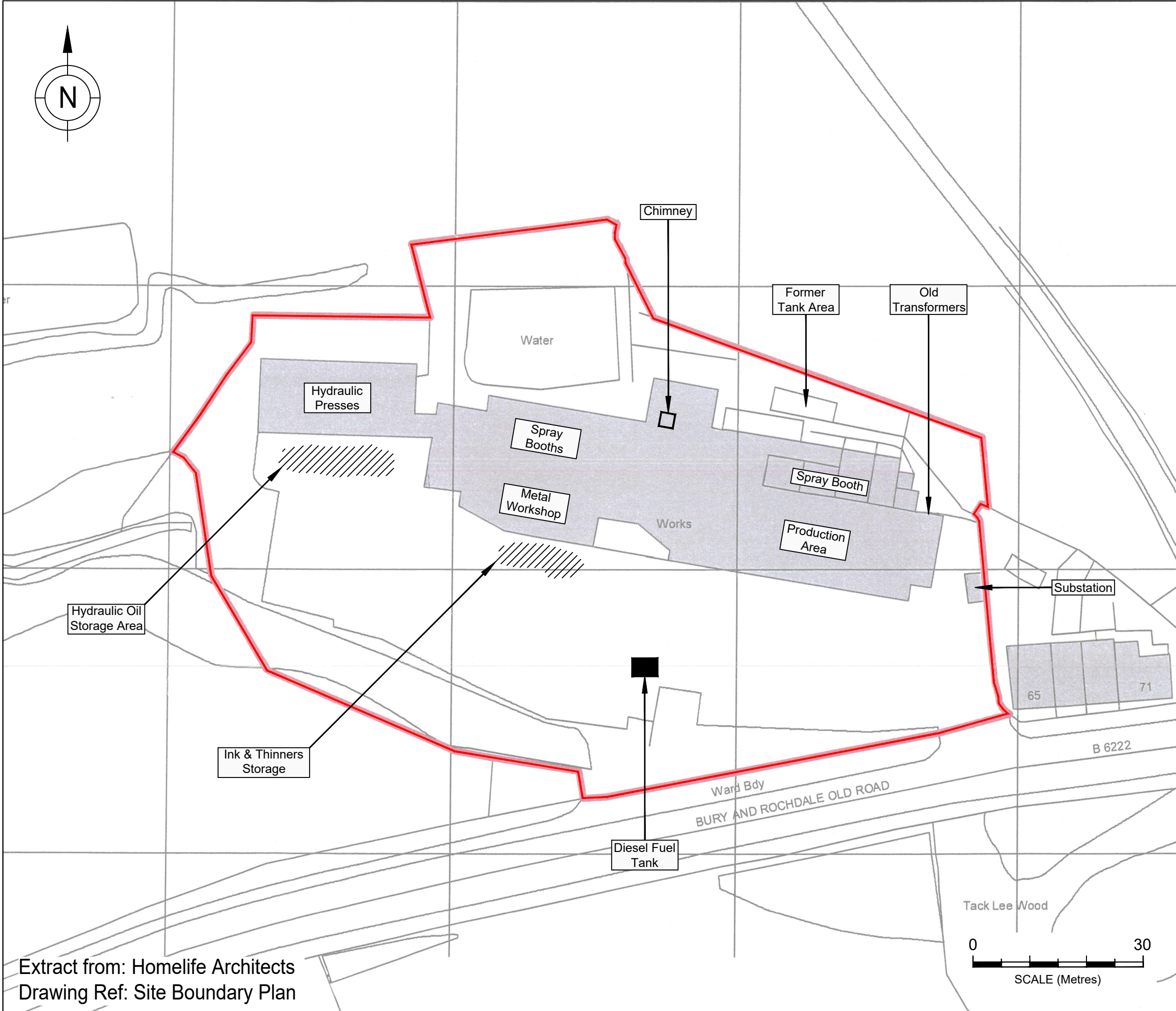
Site:
Tack Lea Works, Bury

Title:
Proposed Layout Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 20 1043	See Scale Bar	3	
Drawn By:	Checked By:	Drawn:	
AC	CB	Aug 2022	

Extract from: Cartwright & Gross Ltd
Drawing Ref: Proposed Site Plan, No.779/200, Rev:D (23/11/2018)





KEY

 Site Boundary

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



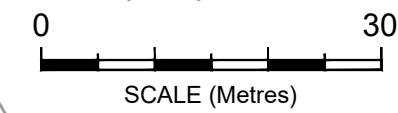
Client: Hall & Co Developments Ltd

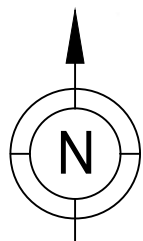
Site: Tack Lea Works, Bury

Title: Former Works Site Features

Job No.: LKC 20 1043	Scale (See Scale Bar): See Scale Bar	Figure: 4	Revision:
Drawn By: AC	Checked By: CB	Drawn: Aug 2022	

Extract from: Homelife Architects
Drawing Ref: Site Boundary Plan





KEY

-  Site Boundary
-  LK Consult Window Sample Borehole (2006)
-  LK Consult Trial Pit (2006)
-  LK Consult Cable Percussive Borehole (2020)
-  LK Consult Trial Pit (2020)
-  Approximate Location of On-Site Culvert

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.



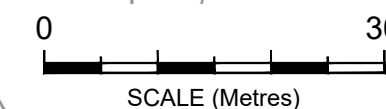
Client:
Hall & Co Developments Ltd

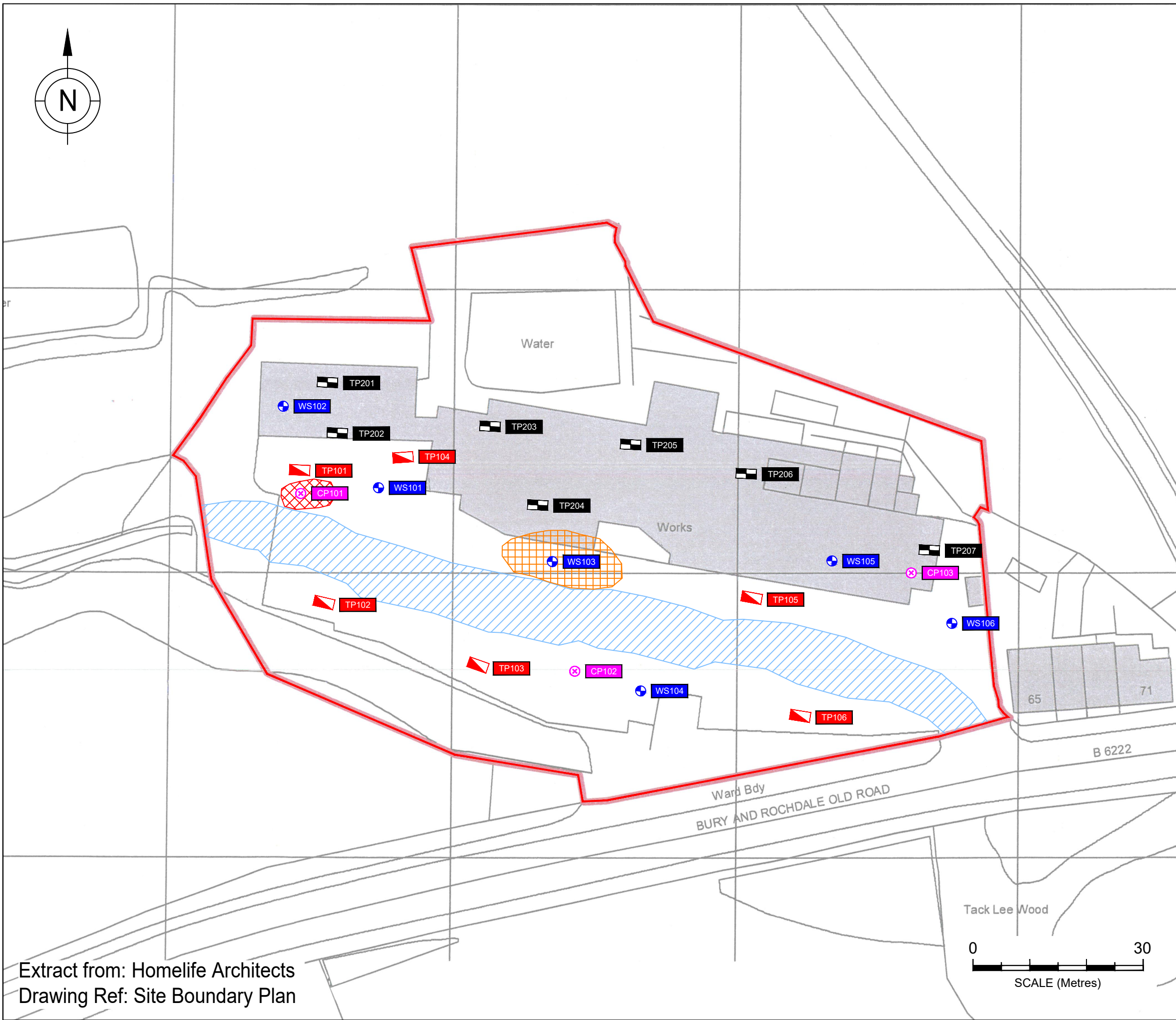
Site:
Tack Lea Works, Bury

Title:
Site Investigation Location Plan

Job No.: LKC 20 1043	Scale (See Scale Bar): See Scale Bar	Figure: 5	Revision:
Drawn By: AC	Checked By: CB	Drawn: Aug 2022	

Extract from: Homelife Architects
Drawing Ref: Site Boundary Plan





KEY

Site Boundary

LK Consult Window Sample Borehole (2006)

LK Consult Trial Pit (2006)

LK Consult Cable Percussive Borehole (2020)

LK Consult Trial Pit (2020)

Approximate Location of On-Site Culvert

HOTSPOT EXTENTS:Hydrocarbon (C12-C16) Hotspot Estimated ExtentNaphthalene Hotspot Estimated Extent

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:
Hall & Co Developments Ltd

Site:
Tack Lea Works, Bury

Title:
Hotspot Extent Plan

Job No.: LKC 20 1043	Scale (See Scale Bar): See Scale Bar	Figure: 6	Revision:
Drawn By: AC	Checked By: CB	Drawn: Aug 2022	

Extract from: Homelife Architects
Drawing Ref: Site Boundary Plan

Rev	Date	Description	Initials



- Trees to be removed
- Trees to be retained
- Trees to be pruned
- Root protection area
- Tree protection fencing
- Special measures

JB Consulting

Joe Barnes
Email: joe-barnes@live.co.uk

Client:
Ainsworth Projects

Site Address:
Tack Lea Works
Rochdale

Drawing Title: Tree Protection Plan
Drawing No: 20/005(3)

Date: 17/04/20
Scale: 1:500@A2
Drawn by: JWB

Note: Dimensions are not to be scaled from this drawing. All written measurements are to be checked on site by the contractor. Copyright JB Consulting. Note: All rights described in Chapter IV of the Copyright Design & Patents Act 1988 have generally been asserted.



Note: this drawing must only be reproduced in colour.

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

Table A. Classification of Consequence

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

Table B. Classification of Probability.

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

Boring Method

Cable Percussion

Casing Diameter
Ground Level (mOD)
Client

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location
Dates

09/03/2020

Project Contractor

Ainsworth Projects

Sheet

1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D					0.10	MADE GROUND: Tarmacadam.			
1.00	D						MADE GROUND: Black SAND and GRAVEL of predominantly ash with occasional stone and cobbles.			
1.20-1.65 1.30-1.60	SPT N=5 B			1,1/1,1,1,2		(3.30)				
2.00-2.45 2.00-2.45 2.30-2.60	SPT N=12 X B			1,1/1,1,5,5						
3.20-3.65 3.20-3.65 3.50-3.80	SPT N=15 X B			2,2/3,4,4,4		3.40	Stiff consistency brown gravelly CLAY with occasional cobbles.			
4.20-4.65 4.20-4.65	SPT N=18 X			2,3/4,4,4,6		(1.60)				
5.00-5.45	U					5.00	Very stiff consistency brown gravelly CLAY with occasional cobbles.			
5.50	D					(1.20)				
6.30-6.64 6.30 6.30-6.65	SPT 50/190 D X			7,12/15,21,14		6.20	Grey MUDSTONE.			
						(1.46)				
7.30-7.66 7.30-7.65	SPT 50/210 X			10,15/16,16,18		7.66	Complete at 7.66m			

Remarks

Chiselling from 6.20m to 7.30m for 1 hour.

**Scale
(approx)**

1:50

**Logged
By**

JH

Figure No.

LKC 20 1043.CP101

Boring Method

Cable Percussion

Casing Diameter
Ground Level (mOD)
Client

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location
Dates

13/03/2020

Project Contractor

Ainsworth Projects

Sheet

1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D						MADE GROUND: Brown CLAY with occasional brick and concrete fragments.			
1.00	D									
1.20-1.65 1.40-1.70	SPT N=5 B			1,2/2,1,1,1						
2.00-2.45 2.00-2.45	SPT N=37 X			1,2/14,12,5,6						
						(5.40)				
3.10-3.55 3.10-3.55	SPT N=10 X			7,6/4,3,2,1						
4.20-4.41 4.30-4.60	SPT 50/60 B			1,1/2,48						
5.40-5.85	X					5.40	Black SAND and GRAVEL of predominantly ash and clinker.			
6.00-6.30	B									
6.40-6.85	SPT N=5			1,2/1,1,2,1						
7.00-7.45 7.00-7.45	SPT N=5 X			1,1/1,2,1,1						
						(4.60)				
8.60-9.05 8.60-9.05	SPT N=6 X			1,2/2,1,1,2						

Remarks
**Scale
(approx)**

1:50

**Logged
By**

JH

Figure No.

LKC 20 1043.CP102

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

Tack Lea Works, Bury

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

Cable Percussion

Casing Diameter**Ground Level (mOD)****Client**

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location**Dates**

13/03/2020

Project Contractor

Ainsworth Projects

Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.10-10.55 10.10-10.55	SPT N=8 X			1,2/2,2,2,2		10.00	Black SAND and GRAVEL of predominantly ash and clinker with an oily sheen.		▼1	
10.50	D			FAST(1) at 10.50m, rose to 10.00m in 20 mins.		(1.20)			Σ1	
11.30-11.48 11.30-11.45	SPT 25*/95 50/85 X			12,13/38,12		11.20	Grey MUDSTONE.			
						(1.30)				
12.40-12.49 12.40-12.50	SPT 25*/40 50/50 X			25/50		12.50	Complete at 12.50m			

Remarks

Chiselling from 11.20m to 12.40m for 1 hour.

**Scale
(approx)**

1:50

**Logged
By**

JH

Figure No.

LKC 20 1043.CP102

Boring Method

Cable Percussion

Casing Diameter
Ground Level (mOD)
Client

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location
Dates

13/02/2020

Project Contractor

Ainsworth Projects

Sheet

1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D						MADE GROUND: Brown CLAY with occasional brick and concrete fragments.			
1.00	D									
1.20-1.65	SPT N=7			1,2/4,1,1,1						
1.30	B									
2.00-2.18	SPT 50/30			10,15/50		(4.00)				
2.50	D									
3.00-3.45	SPT N=4			1,1/1,1,1,1						
3.00-3.45	X									
4.30-4.75	SPT N=4			1,0/1,1,1,1		4.00	MADE GROUND: Black SAND and GRAVEL of predominantly ash with occasional brick fragments.			
4.30-4.80	X									
4.50-4.80	B									
5.20-5.65	SPT N=4			1,2/1,1,1,1		(2.50)				
5.20-5.65	X									
6.60-6.93	SPT 50/180			5,11/15,16,19		6.50	Grey MUDSTONE.			
6.60-6.95	X									
7.00	D					(1.11)				
7.50-7.61	SPT 25*/70			25/50		7.61	Complete at 7.61m			
7.50-7.60	50/40									
	X									

Remarks

Chiselling from 6.50m to 7.50m for 1 hour.

**Scale
(approx)**

1:50

**Logged
By**

JH

Figure No.

