

CLAREMONT ROAD RUSHOLME

ADDITIONAL SITE INVESTIGATION, RISK ASSESSMENT AND UPDATED REMEDIATION STRATEGY

Job Number: LKC 23 1097
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1 Introduction

1.1 Background

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

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

1.2 Site Details

A summary of the site details is presented in Table 1-1. Figure 1 shows the site boundary and development layout.

Site Location	492-494 Claremont Road, Manchester, M14 5AB. Centred at approximate 385087E 395107N.
Approximate Area	Approximately 1,000m ² .
Current Site Use	Partially completed housing development.
Purpose of Report	Planning.
Proposed Development	Residential housing with gardens / soft landscaping.

Table 1-1. Summary of site details.

2 Previous Reports

2.1 Review of Previous Works

A review of previous site investigations was included in the site investigation scope letter completed by LKC dated 8th June 2023 and provided to Manchester City Council (MCC) for comment. A summary of the review of is included here.

LKC were provided with the following reports:

- » Soil Contamination Delineation Letter Report Claremont Road, Manchester undertaken by Earth Environmental (reference A2212/21/LR/V1 dated 16th June 2021).
- » Phase I Geoenvironmental Assessment, Claremont Road, undertaken by Earth Environmental (reference A2212/17, dated January 2022).
- » Phase II Geoenvironmental Investigation, Claremont Road, undertaken by Earth Environmental (reference A2212/19/B.0/V2, dated January 2022).
- » Remediation Strategy Claremont Road, undertaken by Earth Environmental (reference A2212/19/RMS, dated January 2022).

Previous reports include references to earlier reports that were not provided to LKC. The previous Phase II report concluded:

- » No elevated concentrations of TPH fractions were reported in the sample collected from the area of moderate hydrocarbon odour / sheen identified in WS4 at 0.4m.
- » A moderate risk to future site users from dermal contact, ingestion and inhalation of dust was identified for Lead, Naphthalene and Di-benz(a,h)anthracene. A moderate risk of inhalation of fibres was assigned to asbestos.

The delineation letter report found no elevated petroleum hydrocarbons above assessment criteria, and most results reported below limits of detection. Asbestos was identified, but final quantification results are not provided (reported as 'TBC').

After discussion with the regulator and assessment of the previous works LKC produced a conceptual site model for the site, which is summarised in Table 2-1, overleaf.

Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552.

Pollutant Linkage		Risk	Recommendations
PL1: Contaminants posing a risk to future site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and home-grown produce).	ACM, heavy metals, non-volatile PAHs	Moderate	Elevated concentrations of metals and non-volatile PAHs identified in made ground soils likely associated with presence of ash and clinker. Asbestos fibres also encountered. Recommendation: Clean cover soils in gardens and soft landscaping recommended and agreed with regulators. No further assessment required.
	Petroleum hydrocarbons	Low	Localised olfactory evidence of contamination in WS04. No elevated concentrations identified. Recommendation: Clean cover soils in gardens and soft landscaping recommended and agreed with regulators considered sufficient. No further assessment required.
PL2: Volatile contaminants posing a risk to future site users via the inhalation of vapours.	Naphthalene	Moderate / Low	Elevated Naphthalene encountered at 1mbgl in WS1 in Plot 1 & 2. The SOM value (and rationale) used in the risk assessment is unclear. Recommendation: Moderate risk assumed at this stage. Shallow site investigation, including TVOC screening using PID and sampling recommended around perimeter of buildings in Plot 1 & 2 to confirm SOM and naphthalene results.
PL3: Gas (carbon dioxide and methane) posing a risk to buildings and future site users via the migration of gas into building causing explosion and asphyxiation.		Moderate / Low	Gas risk assessment included in Site Investigation undertaken to date. Recommendation: Low risk appropriate. No further work required.
PL4: Mobile contamination posing a risk to controlled waters via the migration through permeable strata.		Moderate / Low	Localised evidence of contamination in perched water around WS04. No assessment included in report. Anecdotal evidence indicates this material has been removed. Recommendation: Moderate localised risk assumed at this stage. Local investigation around WS04 to confirmed level and extent of contamination, if present.

Table 2-1: Summary risk table.

Where moderate / low risk had been identified, the assumed risk is shown in bold.

2.2 Site Investigation Scope

Based on LKC's assessment above, a