LKC 20 1043.CP103

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

Tack Lea Works, Bury

**Trial Pit
Number****TP202****Excavation Method**Machine excavated trial pit to
2.00mbgl.**Dimensions****Ground Level (mOD)****Client**

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location**Dates**

06/02/2020

Project Contractor

Ainsworth Projects

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1 PID=0.1ppm					MADE GROUND: Brown sandy very clayey GRAVEL with frequent bricks (whole and fragments), rare wood fragments, rootlets, metal. Sand is fine to medium. Gravel is fine to coarse and subangular to angular comprising sandstone and mudstone.		
			Water strike(1) at 1.00m.		(1.30)	Moderate-fast inflow of water at 1.00mbgl. Black oily sheen noted in water.		∇1
1.50-2.00	DB2 PID=<0.1ppm				1.30	Stiff consistency grey slightly sandy gravelly CLAY with occasional subrounded sandstone cobbles and rare coal fragments. Sand is fine to medium. Gravel is fine to coarse and angular to subrounded comprising sandstone, mudstone and quartz.		
					(0.70)			
					2.00	Complete at 2.00m		

Plan

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RemarksModerate-fast inflow of water at 1.00mbgl. Black oily sheen noted in water.
Trial pit stable.**Scale (approx)**

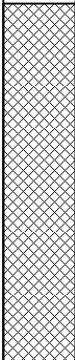
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Logged By

HM

Figure No.

lkc 20 1043.TP202

Excavation Method Machine excavated trial pit to 3.00mbgl.		Dimensions		Ground Level (mOD)		Client Ainsworth Projects		Job Number LKC 20 1043			
		Location		Dates 06/02/2020		Project Contractor Ainsworth Projects		Sheet 1/1			
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water		
0.00-1.00	D1 PID=0.4ppm				(1.90)	MADE GROUND: Brown very gravelly very clayey SAND with frequent brick (whole and fragments), occasional fabric, rare plastic, masonry, metal and wood fragments. Sand is fine to medium. Gravel is fine to coarse and subangular to angular comprising sandstone and mudstone.					
1.90-2.00	D2 PID=0.7ppm				1.90 (0.20) 2.10	MADE GROUND: Black gravelly clayey SAND with frequent ash, occasional clinker. Sand is fine to medium. Gravel is fine to medium and subangular comprising sandstone. Moderate hydrocarbon odour noted and black oily sheen. Moderate hydrocarbon odour noted and oily sheen at 1.90-2.10mbgl.					
2.30-2.50	DB3 PID=0.3ppm				(0.90) 3.00	Firm consistency grey and yellow mottled slightly sandy gravelly CLAY with occasional subrounded sandstone cobbles. Sand is fine to medium. Gravel is fine to coarse and subangular to angular comprising sandstone and mudstone.		   			
						Complete at 3.00m					
Plan						Remarks					
						Trial pit dry and stable.					
						Scale (approx)		Logged By		Figure No.	
						1:40		HM		lkC 20 1043.TP204	

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

Tack Lea Works, Bury

**Trial Pit
Number****TP205****Excavation Method**Machine excavated trial pit to
2.90mbgl.**Dimensions****Ground Level (mOD)****Client**

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location**Dates**

06/02/2020

Project Contractor

Ainsworth Projects

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1 PID=0.1ppm					MADE GROUND: Dark grey slightly clayey gravelly SAND with frequent ash, occasional clinker, masonry and clay inclusions. Sand is fine to medium. Gravel is fine to medium and subangular to angular comprising sandstone and mudstone.		
2.10-2.80	DB2 PID=0.1ppm				2.10 (0.70)	Brown spongy conditions amorphous slightly gravelly clayey PEAT. Gravel is fine to medium and angular comprising mudstone.		
2.80-2.90	B3 PID=<0.1ppm				2.80 2.90	Soft consistency light grey slightly gravelly sandy silty CLAY with rare plant material. Sand is fine to medium. Gravel is fine to medium and subangular comprising sandstone. Complete at 2.90m		

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Remarks

Trial pit dry and stable.

Scale (approx)

1:40

Logged By

HM

Figure No.

lkc 20 1043.TP205

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

Tack Lea Works, Bury

**Trial Pit
Number****TP207****Excavation Method**Machine excavated trial pit to
2.60mbgl.**Dimensions****Ground Level (mOD)****Client**

Ainsworth Projects

**Job
Number**

LKC 20 1043

Location**Dates**

06/02/2020

Project Contractor

Ainsworth Projects

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1 PID=0.7ppm				(0.40)	MADE GROUND: Brown sandy very clayey GRAVEL with occasional brick fragments, ash and rare clinker. Sand is fine to medium. Gravel is fine to coarse and subangular comprising sandstone.		
0.40-1.10	D2 PID=1.2ppm				0.40			
					(0.70)	MADE GROUND: Grey gravelly very sandy CLAY with occasional ash and brick fragments. Sand is fine to medium. Gravel is fine to coarse and subangular comprising sandstone and mudstone.		
					1.10			
					(1.50)	Firm becoming soft consistency dark to light brownish grey slightly gravelly sandy silty CLAY with rare rootlets. Sand is fine to medium. Gravel is fine to coarse and subangular to angular comprising sandstone and mudstone.		
					2.60			
						Complete at 2.60m		

Plan

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Remarks

Trial pit stable.

Scale (approx)

1:40

Logged By

HM

Figure No.

lkc 20 1043.TP207

Appendix C

Certificates of Analysis – Soil



Final Report

Report No.: 20-08924-1

Initial Date of Issue: 27-Mar-2020

Client LK Consult

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

Contact(s): Chris Hughes
Contaminated Land

Project LKC 20 1043, Tack Lea Works

Quotation No.: **Date Received:** 20-Mar-2020

Order No.: 737580 **Date Instructed:** 23-Mar-2020

No. of Samples: 5

Turnaround (Wkdays): 5 **Results Due:** 27-Mar-2020

Date Approved: 27-Mar-2020

Approved By:



Details: Glynn Harvey, Technical Manager

Project: LKC 20 1043, Tack Lea Works

Client: LK Consult	Chemtest Job No.:				20-08924	20-08924	20-08924	20-08924	20-08924
Quotation No.:	Chemtest Sample ID.:				989311	989312	989313	989314	989315
	Client Sample ID.:				CP1	CP2	CP3	CP2	CP2
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.00	0.10	1.00	5.40	10.50
	Bottom Depth (m):				0.30	1.00		6.50	
	Date Sampled:				06-Mar-2020	13-Mar-2020	13-Mar-2020	13-Mar-2020	13-Mar-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD					
ACM Type	U	2192		N/A	-	-	-	-	Board
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Amosite Chrysotile
ACM Detection Stage	U	2192		N/A	-	-	-	-	Stereo Microscopy
Asbestos by Gravimetry	U	2192	%	0.001					0.014
Total Asbestos	N	2192	%	0.001					0.014
Moisture	N	2030	%	0.020	13	14	21	23	8.4
Soil Colour	N	2040		N/A	Black,	Brown,	Black,	Black,	Black,
Other Material	N	2040		N/A	Stones,	Brick,	NONE,	Brick,	Stones,
Soil Texture	N	2040		N/A	Gravel,	Gravel,	Gravel,	Gravel,	Gravel,
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached		
pH	M	2010		4.0	8.4	9.3	8.1		
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.67	0.45	1.2		
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.12	0.063	0.47		
Cyanide (Free)	M	2300	mg/kg	0.50	[B] < 0.50	< 0.50	< 0.50		
Cyanide (Total)	M	2300	mg/kg	0.50	[B] < 0.50	< 0.50	< 0.50		
Arsenic	M	2450	mg/kg	1.0	49	22	55		
Cadmium	M	2450	mg/kg	0.10	0.89	0.49	1.5		
Chromium	M	2450	mg/kg	1.0	26	25	61		
Copper	U	2450	mg/kg	0.50	92	70	150		
Mercury	M	2450	mg/kg	0.10	0.18	0.13	0.34		
Nickel	M	2450	mg/kg	0.50	55	32	55		
Lead	M	2450	mg/kg	0.50	130	75	200		
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	1.4		
Vanadium	U	2450	mg/kg	5.0	63	39	47		
Zinc	U	2450	mg/kg	0.50	100	81	240		
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50		
Organic Matter	M	2625	%	0.40	16	5.0	13	21	2.1
Fuel Type	N	2670		N/A	W. Diesel/PAH	PAH	Lube	PAH	PAH
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	[B] 29	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	[B] 180	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	[B] 1000	7.4	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	[B] 1800	4.1	38	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	[B] 860	20	520	< 1.0	< 1.0

Project: LKC 20 1043, Tack Lea Works

Client: LK Consult	Chemtest Job No.:					20-08924	20-08924	20-08924	20-08924	20-08924
Quotation No.:	Chemtest Sample ID.:					989311	989312	989313	989314	989315
	Client Sample ID.:					CP1	CP2	CP3	CP2	CP2
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.00	0.10	1.00	5.40	10.50
	Bottom Depth (m):					0.30	1.00		6.50	
	Date Sampled:					06-Mar-2020	13-Mar-2020	13-Mar-2020	13-Mar-2020	13-Mar-2020
	Asbestos Lab:					DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD						
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] 36	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 3900	32	550	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	[B] 4.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	[B] 70	13	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	[B] 860	51	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[B] 1200	140	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	[B] 2700	600	62	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] 110	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 5000	810	62	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] 8900	840	620	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	M	2800	mg/kg	0.10	0.82	0.35	0.57			
Acenaphthylene	N	2800	mg/kg	0.10	0.60	0.21	0.23			
Acenaphthene	M	2800	mg/kg	0.10	1.2	0.37	0.76			
Fluorene	M	2800	mg/kg	0.10	2.0	0.53	0.77			
Phenanthrene	M	2800	mg/kg	0.10	12	3.5	4.2			
Anthracene	M	2800	mg/kg	0.10	4.5	1.0	1.0			
Fluoranthene	M	2800	mg/kg	0.10	42	7.1	7.2			
Pyrene	M	2800	mg/kg	0.10	33	5.8	6.2			
Benzo[a]anthracene	M	2800	mg/kg	0.10	20	2.9	5.2			
Chrysene	M	2800	mg/kg	0.10	17	2.6	4.8			
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	29	4.1	4.6			
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	9.3	1.7	1.7			
Benzo[a]pyrene	M	2800	mg/kg	0.10	27	4.0	4.4			
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	18	2.6	2.4			
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	3.0	0.58	0.53			
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	13	2.0	1.8			
Total Of 16 PAH's	N	2800	mg/kg	2.0	230	39	46			
Total Phenols	M	2920	mg/kg	0.30	< 0.30	0.32	< 0.30			

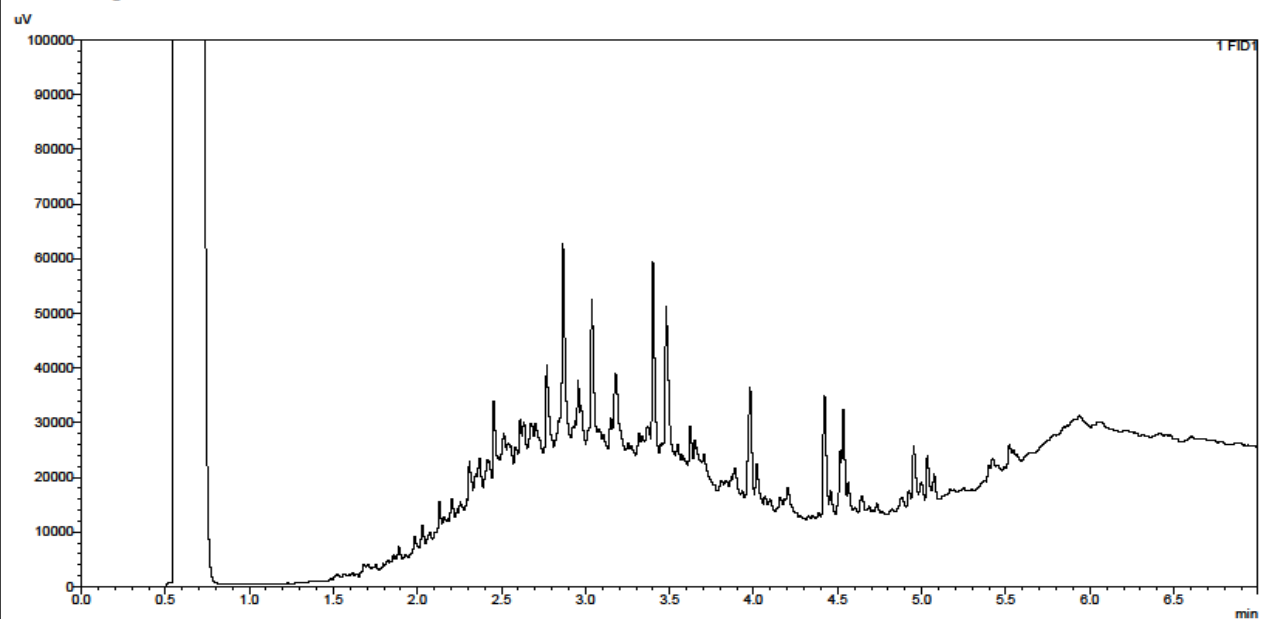
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Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 34
Date Acquired : 24/03/2020 20:58:10
Date Processed : 24/03/2020



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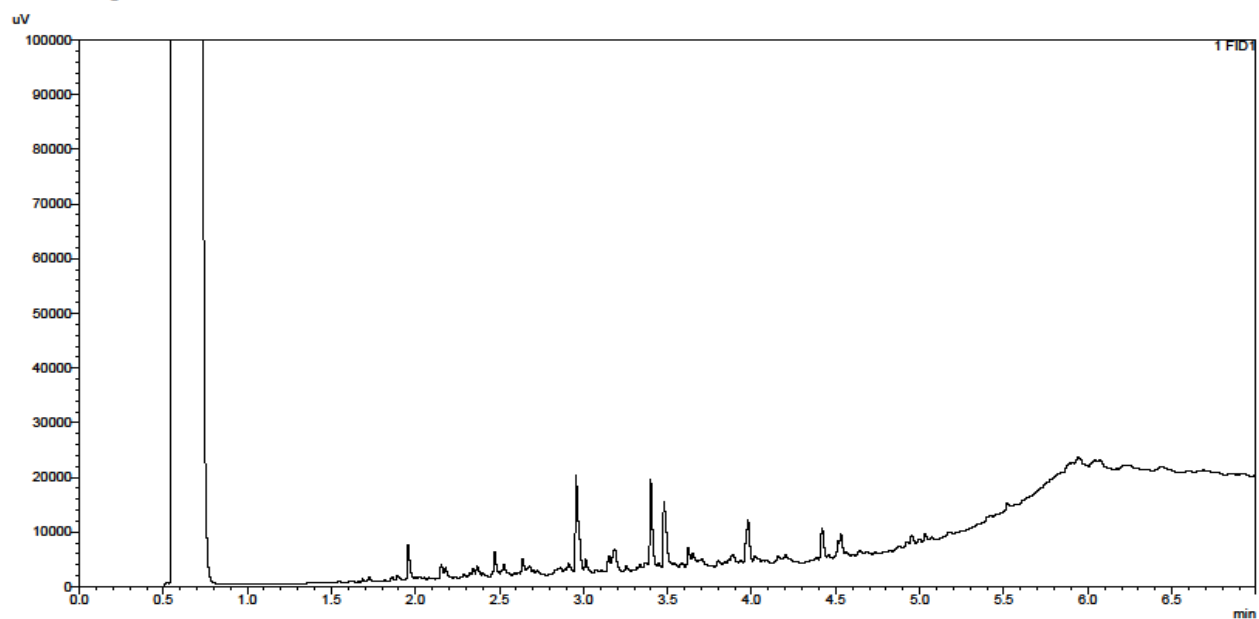
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<Sample Information>

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Data Filename : 24 March 2020_24032020_989312 20-08924_069.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 35
Date Acquired : 24/03/2020 21:10:46
Date Processed : 24/03/2020



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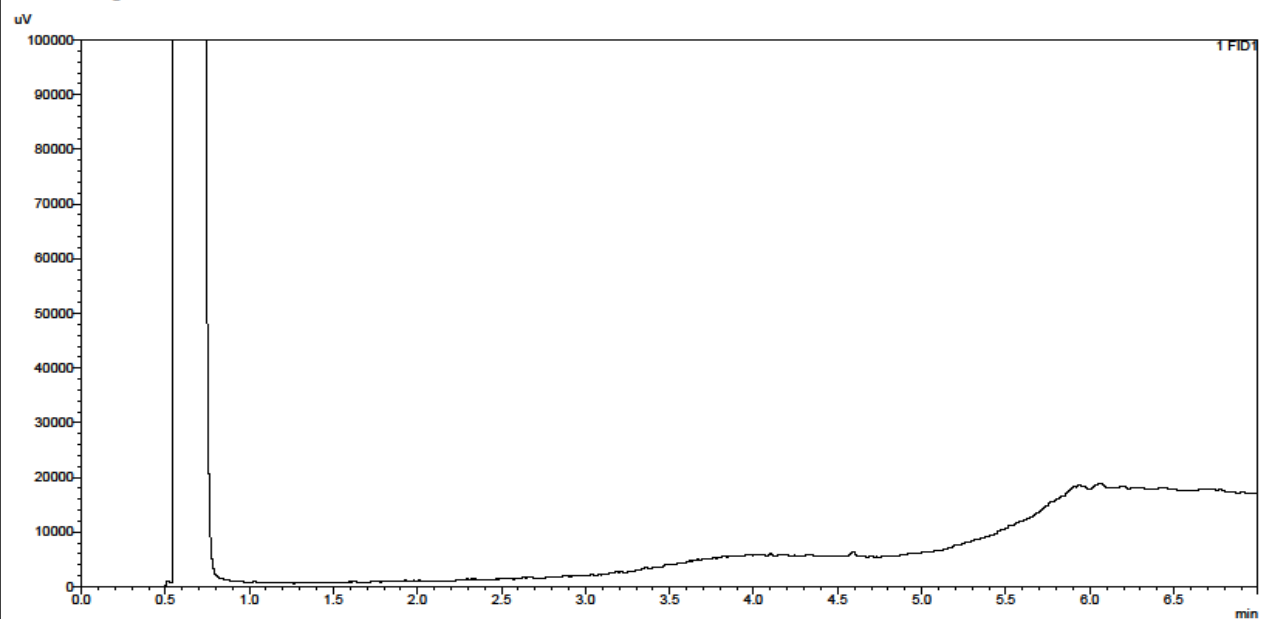
TPH Chromatogram on Soil Sample: 989313

<Sample Information>

Sample Name : 989313 20-08924
Data Filename : 24 March 2020_24032020_989313 20-08924_071.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 36
Date Acquired : 24/03/2020 21:23:22
Date Processed : 24/03/2020



<Chromatogram>



Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
989311		CP1		06-Mar-2020	B	Amber Glass 250ml
989311		CP1		06-Mar-2020	B	Amber Glass 60ml
989311		CP1		06-Mar-2020	B	Plastic Tub 500g

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
2300	Cyanides & Thiocyanate in Soils	Free (or easy 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– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage

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

customerservices@chemtest.com



Final Report

Report No.: 20-03976-1

Initial Date of Issue: 13-Feb-2020

Client LK Consult

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

Contact(s): Contaminated Land
Chris Hughes

Project LKC 20 1043 Tack Lea Works

Quotation No.: **Date Received:** 07-Feb-2020

Order No.: 737580 **Date Instructed:** 07-Feb-2020

No. of Samples: 7

Turnaround (Wkdays): 5 **Results Due:** 13-Feb-2020

Date Approved: 13-Feb-2020

Approved By:



Details: Glynn Harvey, Laboratory Manager

Project: LKC 20 1043 Tack Lea Works

Client: LK Consult	Chemtest Job No.:				20-03976	20-03976	20-03976	20-03976	20-03976	20-03976	20-03976
Quotation No.:	Chemtest Sample ID.:				965926	965927	965931	965934	965935	965936	965940
	Client Sample ID.:				TP201	TP201	TP203	TP204	TP204	TP205	TP207
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.4	1.4	0.4	1.9	2.3	0.0	0.0
	Bottom Depth (m):				1.0	2.0	1.0	2.0	2.5	1.0	0.4
	Date Sampled:				06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A	-	-	-	-	-	Fibres/Clumps	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	Stereo Microscopy	-
Asbestos by Gravimetry	U	2192	%	0.001						<0.001	
Total Asbestos	N	2192	%	0.001						<0.001	
Moisture	N	2030	%	0.020	15	13	22	33	18	17	20
Soil Colour	N	2040		N/A	Brown	Grey	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	None	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Loam	Clay	Loam	Loam	Loam	Loam	Loam
Chromatogram (TPH)	N			N/A	See Attached			See Attached			
pH	M	2010		4.0	8.1		7.5	7.7		8.5	8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40			0.66			
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.19		0.31	0.85		0.097	0.78
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50			< 0.50			
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50			< 0.50			
Arsenic	M	2450	mg/kg	1.0	6.4		130	52		46	27
Cadmium	M	2450	mg/kg	0.10	0.40		< 0.10	11		1.5	3.6
Chromium	M	2450	mg/kg	1.0	16		29	200		16	35
Copper	U	2450	mg/kg	0.50	29		680	760		62	130
Mercury	M	2450	mg/kg	0.10	< 0.10		1.4	2.5		0.31	0.17
Nickel	M	2450	mg/kg	0.50	29		47	48		48	41
Lead	M	2450	mg/kg	0.50	22		220	440		100	210
Selenium	M	2450	mg/kg	0.20	0.51		2.3	1.1		0.32	0.60
Vanadium	U	2450	mg/kg	5.0	16		19	23		36	43
Zinc	U	2450	mg/kg	0.50	100		210	890		260	370
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50	< 0.50		< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	2.6	2.6	7.2	12	3.3	19	11
Fuel Type	N	2670		N/A	Lube	N/A		Indiscernible	N/A		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	1200	< 1.0		120	< 1.0		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		

Results - Soil

Project: LKC 20 1043 Tack Lea Works

Client: LK Consult	Chemtest Job No.:				20-03976	20-03976	20-03976	20-03976	20-03976	20-03976	20-03976
Quotation No.:	Chemtest Sample ID.:				965926	965927	965931	965934	965935	965936	965940
	Client Sample ID.:				TP201	TP201	TP203	TP204	TP204	TP205	TP207
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.4	1.4	0.4	1.9	2.3	0.0	0.0
	Bottom Depth (m):				1.0	2.0	1.0	2.0	2.5	1.0	0.4
	Date Sampled:				06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020	06-Feb-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD							
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	1200	< 5.0		120	< 5.0		
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0		54	< 1.0		
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0		37	< 1.0		
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	430	< 1.0		590	< 1.0		
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	430	< 5.0		680	< 5.0		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	1700	< 10		810	< 10		
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0		
Naphthalene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.33		1.6	0.39
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.11		< 0.10	0.12
Fluorene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.24		< 0.10	0.12
Phenanthrene	M	2800	mg/kg	0.10	0.17		0.25	1.1		1.2	1.1
Anthracene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.39		0.18	0.30
Fluoranthene	M	2800	mg/kg	0.10	0.21		0.18	1.1		0.52	1.9
Pyrene	M	2800	mg/kg	0.10	0.22		0.24	1.4		0.47	1.7
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.77		0.23	0.85
Chrysene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.59		0.22	0.76
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.66		< 0.10	1.3
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.20		< 0.10	0.32
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.50		< 0.10	0.97
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.34		< 0.10	0.64
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10		< 0.10	0.32		< 0.10	0.65
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0		< 2.0	8.1		4.3	11
Total Phenols	M	2920	mg/kg	0.30	< 0.30			< 0.30			

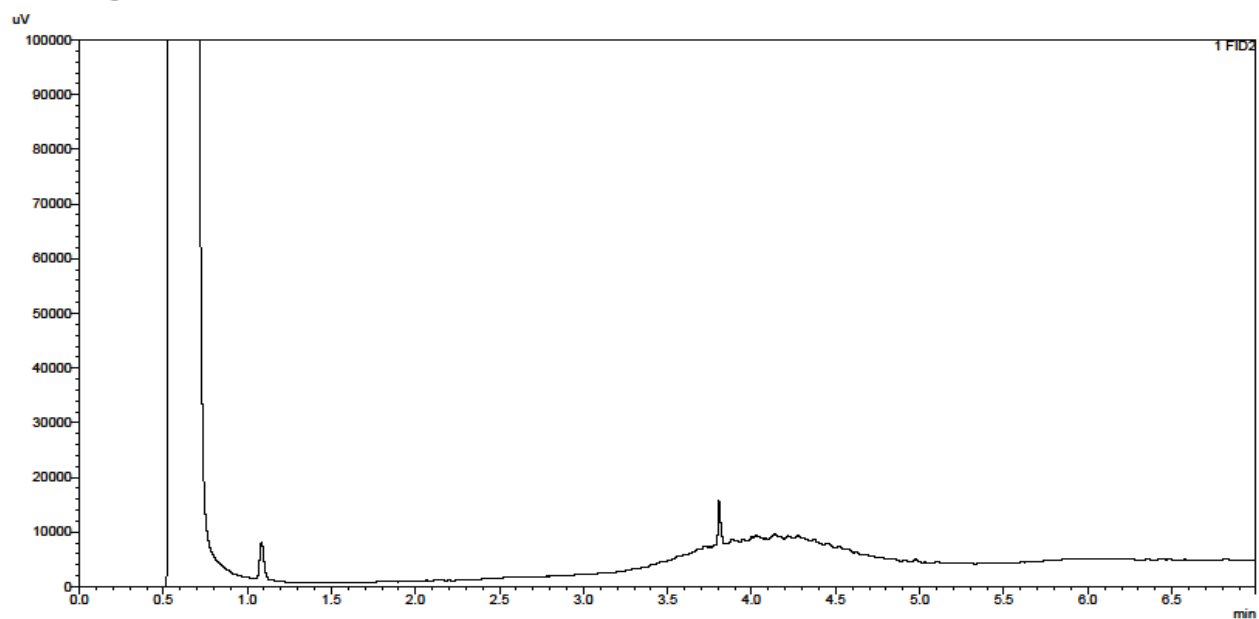
TPH Chromatogram on Soil Sample: 965926

<Sample Information>

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Data Filename : 10Feb2020_10022020_965926 20-03976_108.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 128
Date Acquired : 11/02/2020 03:45:16
Date Processed : 11/02/2020



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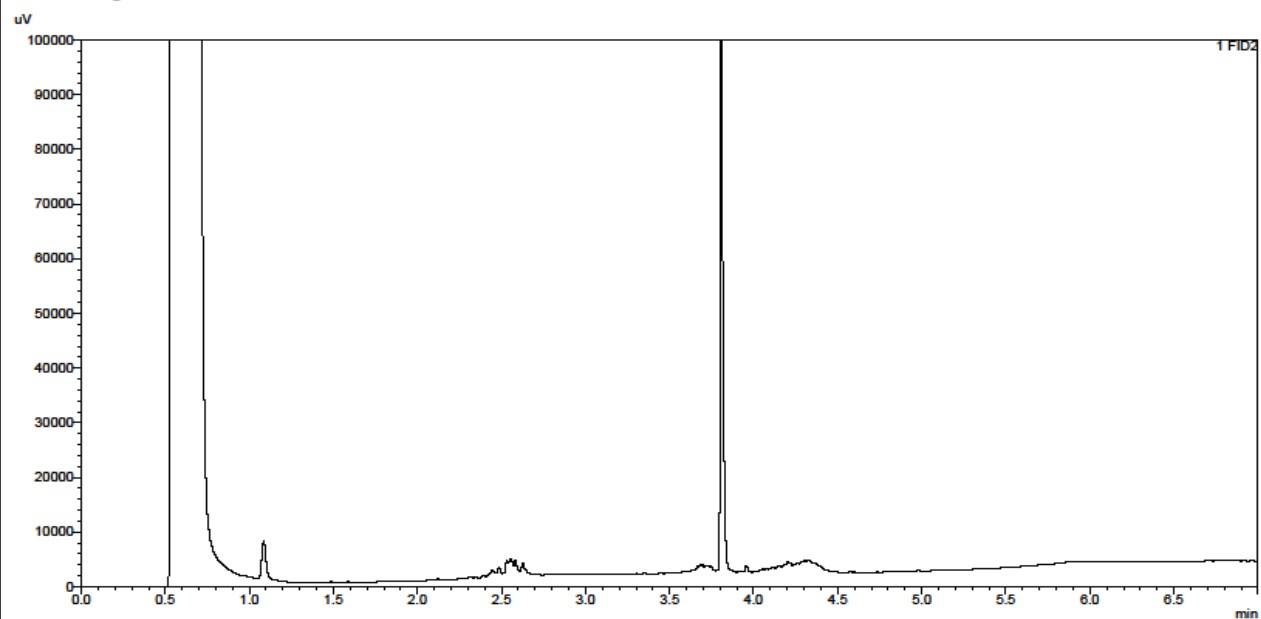
TPH Chromatogram on Soil Sample: 965934

<Sample Information>

Sample Name : 965934 20-03976
Data Filename : 10Feb2020_10022020_965934 20-03976_110.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 130
Date Acquired : 11/02/2020 04:10:50
Date Processed : 11/02/2020



<Chromatogram>



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
2300	Cyanides & Thiocyanate in Soils	Free (or easy 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– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
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 TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

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

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

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All Asbestos testing is performed at the indicated laboratory

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

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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 20 1043 –
Tack Lea Works, Bury

Job Number MRN 3816/47
Date of Issue 15 April 2020
Page 1 of 8

Approved Signatories

S J Hutchings, O P Davies

Notes

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

MURRAY RIX

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

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

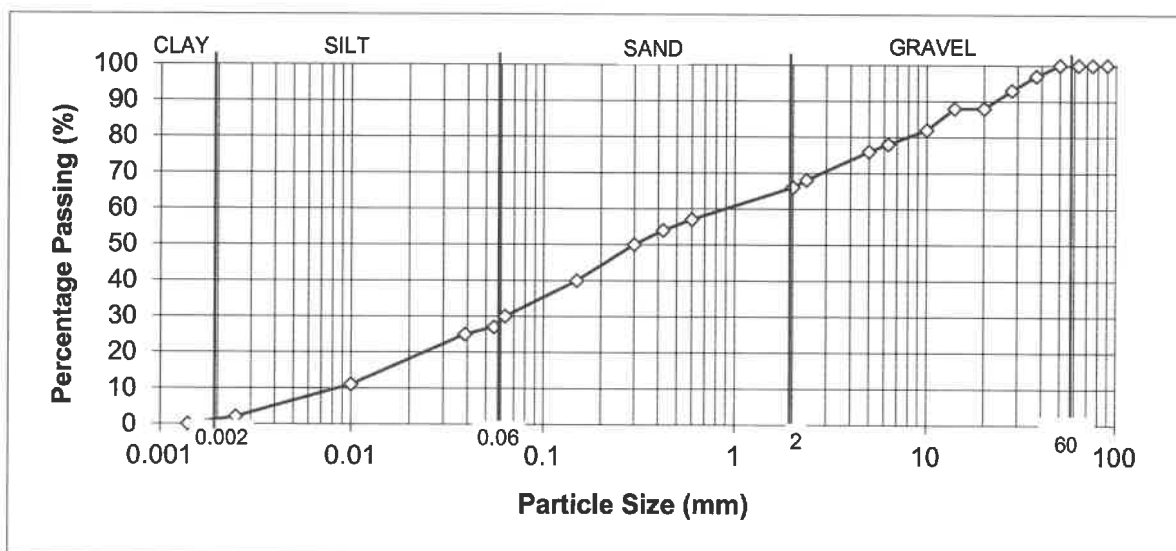
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd		
SITE	LKC 20 1043 - Tack Lea Works, Bury		
JOB NUMBER	MRN 3816/47		

SAMPLE LABEL	CP101 B 1.3-1.6m	DATE SAMPLED	Not advised
LAB SAMPLE No	88887	DATE RECEIVED	02-Apr-20
DATE TESTED	02-Apr-20	SAMPLED BY	Client

MATERIAL	Black silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	66	
75	100		0.6	57	
63	100		0.425	54	
50	100		0.3	50	
37.5	97		0.15	40	
28	93		0.063	30	
20	88		0.055	27	
14	88		0.039	25	
10	82		0.01	11	
6.3	78		0.0025	2	
5	76		0.0014	0	



REMARKS

As received moisture content = 21%

SIGNED

NAME

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

DATE

15-Apr-20

MURRAY RIX

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

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION BS 1377: PART 7: 1990:CLAUSE 8 SINGLE STAGE

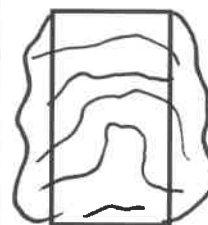
CLIENT	LK Consult Ltd
SITE	LKC 20 1292 ESS117 – Land at Bushy Hill, Chelmsford
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP101 U 5.0-5.45	DATE SAMPLED	Not advised
LAB SAMPLE No	88888	DATE RECEIVED	02 April 2020
DATE TESTED	06 April 2020	SAMPLED BY	Client

MATERIAL	Firm brown silty sandy CLAY with occasional gravel
ADVISED SOURCE	Site Investigation sample

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	102	mm
MOISTURE CONTENT OF SAMPLE	15	%
BULK DENSITY	2.12	Mg/m ³
DRY DENSITY	1.84	Mg/m ³
DEPTH OF TOP OF SPECIMEN	5.20	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
100	20	2.0	104.4	52

REMARKS

SIGNED

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

DATE 15 April 2020

MURRAY RIX

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

TEST CERTIFICATE

DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

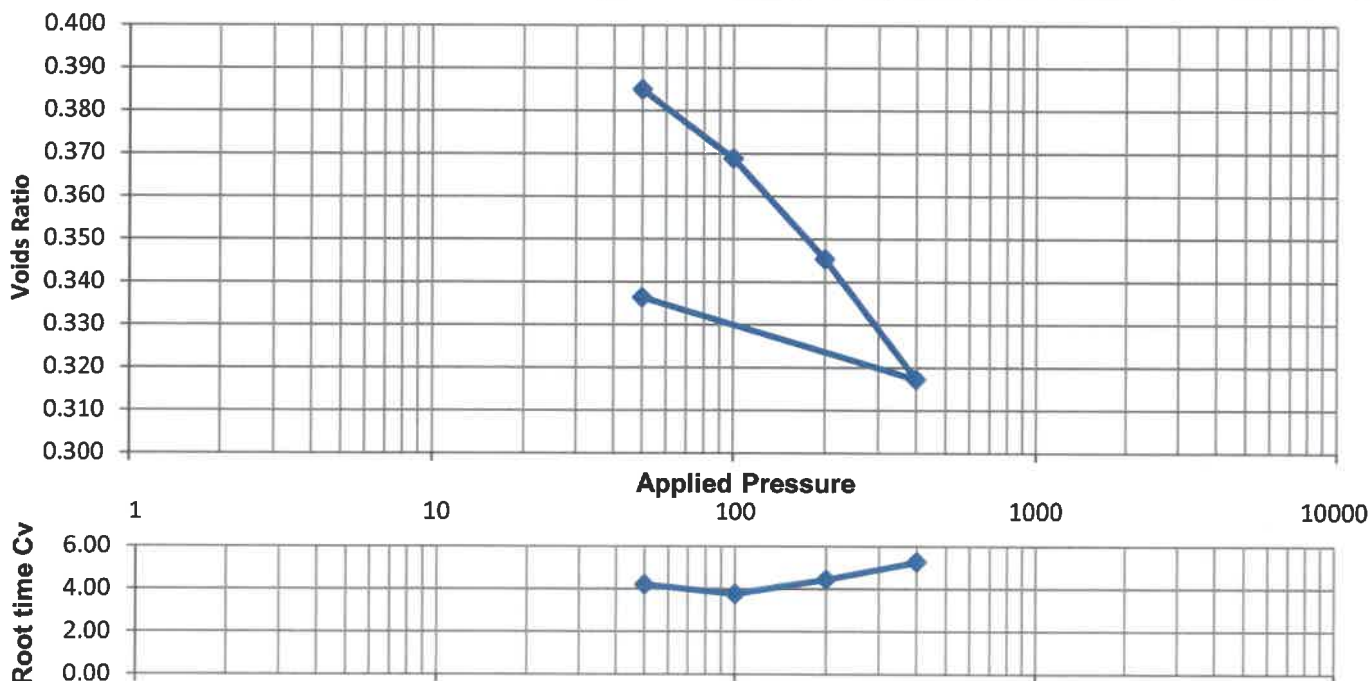
BS 1377 : PART 5 : Clause 3 : 1990

CLIENT	LK Consult Ltd
SITE	LKC 20 1043 - Tack Lea Works, Bury
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP101 U 5.0-5.45	DATE SAMPLED	Not advised
LAB SAMPLE No.	88888	DATE RECEIVED	02-Apr-20
DATE TESTED	06-Apr-20	SAMPLED BY	Client
MATERIAL	Firm brown silty sandy CLAY with occasional gravel		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	100
	Sample Orientation	Vertical	Specimen Condition	Undisturbed

INITIAL CONDITIONS					Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m2/MN	Temp °C	Cv t90 root m2/yr	Cv t50 log m2/yr
Height	20.0 mm	Particle density	2.65	Ass	1	50	19.32	0.385	0.65	18	4.18	4.18
Diameter	75.0 mm	Initial void ratio	0.43		2	100	19.10	0.369	0.24	18	3.76	5.05
Weight wet	188.4 g	Deg. of sat.	94	%	3	200	18.77	0.345	0.18	18	4.42	3.88
Moist. cont.	15 %	Swell. press.	5	kN/m2	4	400	18.38	0.317	0.11	18	5.25	5.28
Bulk Density	2.14 Mg/m3	Dry density	1.85	Mg/m3	5	50	18.65	0.336	0.04	18		
					6							
					7							



Remarks/Abnormalities

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

Signed

Date 15 April 2020

MURRAY RIX

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

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

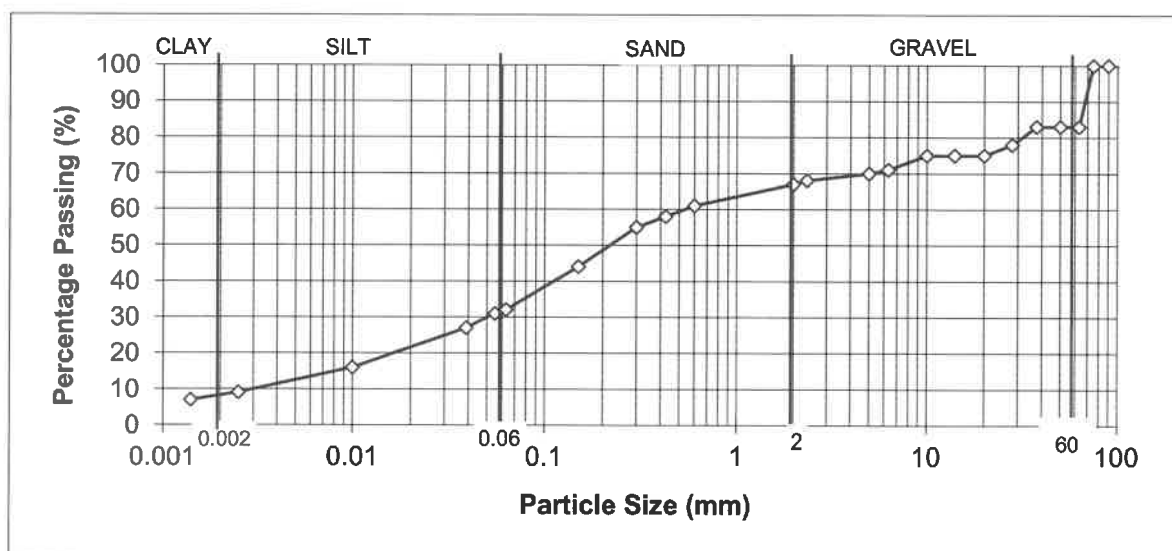
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 20 1043 - Tack Lea Works, Bury
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP102 B 1.4-1.7m	DATE SAMPLED	Not advised
LAB SAMPLE No	88889	DATE RECEIVED	02-Apr-20
DATE TESTED	02-Apr-20	SAMPLED BY	Client

MATERIAL	Brown clayey silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	67	
75	100		0.6	61	
63	83		0.425	58	
50	83		0.3	55	
37.5	83		0.15	44	
28	78		0.063	32	
20	75		0.055	31	
14	75		0.039	27	
10	75		0.01	16	
6.3	71		0.0025	9	
5	70		0.0014	7	



REMARKS

As received moisture content = 16%

SIGNED

NAME

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

DATE

15-Apr-20

MURRAY RIX

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

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

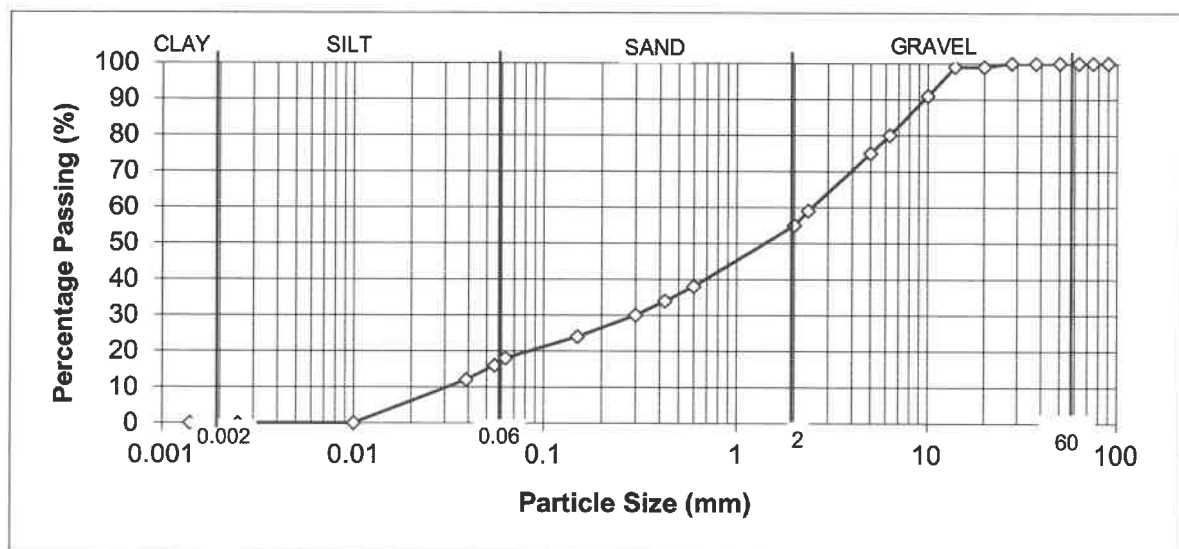
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 20 1043 - Tack Lea Works, Bury
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP102 B 6.0-6.3m	DATE SAMPLED	Not advised
LAB SAMPLE No	88890	DATE RECEIVED	02-Apr-20
DATE TESTED	02-Apr-20	SAMPLED BY	Client

MATERIAL	Black silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	59	
90	100		2	55	
75	100		0.6	38	
63	100		0.425	34	
50	100		0.3	30	
37.5	100		0.15	24	
28	100		0.063	18	
20	99		0.055	16	
14	99		0.039	12	
10	91		0.01	0	
6.3	80		0.0025	0	
5	75		0.0014	0	



REMARKS

As received moisture content = 32%

SIGNED

NAME

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

DATE

15-Apr-20

MURRAY RIX

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

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

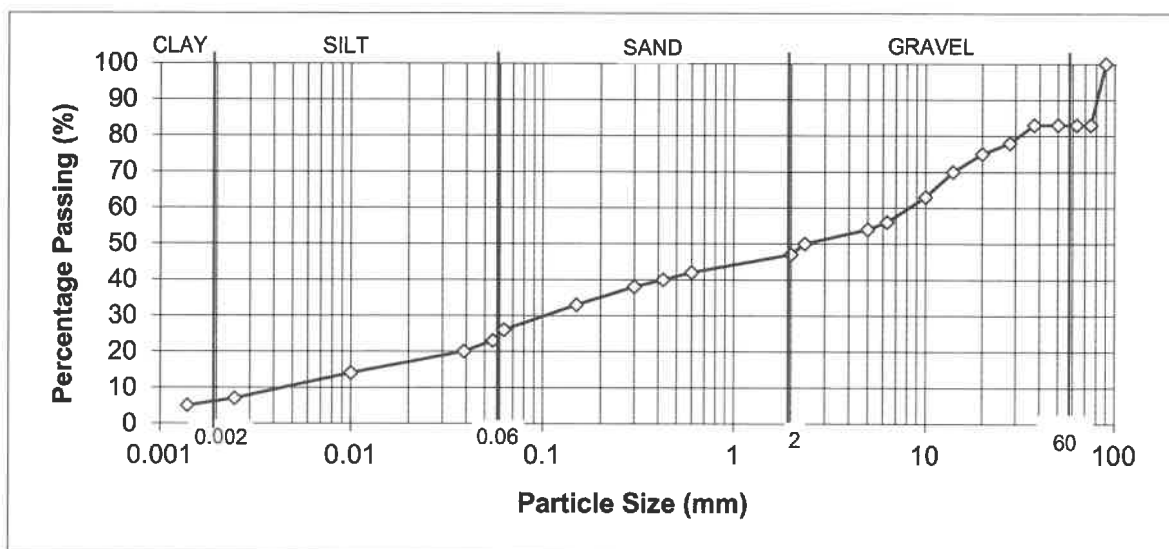
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 20 1043 - Tack Lea Works, Bury
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP103 B 1.3-1.6m	DATE SAMPLED	Not advised
LAB SAMPLE No	88891	DATE RECEIVED	02-Apr-20
DATE TESTED	02-Apr-20	SAMPLED BY	Client

MATERIAL	Brown clayey silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	50	
90	100		2	47	
75	83		0.6	42	
63	83		0.425	40	
50	83		0.3	38	
37.5	83		0.15	33	
28	78		0.063	26	
20	75		0.055	23	
14	70		0.039	20	
10	63		0.01	14	
6.3	56		0.0025	7	
5	54		0.0014	5	



REMARKS

As received moisture content = 16%

SIGNED

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

DATE 15-Apr-20

MURRAY RIX

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

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

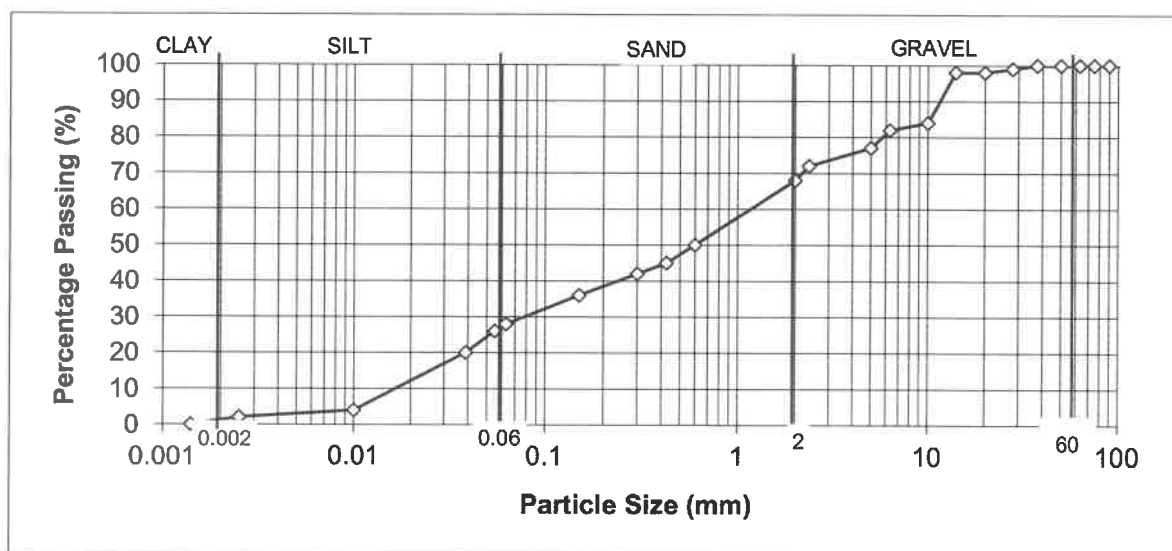
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	LKC 20 1043 - Tack Lea Works, Bury
JOB NUMBER	MRN 3816/47

SAMPLE LABEL	CP103 B 4.5-4.8m	DATE SAMPLED	Not advised
LAB SAMPLE No	88892	DATE RECEIVED	02-Apr-20
DATE TESTED	02-Apr-20	SAMPLED BY	Client

MATERIAL	Black silty SAND and GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	68	
75	100		0.6	50	
63	100		0.425	45	
50	100		0.3	42	
37.5	100		0.15	36	
28	99		0.063	28	
20	98		0.055	26	
14	98		0.039	20	
10	84		0.01	4	
6.3	82		0.0025	2	
5	77		0.0014	0	



REMARKS

As received moisture content = 29%

SIGNED

NAME

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

DATE

15-Apr-20

Appendix E

Certificate of Analysis – Groundwater



2183

Final Report

Report No.: 20-09523-1
Initial Date of Issue: 03-Apr-2020
Client LK Consult
Client Address: Unit 29 Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Chris Hughes
Contaminated Land

Project LKC 20 1043 - Tack Lea

Quotation No.: **Date Received:** 27-Mar-2020

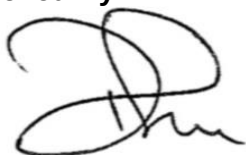
Order No.: 737693 **Date Instructed:** 27-Mar-2020

No. of Samples: 3

Turnaround (Wkdays): 5 **Results Due:** 02-Apr-2020

Date Approved: 03-Apr-2020

Approved By:



Details: Darrell Hall, Director

Project: LKC 20 1043 - Tack Lea

Client: LK Consult	Chemtest Job No.:				20-09523	20-09523	20-09523
Quotation No.:	Chemtest Sample ID.:				992591	992592	992593
	Client Sample ID.:				CP101 (East)	CP102 (South)	CP103 (West)
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020
Determinand	Accred.	SOP	Units	LOD			
pH	U	1010		N/A	7.8	7.5	7.7
Sulphate	U	1220	mg/l	1.0	27	320	190
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Calcium	U	1415	mg/l	5.0	140	140	130
Total Hardness as CaCO3	U	1270	mg/l	15	590	420	400
Arsenic (Dissolved)	U	1450	µg/l	1.0	< 1.0	2.1	2.2
Boron (Dissolved)	U	1450	µg/l	20	< 20	100	97
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	0.17	0.13
Chromium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	1.0
Copper (Dissolved)	U	1450	µg/l	1.0	< 1.0	2.1	1.6
Manganese (Dissolved)	U	1450	µg/l	1.0	1400		46
Nickel (Dissolved)	U	1450	µg/l	1.0	1.7	4.5	3.4
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	5.4	9.6	2.7
Vanadium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	4.6	26	21
Mercury Low Level	U	1460	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20
Dissolved Organic Carbon	U	1610	mg/l	2.0	4.9	6.5	5.4
Fuel Type	N	1670		N/A	N/A	N/A	N/A
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10

Project: LKC 20 1043 - Tack Lea

Client: LK Consult	Chemtest Job No.:				20-09523	20-09523	20-09523
Quotation No.:	Chemtest Sample ID.:				992591	992592	992593
	Client Sample ID.:				CP101 (East)	CP102 (South)	CP103 (West)
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020
Determinand	Accred.	SOP	Units	LOD			
Dichlorodifluoromethane	U	1760	µg/l	1.0		< 1.0	
Chloromethane	U	1760	µg/l	1.0		< 1.0	
Vinyl Chloride	N	1760	µg/l	1.0		< 1.0	
Bromomethane	U	1760	µg/l	5.0		< 5.0	
Chloroethane	U	1760	µg/l	2.0		< 2.0	
Trichlorofluoromethane	U	1760	µg/l	1.0		< 1.0	
1,1-Dichloroethene	U	1760	µg/l	1.0		< 1.0	
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0		< 1.0	
1,1-Dichloroethane	U	1760	µg/l	1.0		< 1.0	
cis 1,2-Dichloroethene	U	1760	µg/l	1.0		< 1.0	
Bromochloromethane	U	1760	µg/l	5.0		< 5.0	
Trichloromethane	U	1760	µg/l	1.0		< 1.0	
1,1,1-Trichloroethane	U	1760	µg/l	1.0		< 1.0	
Tetrachloromethane	U	1760	µg/l	1.0		< 1.0	
1,1-Dichloropropene	U	1760	µg/l	1.0		< 1.0	
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0		< 2.0	
Trichloroethene	N	1760	µg/l	1.0		< 1.0	
1,2-Dichloropropane	U	1760	µg/l	1.0		< 1.0	
Dibromomethane	U	1760	µg/l	10		< 10	
Bromodichloromethane	U	1760	µg/l	5.0		< 5.0	
cis-1,3-Dichloropropene	N	1760	µg/l	10		< 10	
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10		< 10	
1,1,2-Trichloroethane	U	1760	µg/l	10		< 10	
Tetrachloroethene	U	1760	µg/l	1.0		< 1.0	
1,3-Dichloropropane	U	1760	µg/l	2.0		< 2.0	
Dibromochloromethane	U	1760	µg/l	10		< 10	
1,2-Dibromoethane	U	1760	µg/l	5.0		< 5.0	
Chlorobenzene	N	1760	µg/l	1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0		< 2.0	
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0		< 1.0	
Tribromomethane	U	1760	µg/l	1.0		< 1.0	
Isopropylbenzene	U	1760	µg/l	1.0		< 1.0	
Bromobenzene	U	1760	µg/l	1.0		< 1.0	
1,2,3-Trichloropropane	N	1760	µg/l	50		< 50	
N-Propylbenzene	U	1760	µg/l	1.0		< 1.0	

Project: LKC 20 1043 - Tack Lea

Client: LK Consult	Chemtest Job No.:				20-09523	20-09523	20-09523
Quotation No.:	Chemtest Sample ID.:				992591	992592	992593
	Client Sample ID.:				CP101 (East)	CP102 (South)	CP103 (West)
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020
Determinand	Accred.	SOP	Units	LOD			
2-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	
4-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	
Tert-Butylbenzene	U	1760	µg/l	1.0		< 1.0	
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	
Sec-Butylbenzene	U	1760	µg/l	1.0		< 1.0	
1,3-Dichlorobenzene	N	1760	µg/l	1.0		< 1.0	
4-Isopropyltoluene	U	1760	µg/l	1.0		< 1.0	
1,4-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	
N-Butylbenzene	U	1760	µg/l	1.0		< 1.0	
1,2-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50		< 50	
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0		< 1.0	
Hexachlorobutadiene	U	1760	µg/l	1.0		< 1.0	
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0		< 2.0	
Carbon Disulphide	N	1760	µg/l	2.0		< 2.0	
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50		< 0.50	
Phenol	N	1790	µg/l	0.50		< 0.50	
2-Chlorophenol	N	1790	µg/l	0.50		< 0.50	
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50		< 0.50	
1,3-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50	
1,4-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50	
1,2-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50	
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50		< 0.50	
Hexachloroethane	N	1790	µg/l	0.50		< 0.50	
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50		< 0.50	
4-Methylphenol	N	1790	µg/l	0.50		< 0.50	
Nitrobenzene	N	1790	µg/l	0.50		< 0.50	
Isophorone	N	1790	µg/l	0.50		< 0.50	
2-Nitrophenol	N	1790	µg/l	0.50		< 0.50	
2,4-Dimethylphenol	N	1790	µg/l	0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50		< 0.50	
2,4-Dichlorophenol	N	1790	µg/l	0.50		< 0.50	
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50		< 0.50	
Naphthalene	N	1790	µg/l	0.50		< 0.50	
4-Chloroaniline	N	1790	µg/l	0.50		< 0.50	
Hexachlorobutadiene	N	1790	µg/l	0.50		< 0.50	
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50		< 0.50	

Project: LKC 20 1043 - Tack Lea

Client: LK Consult	Chemtest Job No.:				20-09523	20-09523	20-09523
Quotation No.:	Chemtest Sample ID.:				992591	992592	992593
	Client Sample ID.:				CP101 (East)	CP102 (South)	CP103 (West)
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020
Determinand	Accred.	SOP	Units	LOD			
2-Methylnaphthalene	N	1790	µg/l	0.50		< 0.50	
Hexachlorocyclopentadiene	N	1790	µg/l	0.50		< 0.50	
2,4,6-Trichlorophenol	N	1790	µg/l	0.50		< 0.50	
2,4,5-Trichlorophenol	N	1790	µg/l	0.50		< 0.50	
2-Chloronaphthalene	N	1790	µg/l	0.50		< 0.50	
2-Nitroaniline	N	1790	µg/l	0.50		< 0.50	
Acenaphthylene	N	1790	µg/l	0.50		< 0.50	
Dimethylphthalate	N	1790	µg/l	0.50		< 0.50	
2,6-Dinitrotoluene	N	1790	µg/l	0.50		< 0.50	
Acenaphthene	N	1790	µg/l	0.50		< 0.50	
3-Nitroaniline	N	1790	µg/l	0.50		< 0.50	
Dibenzofuran	N	1790	µg/l	0.50		< 0.50	
4-Chlorophenylphenylether	N	1790	µg/l	0.50		< 0.50	
2,4-Dinitrotoluene	N	1790	µg/l	0.50		< 0.50	
Fluorene	N	1790	µg/l	0.50		< 0.50	
Diethyl Phthalate	N	1790	µg/l	0.50		< 0.50	
4-Nitroaniline	N	1790	µg/l	0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50		< 0.50	
Azobenzene	N	1790	µg/l	0.50		< 0.50	
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50		< 0.50	
Hexachlorobenzene	N	1790	µg/l	0.50		< 0.50	
Pentachlorophenol	N	1790	µg/l	0.50		< 0.50	
Phenanthrene	N	1790	µg/l	0.50		< 0.50	
Anthracene	N	1790	µg/l	0.50		< 0.50	
Carbazole	N	1790	µg/l	0.50		< 0.50	
Di-N-Butyl Phthalate	N	1790	µg/l	0.50		< 0.50	
Fluoranthene	N	1790	µg/l	0.50		< 0.50	
Pyrene	N	1790	µg/l	0.50		< 0.50	
Butylbenzyl Phthalate	N	1790	µg/l	0.50		< 0.50	
Benzo[a]anthracene	N	1790	µg/l	0.50		< 0.50	
Chrysene	N	1790	µg/l	0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50		< 0.50	
Di-N-Octyl Phthalate	N	1790	µg/l	0.50		< 0.50	
Benzo[b]fluoranthene	N	1790	µg/l	0.50		< 0.50	
Benzo[k]fluoranthene	N	1790	µg/l	0.50		< 0.50	
Benzo[a]pyrene	N	1790	µg/l	0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50		< 0.50	
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50		< 0.50	
Benzo[g,h,i]perylene	N	1790	µg/l	0.50		< 0.50	
4-Nitrophenol	N	1790	µg/l	0.50		< 0.50	

Project: LKC 20 1043 - Tack Lea

Client: LK Consult	Chemtest Job No.:				20-09523	20-09523	20-09523
Quotation No.:	Chemtest Sample ID.:				992591	992592	992593
	Client Sample ID.:				CP101 (East)	CP102 (South)	CP103 (West)
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020
Determinand	Accred.	SOP	Units	LOD			
Naphthalene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030

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 CaCO ₃ equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1460	Mercury low-level in Waters by AFS	Mercury	Atomic Fluorescence Spectrometry, with collimated UV source, wavelength 253.7 nm.
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; 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

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage

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

customerservices@chemtest.com



2183

Final Report

Report No.: 20-11720-1

Initial Date of Issue: 11-May-2020

Client LK Consult

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

Contact(s): Contaminated Land
Chris Hughes

Project LKC 20 1043 Tack Lea Works, Bury

Quotation No.: **Date Received:** 05-May-2020

Order No.: 737580 **Date Instructed:** 05-May-2020

No. of Samples: 1

Turnaround (Wkdays): 5 **Results Due:** 12-May-2020

Date Approved: 11-May-2020

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Client: LK Consult	Chemtest Job No.:				20-11720
Quotation No.:	Chemtest Sample ID.:				1002055
	Client Sample ID.:				SW202
	Sample Type:				WATER
	Date Sampled:				04-May-2020
Determinand	Accred.	SOP	Units	LOD	
pH	U	1010		N/A	8.2
Sulphate	U	1220	mg/l	1.0	37
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050
Calcium	U	1415	mg/l	5.0	33
Total Hardness as CaCO ₃	U	1270	mg/l	15	140
Arsenic (Dissolved)	U	1450	µg/l	1.0	< 1.0
Boron (Dissolved)	U	1450	µg/l	20	28
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	5.8
Copper (Dissolved)	U	1450	µg/l	1.0	2.8
Manganese (Dissolved)	U	1450	µg/l	1.0	18
Nickel (Dissolved)	U	1450	µg/l	1.0	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	1.0
Vanadium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	2.7
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	6.5
Fuel Type	N	1670		N/A	N/A
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

Results - Water

Client: LK Consult	Chemtest Job No.:				20-11720
Quotation No.:	Chemtest Sample ID.:				1002055
	Client Sample ID.:				SW202
	Sample Type:				WATER
	Date Sampled:				04-May-2020
Determinand	Accred.	SOP	Units	LOD	
Toluene	U	1760	µg/l	1.0	< 1.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0
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	0.10	< 0.10
Total Phenols	U	1920	mg/l	0.030	< 0.030

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 CaCO ₃ equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1460	Mercury low-level in Waters by AFS	Mercury	Atomic Fluorescence Spectrometry, with collimated UV source, wavelength 253.7 nm.
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >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; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

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Appendix F

Previous Gas Monitoring Results



LK CONSULT LTD

GAS MONITORING RECORD

SITE	Tack Lea, Bury
REF	LKC 16 1018
DATE	30-Sep-2016
STAFF	AT
VISIT	6 of 6

EQUIPMENT ^{*1}		
Instrument / Model Type	Serial Number	Comments
Geotechnical Instruments GA5000	G502417	Serviced, calibrated & gas checked.
Geotech dipmeter	79864	Operating Normally

ATMOSPHERIC / GROUND CONDITIONS	
Atmospheric Pressure Trend on Site	Steady
Atmospheric Pressure (Prev 24hrs)	Rising
Weather Conditions	Sunny, cool, no wind
Ground Conditions	Dry

Borehole ID	Date/Time	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Peak CH4 (% v/v)	% of Lower Explosive Limit ^{*2}	CO Pod (ppm)	H2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow ^{*3} (ltr/hr)	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Notes
WS01	30/09/2016 10:19	0.0	6.6	8.5	0.0	0.0	3.0	1.0	84.9	989	0.0	2.14	3.03	
WS02	30/09/2016 10:07	0.0	2.0	18.9	0.0	0.0	2.0	1.0	79.1	988	0.0	0.51	1.94	Steady flow after 2m 45s. Water in tube after 95s.
WS03	30/09/2016 10:29	0.0	2.0	17.9	0.0	0.0	2.0	1.0	80.1	990	0.0	4.29	4.93	
WS04	30/09/2016 10:37	0.0	8.2	9.7	0.0	0.0	4.0	1.0	82.1	991	0.0	2.92	3.02	
WS05	30/09/2016 10:46	0.0	0.2	20.1	0.0	0.0	4.0	1.0	79.7	991	0.0	1.69	3.48	
WS06	30/09/2016 10:56	0.0	3.4	15.6	0.0	0.0	0.0	1.0	81.0	992	-0.1	DRY	4.38	Borehole dry.

ABBREVIATIONS			
^{*1}	Refer to Note 1	ppm	Parts per million
ND	Not detected	mb	Millibars
NR	Not recorded	ltr/hr	Litres per hour
UR	Unable to record	mbgl	Metres below ground level
OS	Off recordable scale	LEL	Lower explosive limit in air
N/A	Not applicable	OEL	Occupational exposure limit
% v/v	Percentage volume by total volume		

NOTES	
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)
4.	After CIRIA C665. GSV = gas concentration (%) x flow rate. Peak CH4 and Steady CO2 values used.
5.	Monitoring is carried out in line with procedures set by LKC Ltd with reference to CIRIA C665. Refer to procedural documents



LK CONSULT LTD

GAS MONITORING RECORD

SITE	Tack Lea, Bury
REF	LKC 16 1018
DATE	13-Sep-2016
STAFF	AT
VISIT	5 of 6

EQUIPMENT ^{*1}		
Instrument / Model Type	Serial Number	Comments
Geotechnical Instruments GA5000	G502417	Serviced, calibrated & gas checked.
Geotech dipmeter	79864	Operating Normally

ATMOSPHERIC / GROUND CONDITIONS	
Atmospheric Pressure Trend on Site	Rising
Atmospheric Pressure (Prev 24hrs)	Steady
Weather Conditions	Sunny, warm, no wind
Ground Conditions	Dry

Borehole ID	Date/Time	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Peak CH4 (% v/v)	% of Lower Explosive Limit ^{*2}	CO Pod (ppm)	H2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow ^{*3} (ltr/hr)	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Notes
WS101	13/09/2016 10:37	0.0	6.5	9.0	0.0	0.0	5.0	1.0	84.5	994	0.0	2.20	3.02	
WS102	13/09/2016 10:27	0.2	1.6	18.4	0.2	4.0	7.0	1.0	79.8	993	0.0	0.51	1.93	
WS103	13/09/2016 10:47	0.0	1.7	17.7	0.0	0.0	6.0	1.0	80.6	995	0.0	4.30	4.93	
WS104	13/09/2016 10:55	0.0	1.8	16.6	0.0	0.0	6.0	1.0	81.6	996	-0.1	2.93	3.02	
WS105	13/09/2016 11:04	0.0	0.1	19.6	0.0	0.0	5.0	1.0	80.3	996	0.1	1.69	3.48	
WS106	13/09/2016 11:13	0.0	0.0	19.7	0.0	0.0	1.0	1.0	80.3	996	0.0	DRY	4.38	Borehole dry.

ABBREVIATIONS			
^{*1}	Refer to Note 1	ppm	Parts per million
ND	Not detected	mb	Millibars
NR	Not recorded	ltr/hr	Litres per hour
UR	Unable to record	mbgl	Metres below ground level
OS	Off recordable scale	LEL	Lower explosive limit in air
N/A	Not applicable	OEL	Occupational exposure limit
% v/v	Percentage volume by total volume		

NOTES	
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)
4.	After CIRIA C665. GSV = gas concentration (%) x flow rate. Peak CH4 and Steady CO2 values used.
5.	Monitoring is carried out in line with procedures set by LKC Ltd with reference to CIRIA C665. Refer to procedural documents



LK CONSULT LTD

GAS MONITORING RECORD

SITE	Tack Lea, Bury
REF	LKC 16 1018
DATE	30-Aug-2016
STAFF	AT
VISIT	4 of 6

EQUIPMENT ^{*1}		
Instrument / Model Type	Serial Number	Comments
Geotechnical Instruments GA5000	G502417	Serviced, calibrated & gas checked.
Geotech dipmeter	79864	Operating Normally

ATMOSPHERIC / GROUND CONDITIONS	
Atmospheric Pressure Trend on Site	Rising
Atmospheric Pressure (Prev 24hrs)	Rising
Weather Conditions	Overcast, warm, no wind
Ground Conditions	Dry

Borehole ID	Date/Time	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Peak CH4 (% v/v)	% of Lower Explosive Limit ^{*2}	CO Pod (ppm)	H2S Pod (ppm)	Balance (%)	Barometric Pressure (mb)	Relative Pressure (mb)	Internal Flow ^{*3} (ltr/hr)	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Notes
WS101	30/08/2016 11:17	0.0	6.3	9.9	0.0	0.0	4.0	1.0	83.8	1006	0.0	-0.1	2.20	3.02	
WS102	30/08/2016 11:02	1.5	2.1	17.9	1.5	0.0	6.0	1.0	78.5	1006	0.0	0.0	0.58	1.94	Flow steady after 4 m 33 s. Water in tube.
WS103	30/08/2016 11:29	0.0	1.5	18.6	0.0	0.0	9.0	1.0	79.9	1007	0.0	0.0	4.29	4.92	
WS104	30/08/2016 11:43	0.0	2.2	17.1	0.0	0.0	5.0	1.0	80.7	1008	0.0	-0.1	2.94	3.02	
WS105	30/08/2016 11:56	0.0	0.1	20.4	0.0	0.0	4.0	1.0	79.5	1008	0.0	0.0	1.69	3.48	
WS106	30/08/2016 12:13	0.0	0.1	20.5	0.0	0.0	2.0	1.0	79.4	1009	0.0	-0.1		4.37	
CPBH	-	-	-	-	-	-	-	-	-	-	-	-	9.84	10.08	CPBH from previous SI. Dipped, no gas.

ABBREVIATIONS			
^{*1}	Refer to Note 1	ppm	Parts per million
ND	Not detected	mb	Millibars
NR	Not recorded	ltr/hr	Litres per hour
UR	Unable to record	mbgl	Metres below ground level
OS	Off recordable scale	LEL	Lower explosive limit in air
N/A	Not applicable	OEL	Occupational exposure limit
% v/v	Percentage volume by total volume		

- NOTES**
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)
 4. After CIRIA C665. GSV = gas concentration (%) x flow rate. Peak CH4 and Steady CO2 values used.
 5. Monitoring is carried out in line with procedures set by LKC Ltd with reference to CIRIA C665. Refer to procedural documents



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)
4. After CIRIA C665. GSV = gas concentration (%) x flow rate. Peak CH4 and Steady CO2 values used.
5. Monitoring is carried out in line with procedures set by LKC Ltd with reference to CIRIA C665. Refer to procedural documents



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)
4. After CIRIA C665, GSV = gas concentration (%) x flow rate. Peak CH4 and Steady CO2 values used.
5. Monitoring is carried out in line with procedures set by LKC Ltd with reference to CIRIA C665. Refer to procedural documents

Appendix G

Generic Assessment Criteria Values

Summary of Category 4 Screening Levels: 2015

Substance	Residential (with home- grown produce)	Residential (without home- grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	170 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5.0 mg/kg	5.3 mg/kg	5.7 mg/kg	77 mg/kg	10 mg/kg	21 mg/kg
Cadmium	22 mg/kg	150 mg/kg	3.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	21 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2300 mg/kg	630 mg/kg	1300 mg/kg

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

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

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel	6%	180	180	230	980	230	3,400
	Selenium	6%	250	430	88	12,000	1,100	1,800
	Vanadium	6%	410	1,200	91	9,000	2,000	5,000
Zinc	6%	3,700	40,000	620	730,000	81,000	170,000	
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90
		2.5%	0.17	0.70	0.034	47	72	100
		6%	0.37	1.4	0.075	90	73	110
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920) ^{vap}
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220) ^{vap}
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}
	o-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470) ^{vap}
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}
	p-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}

NOTES

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

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

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

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

NOTES

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

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

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

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

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

NOTES

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

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

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

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

NOTES

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

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

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}
		6%	2.4	2.4	32	290	14,000	2,900
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190
		6%	22	38	7.0	830	100	190
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100
		2.5%	2.0	150	0.30	4,000	620	1,100
		6%	4.5	210	0.70	4,300	620	1,100
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110
		2.5%	0.52	29	8.0E-02	400	60	120
		6%	1.2	31	0.19	400	60	120
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300
		2.5%	0.29	0.29	10	22	11,000	1,900
		6%	0.62	0.62	23	47	11,000	2,700
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48
		2.5%	0.7	0.78	0.61	66	25	50
		6%	1.6	1.8	1.4	120	25	51
	Phenol	1%	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
		2.5%	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
		6%	1,100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)

NOTES

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

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

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

Appendix H

Hazard Index Spreadsheets

$$HI = \sum_{Fi=1}^{16} HQ Fi = \frac{\text{Measured concentration } Fi \text{ (mg/kg)}}{S4UL \text{ } Fi \text{ (mg/kg)}}$$

where: HI = Hazard Index
 HQ = Hazard Quotient
 Fi = Fraction I
 S4UL = LQM Suitable 4 Use Levels (S4ULs)

Job Tack Lea Works, Bury
Job No. LKC 20 1043
SOM 12%
Comment TP204

Residential With Plant Uptake

	1% S4UL	2.50% S4UL	6% S4UL	Max Soil concn.	HQ (1% SOM)	HQ (2.5% SOM)	HQ (6% SOM)	
Aliphatic								
EC5-EC6	42	78	160	1	0.0238095	0.01282051	0.00625	
EC6-EC8	100	230	530	1	0.01	0.00434783	0.00188679	
EC8-EC10	27	65	150	1	0.037037	0.01538462	0.00666667	
EC10-EC12	130	330	760	1	0.0076923	0.0030303	0.00131579	
EC12-EC16	1100	2400	4300	1	0.0009091	0.00041667	0.00023256	
EC16-EC21	65000	92000	110000	120	0.0018462	0.00130435	0.00109091	
EC21-EC35								
EC35-EC44	65000	92000	110000	1	1.538E-05	1.087E-05	9.0909E-06	
Aromatic								
EC5-EC7 (benzene)	70	140	300	1	0.0142857	0.00714286	0.00333333	
EC7-EC8 (tolulene)	130	290	660	1	0.0076923	0.00344828	0.00151515	
EC8-EC10	34	83	190	1	0.0294118	0.01204819	0.00526316	
EC10-EC12	74	180	380	1	0.0135135	0.00555556	0.00263158	
EC12-EC16	140	330	660	1.6	0.0114286	0.00484848	0.00242424	
EC16-EC21	260	540	930	44	0.1692308	0.08148148	0.04731183	
EC21-EC35	1100	1500	1700	990	0.9	0.66	0.58235294	
EC35-EC44	1100	1500	1700	1	0.0009091	0.00066667	0.00058824	
					HI	1.23	0.81	0.66

Sample number	MAX or US95
Depth	
Aliphatic	
EC5-EC6	1
EC6-EC8	1
EC8-EC10	1
EC10-EC12	1
EC12-EC16	8
EC16-EC21	1
EC21-EC35	140
EC35-EC44	1
Aromatic	
EC5-EC7 (benzene)	1
EC7-EC8 (tolulene)	1
EC8-EC10	1
EC10-EC12	1
EC12-EC16	1.6
EC16-EC21	44
EC21-EC35	990
EC35-EC44	14
0.00E+00 0.00E+00 0.00E+00 0.00E+00	

$$HI = \sum_{Fi=1}^{16} HQ \text{ Fi} = \frac{\text{Measured concentration Fi (mg/kg)}}{S4UL \text{ Fi (mg/kg)}}$$

where: HI = Hazard Index
 HQ = Hazard Quotient
 Fi = Fraction I
 S4UL = LQM Sutable 4 Use Levels (S4ULs)

Job Tack Lea Works, Bury
Job No. LKC 20 1043
SOM 5%
Comment CP2 0.1-1.0

Residential With Plant Uptake								
	1% S4UL	2.50% S4UL	6% S4UL	Max Soil concn.	HQ (1%SOM)	HQ (2.5%SOM)	HQ (6% SOM)	
Aliphatic								
EC5-EC6	42	78	160	1	0.0238095	0.01282051	0.00625	
EC6-EC8	100	230	530	1	0.01	0.00434783	0.00188679	
EC8-EC10	27	65	150	1	0.037037	0.01538462	0.00666667	
EC10-EC12	130	330	760	1	0.0076923	0.0030303	0.00131579	
EC12-EC16	1100	2400	4300	7.4	0.0067273	0.00308333	0.00172093	
EC16-EC21				4.1				
EC21-EC35	65000	92000	110000	20	6.308E-05	4.4565E-05	3.7273E-05	
EC35-EC44	65000	92000	110000	1	1.538E-05	1.087E-05	9.0909E-06	
Aromatic								
EC5-EC7 (benzene)	70	140	300	1	0.0142857	0.00714286	0.00333333	
EC7-EC8 (tolulene)	130	290	660	1	0.0076923	0.00344828	0.00151515	
EC8-EC10	34	83	190	1	0.0294118	0.01204819	0.00526316	
EC10-EC12	74	180	380	13	0.1756757	0.07222222	0.03421053	
EC12-EC16	140	330	660	51	0.3642857	0.15454545	0.07727273	
EC16-EC21	260	540	930	140	0.5384615	0.25925926	0.15053763	
EC21-EC35	1100	1500	1700	600	0.5454545	0.4	0.35294118	
EC35-EC44	1100	1500	1700	1	0.0009091	0.00066667	0.00058824	
				810				
					HI	1.76	0.95	0.64

Sample number	MAX or US95
Depth	
Aliphatic	
EC5-EC6	< 1.0
EC6-EC8	< 1.0
EC8-EC10	< 1.0
EC10-EC12	< 1.0
EC12-EC16	< 1.0
EC16-EC21	38
EC21-EC35	520
EC35-EC44	< 1.0
Aromatic	
EC5-EC7 (benzene)	< 1.0
EC7-EC8 (tolulene)	< 1.0
EC8-EC10	< 1.0
EC10-EC12	< 1.0
EC12-EC16	< 1.0
EC16-EC21	< 1.0
EC21-EC35	62
EC35-EC44	< 1.0
0.00E+00 0.00E+00 0.00E+00 0.00E+00	

$$HI = \sum_{Fi=1}^{16} HQ \text{ Fi} = \frac{\text{Measured concentration Fi (mg/kg)}}{S4UL \text{ Fi (mg/kg)}}$$

where: HI = Hazard Index
 HQ = Hazard Quotient
 Fi = Fraction I
 S4UL = LQM Sutable 4 Use Levels (S4ULs)

Job Tack Lea Works, Bury
Job No. LKC 20 1043
SOM 3%
Comment TP201 0.4-1.0m

Residential With Plant Uptake

	1% S4UL	2.50% S4UL	6% S4UL	Max Soil concn.	HQ (1% SOM)	HQ (2.5% SOM)	HQ (6% SOM)	
Aliphatic								
EC5-EC6	42	78	160	1	0.0238095	0.01282051	0.00625	
EC6-EC8	100	230	530	1	0.01	0.00434783	0.00188679	
EC8-EC10	27	65	150	1	0.037037	0.01538462	0.00666667	
EC10-EC12	130	330	760	1	0.0076923	0.0030303	0.00131579	
EC12-EC16	1100	2400	4300	1	0.0009091	0.00041667	0.00023256	
EC16-EC21	65000	92000	110000	1200	0.0184615	0.01304348	0.01090909	
EC21-EC35								
EC35-EC44	65000	92000	110000	1	1.538E-05	1.087E-05	9.0909E-06	
Aromatic								
EC5-EC7 (benzene)	70	140	300	1	0.0142857	0.00714286	0.00333333	
EC7-EC8 (tolulene)	130	290	660	1	0.0076923	0.00344828	0.00151515	
EC8-EC10	34	83	190	1	0.0294118	0.01204819	0.00526316	
EC10-EC12	74	180	380	1	0.0135135	0.00555556	0.00263158	
EC12-EC16	140	330	660	1	0.0071429	0.0030303	0.00151515	
EC16-EC21	260	540	930	1	0.0038462	0.00185185	0.00107527	
EC21-EC35	1100	1500	1700	430	0.3909091	0.28666667	0.25294118	
EC35-EC44	1100	1500	1700	1	0.0009091	0.00066667	0.00058824	
					HI	0.57	0.37	0.30

Sample number	MAX or US95
Depth	
Aliphatic	
EC5-EC6	< 1.0
EC6-EC8	< 1.0
EC8-EC10	< 1.0
EC10-EC12	< 1.0
EC12-EC16	< 1.0
EC16-EC21	< 1.0
EC21-EC35	1200
EC35-EC44	< 1.0
Aromatic	
EC5-EC7 (benzene)	< 1.0
EC7-EC8 (tolulene)	< 1.0
EC8-EC10	< 1.0
EC10-EC12	< 1.0
EC12-EC16	< 1.0
EC16-EC21	< 1.0
EC21-EC35	430
EC35-EC44	< 1.0
0.00E+00 0.00E+00 0.00E+00 0.00E+00	

Appendix I

HazWaste Online Classification Report

Waste Classification Report



CZAPX-8Q763-H4JJ9

Job name

LKC 20 1043 Tack Lea Works

Description/Comments

Project

LKC 20 1043 Tack Lea Works

Site

LKC 20 1043 Tack Lea Works

Related Documents

#	Name	Description
1	HWOL_20-03976-20200213 155801.hwol	.hwol file used to create the Job
2	HWOL_20-08924-20200327 153518.hwol	.hwol file used to create the Job

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name: Peter Dunn Date: 23 Apr 2020 10:03 GMT Telephone: 0161 763 7200	Company: LK Group Unit 29, Eton Business Park Eton Hill Rd, Radcliffe Manchester M26 2ZS	HazWasteOnline™ Training Record: Course Hazardous Waste Classification Advanced Hazardous Waste Classification	Date 17 Sep 2019 18 Sep 2019
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Report

Created by: Peter Dunn
Created date: 23 Apr 2020 10:03 GMT

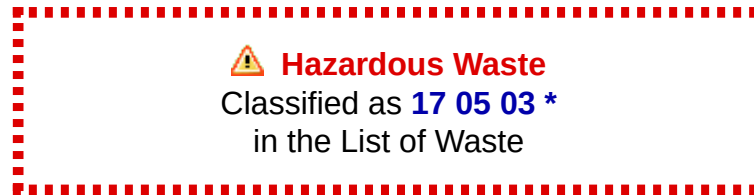
Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	CP1-989311-06/03/2020-0.00	0.00-0.30	Hazardous	HP 7, HP 11	3
2	CP2-989312-13/03/2020-0.10	0.10-1.00	Non Hazardous		6
3	CP3-989313-13/03/2020-1.00	1.00	Non Hazardous		9
4	CP2-989314-13/03/2020-5.40	5.40-6.50	Non Hazardous		12
5	CP2-989315-13/03/2020-10.50	10.50	Non Hazardous		13
6	TP201-965926-06/02/2020-0.4	0.4-1.0	Hazardous	HP 7, HP 11	14
7	TP201-965927-06/02/2020-1.4	1.4-2.0	Non Hazardous		17
8	TP203-965931-06/02/2020-0.4	0.4-1.0	Non Hazardous		18
9	TP204-965934-06/02/2020-1.9	1.9-2.0	Non Hazardous		20
10	TP204-965935-06/02/2020-2.3	2.3-2.5	Non Hazardous		23
11	TP205-965936-06/02/2020-0.0	0.0-1.0	Non Hazardous		24

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
12	TP207-965940-06/02/2020-0.0	0.0-0.4	Non Hazardous		26

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	28
Appendix B: Rationale for selection of metal species	29
Appendix C: Version	30

Classification of sample: CP1-989311-06/03/2020-0.00



Sample details

Sample Name:	LoW Code:	
CP1-989311-06/03/2020-0.00	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 03 * (Soil and stones containing hazardous substances)
0.00-0.30 m		
Moisture content:		
13%		
(wet weight correction)		

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.774%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.774%)

Determinands

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

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				49 mg/kg	1.32	56.285 mg/kg	0.00563 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	boron { diboron trioxide; boric oxide }				0.67 mg/kg	3.22	1.877 mg/kg	0.000188 %	✓	
	005-008-00-8	215-125-8	1303-86-2							
3	cadmium { cadmium oxide }				0.89 mg/kg	1.142	0.885 mg/kg	0.0000885 %	✓	
	048-002-00-0	215-146-2	1306-19-0							
4	chromium in chromium(III) compounds { chromium(III) oxide }				26 mg/kg	1.462	33.06 mg/kg	0.00331 %	✓	
		215-160-9	1308-38-9							
5	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
6	copper { dicopper oxide; copper (I) oxide }				92 mg/kg	1.126	90.116 mg/kg	0.00901 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead chromate }			1	130 mg/kg	1.56	176.415 mg/kg	0.0113 %	✓	
	082-004-00-2	231-846-0	7758-97-6							

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
8	mercury { mercury dichloride }				0.18	mg/kg	1.353	0.212	mg/kg	0.0000212 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel chromate }				55	mg/kg	2.976	142.414	mg/kg	0.0142 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		<LOD
	034-002-00-8											
11	zinc { zinc oxide }				100	mg/kg	1.245	108.29	mg/kg	0.0108 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group				8900	mg/kg		7743	mg/kg	0.774 %	✓	
			TPH									
13	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									
14	benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
15	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
16	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
17	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]									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
19	pH				8.4	pH		8.4	pH	8.4 pH		
			PH									
20	naphthalene				0.82	mg/kg		0.713	mg/kg	0.0000713 %	✓	
	601-052-00-2	202-049-5	91-20-3									
21	acenaphthylene				0.6	mg/kg		0.522	mg/kg	0.0000522 %	✓	
		205-917-1	208-96-8									
22	acenaphthene				1.2	mg/kg		1.044	mg/kg	0.000104 %	✓	
		201-469-6	83-32-9									
23	fluorene				2	mg/kg		1.74	mg/kg	0.000174 %	✓	
		201-695-5	86-73-7									
24	phenanthrene				12	mg/kg		10.44	mg/kg	0.00104 %	✓	
		201-581-5	85-01-8									
25	anthracene				4.5	mg/kg		3.915	mg/kg	0.000392 %	✓	
		204-371-1	120-12-7									
26	fluoranthene				42	mg/kg		36.54	mg/kg	0.00365 %	✓	
		205-912-4	206-44-0									
27	pyrene				33	mg/kg		28.71	mg/kg	0.00287 %	✓	
		204-927-3	129-00-0									
28	benzo[a]anthracene				20	mg/kg		17.4	mg/kg	0.00174 %	✓	
	601-033-00-9	200-280-6	56-55-3									
29	chrysene				17	mg/kg		14.79	mg/kg	0.00148 %	✓	
	601-048-00-0	205-923-4	218-01-9									
30	benzo[b]fluoranthene				29	mg/kg		25.23	mg/kg	0.00252 %	✓	
	601-034-00-4	205-911-9	205-99-2									
31	benzo[k]fluoranthene				9.3	mg/kg		8.091	mg/kg	0.000809 %	✓	
	601-036-00-5	205-916-6	207-08-9									
32	benzo[a]pyrene; benzo[def]chrysene				27	mg/kg		23.49	mg/kg	0.00235 %	✓	
	601-032-00-3	200-028-5	50-32-8									
33	indeno[123-cd]pyrene				18	mg/kg		15.66	mg/kg	0.00157 %	✓	
		205-893-2	193-39-5									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
34	dibenz[a,h]anthracene				3 mg/kg		2.61 mg/kg	0.000261 %	✓	
	601-041-00-2	200-181-8	53-70-3							
35	benzo[ghi]perylene				13 mg/kg		11.31 mg/kg	0.00113 %	✓	
		205-883-8	191-24-2							
36	vanadium { divanadium pentaoxide; vanadium pentoxide }				63 mg/kg	1.785	97.846 mg/kg	0.00978 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
Total:								0.859 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	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 ash and tarmac noted in sample. Lab trace is non-coal tar PAHs. Not considered flammable.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.774%)

Classification of sample: CP2-989312-13/03/2020-0.10

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

Sample details

Sample Name:	LoW Code:
CP2-989312-13/03/2020-0.10	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.10-1.00 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
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	arsenic { arsenic trioxide }				22	mg/kg	1.32	24.981	mg/kg	0.0025 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	boron { diboron trioxide; boric oxide }				0.45	mg/kg	3.22	1.246	mg/kg	0.000125 %	✓	
	005-008-00-8	215-125-8	1303-86-2									
3	cadmium { cadmium oxide }				0.49	mg/kg	1.142	0.481	mg/kg	0.0000481 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
4	chromium in chromium(III) compounds { chromium(III) oxide }				25	mg/kg	1.462	31.423	mg/kg	0.00314 %	✓	
		215-160-9	1308-38-9									
5	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
6	copper { dicopper oxide; copper (I) oxide }				70	mg/kg	1.126	67.778	mg/kg	0.00678 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead chromate }			1	75	mg/kg	1.56	100.608	mg/kg	0.00645 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
8	mercury { mercury dichloride }				0.13	mg/kg	1.353	0.151	mg/kg	0.0000151 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel chromate }				32	mg/kg	2.976	81.907	mg/kg	0.00819 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	2.554	<0.511	mg/kg	<0.0000511 %		<LOD
	034-002-00-8											
11	zinc { zinc oxide }				81	mg/kg	1.245	86.707	mg/kg	0.00867 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group				840	mg/kg		722.4	mg/kg	0.0722 %	✓	
			TPH									
13	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									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
14	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
15	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
16	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
17	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]							
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
	006-007-00-5									
19	pH				9.3 pH		9.3 pH	9.3 pH		
			PH							
20	naphthalene				0.35 mg/kg		0.301 mg/kg	0.0000301 %	✓	
	601-052-00-2	202-049-5	91-20-3							
21	acenaphthylene				0.21 mg/kg		0.181 mg/kg	0.0000181 %	✓	
		205-917-1	208-96-8							
22	acenaphthene				0.37 mg/kg		0.318 mg/kg	0.0000318 %	✓	
		201-469-6	83-32-9							
23	fluorene				0.53 mg/kg		0.456 mg/kg	0.0000456 %	✓	
		201-695-5	86-73-7							
24	phenanthrene				3.5 mg/kg		3.01 mg/kg	0.000301 %	✓	
		201-581-5	85-01-8							
25	anthracene				1 mg/kg		0.86 mg/kg	0.000086 %	✓	
		204-371-1	120-12-7							
26	fluoranthene				7.1 mg/kg		6.106 mg/kg	0.000611 %	✓	
		205-912-4	206-44-0							
27	pyrene				5.8 mg/kg		4.988 mg/kg	0.000499 %	✓	
		204-927-3	129-00-0							
28	benzo[a]anthracene				2.9 mg/kg		2.494 mg/kg	0.000249 %	✓	
	601-033-00-9	200-280-6	56-55-3							
29	chrysene				2.6 mg/kg		2.236 mg/kg	0.000224 %	✓	
	601-048-00-0	205-923-4	218-01-9							
30	benzo[b]fluoranthene				4.1 mg/kg		3.526 mg/kg	0.000353 %	✓	
	601-034-00-4	205-911-9	205-99-2							
31	benzo[k]fluoranthene				1.7 mg/kg		1.462 mg/kg	0.000146 %	✓	
	601-036-00-5	205-916-6	207-08-9							
32	benzo[a]pyrene; benzo[def]chrysene				4 mg/kg		3.44 mg/kg	0.000344 %	✓	
	601-032-00-3	200-028-5	50-32-8							
33	indeno[123-cd]pyrene				2.6 mg/kg		2.236 mg/kg	0.000224 %	✓	
		205-893-2	193-39-5							
34	dibenz[a,h]anthracene				0.58 mg/kg		0.499 mg/kg	0.0000499 %	✓	
	601-041-00-2	200-181-8	53-70-3							
35	benzo[ghi]perylene				2 mg/kg		1.72 mg/kg	0.000172 %	✓	
		205-883-8	191-24-2							
36	vanadium { divanadium pentaoxide; vanadium pentoxide }				39 mg/kg	1.785	59.875 mg/kg	0.00599 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
Total:								0.118 %		

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 Lab trace is PAHs. AGS recommends that concentrations <1% unlikely to result in hazardous classification.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0722%)

Classification of sample: CP3-989313-13/03/2020-1.00

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

Sample details

Sample Name:	CP3-989313-13/03/2020-1.00	LoW Code:	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	1.00 m	Entry:		17 05 04 (Soil and stones other than those mentioned in 17 05 03)
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 }				55 mg/kg	1.32	57.368 mg/kg	0.00574 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	boron { diboron trioxide; boric oxide }				1.2 mg/kg	3.22	3.052 mg/kg	0.000305 %	✓	
	005-008-00-8	215-125-8	1303-86-2							
3	cadmium { cadmium oxide }				1.5 mg/kg	1.142	1.354 mg/kg	0.000135 %	✓	
	048-002-00-0	215-146-2	1306-19-0							
4	chromium in chromium(III) compounds { chromium(III) oxide }				61 mg/kg	1.462	70.432 mg/kg	0.00704 %	✓	
		215-160-9	1308-38-9							
5	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
6	copper { dicopper oxide; copper (I) oxide }				150 mg/kg	1.126	133.418 mg/kg	0.0133 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead chromate }			1	200 mg/kg	1.56	246.451 mg/kg	0.0158 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
8	mercury { mercury dichloride }				0.34 mg/kg	1.353	0.364 mg/kg	0.0000364 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
9	nickel { nickel chromate }				55 mg/kg	2.976	129.319 mg/kg	0.0129 %	✓	
	028-035-00-7	238-766-5	14721-18-7							
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.4 mg/kg	2.554	2.824 mg/kg	0.000282 %	✓	
	034-002-00-8									
11	zinc { zinc oxide }				240 mg/kg	1.245	235.998 mg/kg	0.0236 %	✓	
	030-013-00-7	215-222-5	1314-13-2							
12	TPH (C6 to C40) petroleum group				620 mg/kg		489.8 mg/kg	0.049 %	✓	
			TPH							
13	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							

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
15	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
16	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
17	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]									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
19	pH				8.1	pH		8.1	pH	8.1 pH		
20	naphthalene				0.57	mg/kg		0.45	mg/kg	0.000045 %	✓	
	601-052-00-2	202-049-5	91-20-3									
21	acenaphthylene				0.23	mg/kg		0.182	mg/kg	0.0000182 %	✓	
		205-917-1	208-96-8									
22	acenaphthene				0.76	mg/kg		0.6	mg/kg	0.00006 %	✓	
		201-469-6	83-32-9									
23	fluorene				0.77	mg/kg		0.608	mg/kg	0.0000608 %	✓	
		201-695-5	86-73-7									
24	phenanthrene				4.2	mg/kg		3.318	mg/kg	0.000332 %	✓	
		201-581-5	85-01-8									
25	anthracene				1	mg/kg		0.79	mg/kg	0.000079 %	✓	
		204-371-1	120-12-7									
26	fluoranthene				7.2	mg/kg		5.688	mg/kg	0.000569 %	✓	
		205-912-4	206-44-0									
27	pyrene				6.2	mg/kg		4.898	mg/kg	0.00049 %	✓	
		204-927-3	129-00-0									
28	benzo[a]anthracene				5.2	mg/kg		4.108	mg/kg	0.000411 %	✓	
	601-033-00-9	200-280-6	56-55-3									
29	chrysene				4.8	mg/kg		3.792	mg/kg	0.000379 %	✓	
	601-048-00-0	205-923-4	218-01-9									
30	benzo[b]fluoranthene				4.6	mg/kg		3.634	mg/kg	0.000363 %	✓	
	601-034-00-4	205-911-9	205-99-2									
31	benzo[k]fluoranthene				1.7	mg/kg		1.343	mg/kg	0.000134 %	✓	
	601-036-00-5	205-916-6	207-08-9									
32	benzo[a]pyrene; benzo[def]chrysene				4.4	mg/kg		3.476	mg/kg	0.000348 %	✓	
	601-032-00-3	200-028-5	50-32-8									
33	indeno[123-cd]pyrene				2.4	mg/kg		1.896	mg/kg	0.00019 %	✓	
		205-893-2	193-39-5									
34	dibenz[a,h]anthracene				0.53	mg/kg		0.419	mg/kg	0.0000419 %	✓	
	601-041-00-2	200-181-8	53-70-3									
35	benzo[ghi]perylene				1.8	mg/kg		1.422	mg/kg	0.000142 %	✓	
		205-883-8	191-24-2									
36	vanadium { divanadium pentaoxide; vanadium pentoxide }				47	mg/kg	1.785	66.284	mg/kg	0.00663 %	✓	
	023-001-00-8	215-239-8	1314-62-1									
Total:										0.139 %		

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 AGS recommends that concentrations <1% unlikely to result in hazardous classification.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.049%)

Classification of sample: CP2-989314-13/03/2020-5.40



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

Sample details

Sample Name:	LoW Code:
CP2-989314-13/03/2020-5.40	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
5.40-6.50 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
23%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 23% 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	●	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
				TPH							
2		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							
3		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2							
4		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3							
5	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4							
6		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]							
Total:									0.001 %		

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)
<LOD	Below limit of detection
ND	Not detected

Classification of sample: CP2-989315-13/03/2020-10.50

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

Sample details

Sample Name:	CP2-989315-13/03/2020-10.50	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	10.50 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:	8.4%	Entry:	
(wet weight correction)			

Hazard properties

None identified

Determinands

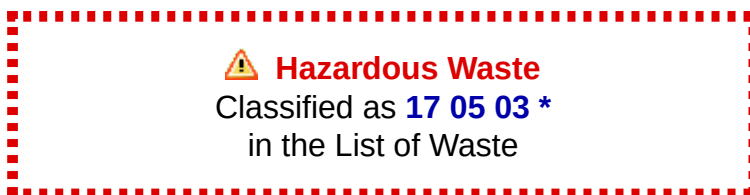
Moisture content: 8.4% Wet Weight Moisture Correction applied (MC)

#	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	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
2	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							
3	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
4	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
5	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
6	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]							
7	asbestos				140 mg/kg		128.24 mg/kg	0.0128 %	✓	
	650-013-00-6	- - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5							
Total:								0.0138 %		

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)
<LOD	Below limit of detection
ND	Not detected

Classification of sample: TP201-965926-06/02/2020-0.4



Sample details

Sample Name:	LoW Code:
TP201-965926-06/02/2020-0.4	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.4-1.0 m	Entry:
Moisture content:	17 05 03 * (Soil and stones containing hazardous substances)
15%	
(wet weight correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.145%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.145%)

Determinands

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

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				6.4 mg/kg	1.32	7.183 mg/kg	0.000718 %		✓	
	033-003-00-0	215-481-4	1327-53-3								
2	boron { diboron trioxide; boric oxide }				<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %			<LOD
	005-008-00-8	215-125-8	1303-86-2								
3	cadmium { cadmium oxide }				0.4 mg/kg	1.142	0.388 mg/kg	0.0000388 %		✓	
	048-002-00-0	215-146-2	1306-19-0								
4	chromium in chromium(III) compounds { chromium(III) oxide }				16 mg/kg	1.462	19.877 mg/kg	0.00199 %		✓	
		215-160-9	1308-38-9								
5	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
6	copper { dicopper oxide; copper (I) oxide }				29 mg/kg	1.126	27.753 mg/kg	0.00278 %		✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	22 mg/kg	1.56	29.169 mg/kg	0.00187 %		✓	
	082-004-00-2	231-846-0	7758-97-6								

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
8	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									
9	nickel { nickel chromate }				29	mg/kg	2.976	73.365	mg/kg	0.00734 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.51	mg/kg	2.554	1.107	mg/kg	0.000111 %	✓	
	034-002-00-8											
11	zinc { zinc oxide }				100	mg/kg	1.245	105.801	mg/kg	0.0106 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group				1700	mg/kg		1445	mg/kg	0.145 %	✓	
			TPH									
13	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									
14	benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
15	toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
16	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
17	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]									
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
19	pH				8.1	pH		8.1	pH	8.1 pH		
			PH									
20	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
21	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		205-917-1	208-96-8									
22	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-469-6	83-32-9									
23	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7									
24	phenanthrene				0.17	mg/kg		0.145	mg/kg	0.0000145 %	✓	
		201-581-5	85-01-8									
25	anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		204-371-1	120-12-7									
26	fluoranthene				0.21	mg/kg		0.179	mg/kg	0.0000179 %	✓	
		205-912-4	206-44-0									
27	pyrene				0.22	mg/kg		0.187	mg/kg	0.0000187 %	✓	
		204-927-3	129-00-0									
28	benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
29	chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
30	benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-034-00-4	205-911-9	205-99-2									
31	benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-036-00-5	205-916-6	207-08-9									
32	benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
33	indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		205-893-2	193-39-5									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used	
		CLP index number	EC Number	CAS Number											
34		dibenz[a,h]anthracene				<0.1 mg/kg			<0.1 mg/kg		<0.00001 %			<LOD	
		601-041-00-2	200-181-8	53-70-3											
35	■	benzo[ghi]perylene				<0.1 mg/kg			<0.1 mg/kg		<0.00001 %			<LOD	
			205-883-8	191-24-2											
36	🧪	vanadium { divanadium pentaoxide; vanadium pentoxide }				16 mg/kg		1.785	24.279 mg/kg		0.00243 %		✓		
		023-001-00-8	215-239-8	1314-62-1											
Total:												0.173 %			

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	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 Lab trace identifies 'lube oil'. Hydrocarbon and oily sheen identified. PID 0.7ppm. AGS recommends that concentrations <1% unlikely to result in hazardous classification. Not considered flammable.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.145%)

Classification of sample: TP201-965927-06/02/2020-1.4

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

Sample details

Sample Name: **TP201-965927-06/02/2020-1.4** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **1.4-2.0 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Moisture content: **13%**
(wet weight correction)

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
2	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							
3	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
4	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
5	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
6	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]							
Total:								0.001 %		

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)
<LOD Below limit of detection
ND Not detected

Classification of sample: TP203-965931-06/02/2020-0.4



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

Sample details

Sample Name:	LoW Code:
TP203-965931-06/02/2020-0.4	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.4-1.0 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
22%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 22% 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 }				130	mg/kg	1.32	133.881	mg/kg	0.0134 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<LOD
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide }				29	mg/kg	1.462	33.06	mg/kg	0.00331 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	copper { dicopper oxide; copper (I) oxide }				680	mg/kg	1.126	597.171	mg/kg	0.0597 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	220	mg/kg	1.56	267.664	mg/kg	0.0172 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				1.4	mg/kg	1.353	1.478	mg/kg	0.000148 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				47	mg/kg	2.976	109.11	mg/kg	0.0109 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.3	mg/kg	2.554	4.581	mg/kg	0.000458 %	✓	
	034-002-00-8											
10	zinc { zinc oxide }				210	mg/kg	1.245	203.884	mg/kg	0.0204 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				7.5	pH		7.5	pH	7.5 pH		
12	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		205-917-1	208-96-8									
14	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
15	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	phenanthrene	201-581-5	85-01-8		0.25 mg/kg		0.195 mg/kg	0.0000195 %	✓	
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		0.18 mg/kg		0.14 mg/kg	0.000014 %	✓	
19	pyrene	204-927-3	129-00-0		0.24 mg/kg		0.187 mg/kg	0.0000187 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
21	chrysene	601-048-00-0	205-923-4		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		19 mg/kg	1.785	26.456 mg/kg	0.00265 %	✓	
Total:								0.128 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
•	Speciated 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: TP204-965934-06/02/2020-1.9



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

Sample details

Sample Name:	LoW Code:
TP204-965934-06/02/2020-1.9	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
1.9-2.0 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
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 }				52	mg/kg	1.32	46	mg/kg	0.0046 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	boron { diboron trioxide; boric oxide }				0.66	mg/kg	3.22	1.424	mg/kg	0.000142 %	✓	
	005-008-00-8	215-125-8	1303-86-2									
3	cadmium { cadmium oxide }				11	mg/kg	1.142	8.419	mg/kg	0.000842 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
4	chromium in chromium(III) compounds { chromium(III) oxide }				200	mg/kg	1.462	195.848	mg/kg	0.0196 %	✓	
		215-160-9	1308-38-9									
5	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
6	copper { dicopper oxide; copper (I) oxide }				760	mg/kg	1.126	573.302	mg/kg	0.0573 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead chromate }			1	440	mg/kg	1.56	459.834	mg/kg	0.0295 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
8	mercury { mercury dichloride }				2.5	mg/kg	1.353	2.267	mg/kg	0.000227 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel chromate }				48	mg/kg	2.976	95.717	mg/kg	0.00957 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.1	mg/kg	2.554	1.882	mg/kg	0.000188 %	✓	
	034-002-00-8											
11	zinc { zinc oxide }				890	mg/kg	1.245	742.223	mg/kg	0.0742 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
12	TPH (C6 to C40) petroleum group				810	mg/kg		542.7	mg/kg	0.0543 %	✓	
			TPH									
13	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									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
14	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %			<LOD
	601-020-00-8	200-753-7	71-43-2								
15	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %			<LOD
	601-021-00-3	203-625-9	108-88-3								
16	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %			<LOD
	601-023-00-4	202-849-4	100-41-4								
17	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]								
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %			<LOD
	006-007-00-5										
19	pH				7.7 pH		7.7 pH	7.7 pH			
			PH								
20	naphthalene				0.33 mg/kg		0.221 mg/kg	0.0000221 %		✓	
	601-052-00-2	202-049-5	91-20-3								
21	acenaphthylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
		205-917-1	208-96-8								
22	acenaphthene				0.11 mg/kg		0.0737 mg/kg	0.00000737 %		✓	
		201-469-6	83-32-9								
23	fluorene				0.24 mg/kg		0.161 mg/kg	0.0000161 %		✓	
		201-695-5	86-73-7								
24	phenanthrene				1.1 mg/kg		0.737 mg/kg	0.0000737 %		✓	
		201-581-5	85-01-8								
25	anthracene				0.39 mg/kg		0.261 mg/kg	0.0000261 %		✓	
		204-371-1	120-12-7								
26	fluoranthene				1.1 mg/kg		0.737 mg/kg	0.0000737 %		✓	
		205-912-4	206-44-0								
27	pyrene				1.4 mg/kg		0.938 mg/kg	0.0000938 %		✓	
		204-927-3	129-00-0								
28	benzo[a]anthracene				0.77 mg/kg		0.516 mg/kg	0.0000516 %		✓	
	601-033-00-9	200-280-6	56-55-3								
29	chrysene				0.59 mg/kg		0.395 mg/kg	0.0000395 %		✓	
	601-048-00-0	205-923-4	218-01-9								
30	benzo[b]fluoranthene				0.66 mg/kg		0.442 mg/kg	0.0000442 %		✓	
	601-034-00-4	205-911-9	205-99-2								
31	benzo[k]fluoranthene				0.2 mg/kg		0.134 mg/kg	0.0000134 %		✓	
	601-036-00-5	205-916-6	207-08-9								
32	benzo[a]pyrene; benzo[def]chrysene				0.5 mg/kg		0.335 mg/kg	0.0000335 %		✓	
	601-032-00-3	200-028-5	50-32-8								
33	indeno[123-cd]pyrene				0.34 mg/kg		0.228 mg/kg	0.0000228 %		✓	
		205-893-2	193-39-5								
34	dibenz[a,h]anthracene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
35	benzo[ghi]perylene				0.32 mg/kg		0.214 mg/kg	0.0000214 %		✓	
		205-883-8	191-24-2								
36	vanadium { divanadium pentaoxide; vanadium pentoxide }				23 mg/kg	1.785	27.51 mg/kg	0.00275 %		✓	
	023-001-00-8	215-239-8	1314-62-1								
Total:									0.254 %		

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 Hydrocarbon and oily sheen identified. PID 0.7ppm. AGS recommends that concentrations <1% unlikely to result in hazardous classification. Not considered flammable.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0543%)

Classification of sample: TP204-965935-06/02/2020-2.3

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

Sample details

Sample Name:	LoW Code:	
TP204-965935-06/02/2020-2.3	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)
2.3-2.5 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	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
2	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							
3	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
4	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
5	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
6	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]							
Total:								0.001 %		

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)
<LOD	Below limit of detection
ND	Not detected

Classification of sample: TP205-965936-06/02/2020-0.0



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

Sample details

Sample Name:	LoW Code:	
TP205-965936-06/02/2020-0.0	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)
0.0-1.0 m		
Moisture content:		
17%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 17% 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 }				46	mg/kg	1.32	50.41	mg/kg	0.00504 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				1.5	mg/kg	1.142	1.422	mg/kg	0.000142 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide }				16	mg/kg	1.462	19.409	mg/kg	0.00194 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	copper { dicopper oxide; copper (I) oxide }				62	mg/kg	1.126	57.938	mg/kg	0.00579 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	100	mg/kg	1.56	129.465	mg/kg	0.0083 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.31	mg/kg	1.353	0.348	mg/kg	0.0000348 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				48	mg/kg	2.976	118.574	mg/kg	0.0119 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.32	mg/kg	2.554	0.678	mg/kg	0.0000678 %	✓	
	034-002-00-8											
10	zinc { zinc oxide }				260	mg/kg	1.245	268.609	mg/kg	0.0269 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				8.5	pH		8.5	pH	8.5 pH		
12	naphthalene				1.6	mg/kg		1.328	mg/kg	0.000133 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		205-917-1	208-96-8									
14	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
15	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	phenanthrene	201-581-5	85-01-8		1.2 mg/kg		0.996 mg/kg	0.0000996 %	✓	
17	anthracene	204-371-1	120-12-7		0.18 mg/kg		0.149 mg/kg	0.0000149 %	✓	
18	fluoranthene	205-912-4	206-44-0		0.52 mg/kg		0.432 mg/kg	0.0000432 %	✓	
19	pyrene	204-927-3	129-00-0		0.47 mg/kg		0.39 mg/kg	0.000039 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.23 mg/kg		0.191 mg/kg	0.0000191 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.22 mg/kg		0.183 mg/kg	0.0000183 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		36 mg/kg	1.785	53.341 mg/kg	0.00533 %	✓	
29	asbestos	650-013-00-6	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
Total:								0.0669 %		

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: TP207-965940-06/02/2020-0.0

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

Sample details

Sample Name:	LoW Code:
TP207-965940-06/02/2020-0.0	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.0-0.4 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
20%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 20% 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 }				27	mg/kg	1.32	28.519	mg/kg	0.00285 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				3.6	mg/kg	1.142	3.29	mg/kg	0.000329 %	✓	
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide }				35	mg/kg	1.462	40.924	mg/kg	0.00409 %	✓	
		215-160-9	1308-38-9									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	copper { dicopper oxide; copper (I) oxide }				130	mg/kg	1.126	117.092	mg/kg	0.0117 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
6	lead { lead chromate }			1	210	mg/kg	1.56	262.049	mg/kg	0.0168 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
7	mercury { mercury dichloride }				0.17	mg/kg	1.353	0.184	mg/kg	0.0000184 %	✓	
	080-010-00-X	231-299-8	7487-94-7									
8	nickel { nickel chromate }				41	mg/kg	2.976	97.621	mg/kg	0.00976 %	✓	
	028-035-00-7	238-766-5	14721-18-7									
9	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.6	mg/kg	2.554	1.226	mg/kg	0.000123 %	✓	
	034-002-00-8											
10	zinc { zinc oxide }				370	mg/kg	1.245	368.435	mg/kg	0.0368 %	✓	
	030-013-00-7	215-222-5	1314-13-2									
11	pH				8.9	pH		8.9	pH	8.9 pH		
12	naphthalene				0.39	mg/kg		0.312	mg/kg	0.0000312 %	✓	
	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				0.12	mg/kg		0.096	mg/kg	0.0000096 %	✓	
		201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
15	fluorene	201-695-5	86-73-7		0.12 mg/kg		0.096 mg/kg	0.000096 %	✓	
16	phenanthrene	201-581-5	85-01-8		1.1 mg/kg		0.88 mg/kg	0.000088 %	✓	
17	anthracene	204-371-1	120-12-7		0.3 mg/kg		0.24 mg/kg	0.000024 %	✓	
18	fluoranthene	205-912-4	206-44-0		1.9 mg/kg		1.52 mg/kg	0.000152 %	✓	
19	pyrene	204-927-3	129-00-0		1.7 mg/kg		1.36 mg/kg	0.000136 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.85 mg/kg		0.68 mg/kg	0.000068 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.76 mg/kg		0.608 mg/kg	0.0000608 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		1.3 mg/kg		1.04 mg/kg	0.000104 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.32 mg/kg		0.256 mg/kg	0.0000256 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.97 mg/kg		0.776 mg/kg	0.0000776 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.64 mg/kg		0.512 mg/kg	0.0000512 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		0.65 mg/kg		0.52 mg/kg	0.000052 %	✓	
28	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		43 mg/kg	1.785	61.41 mg/kg	0.00614 %	✓	
Total:								0.0897 %		

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** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

■ **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

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

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

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

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

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

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

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

• **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: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

• **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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

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

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

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

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

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

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

copper {dicopper oxide; copper (I) oxide}

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

lead {lead chromate}

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

mercury {mercury dichloride}

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

nickel {nickel chromate}

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

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

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

zinc {zinc oxide}

Worst case CLP in absence of CrVI

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: 2020.113.4250.8416 (22 Apr 2020)

HazWasteOnline Database: 2020.113.4250.8416 (22 Apr 2020)

This classification utilises the following guidance and legislation:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010

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

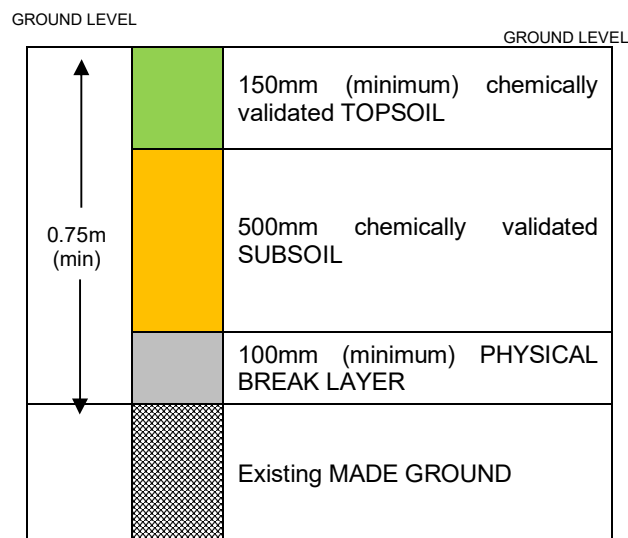
Appendix J

Environmental Cover System Construction

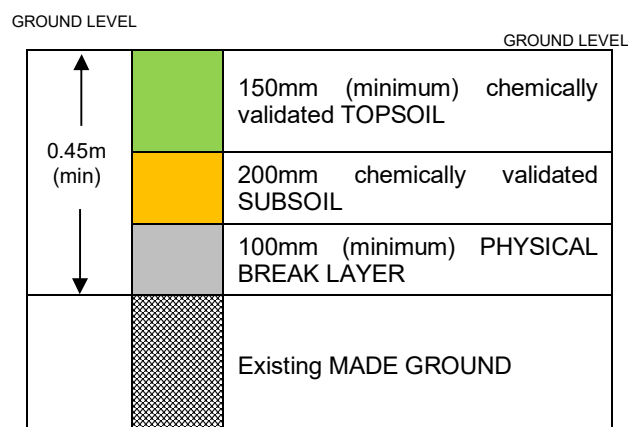
Private Gardens

Shared Landscaping

PRIVATE BACK GARDENS:



PRIVATE FRONT GARDENS / SHARED LANDSCAPING:



Hardstood Areas – No Remediation Required

Root Protection Areas – Maximum of 100mm covering of sandy topsoil.

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- » Geotechnical
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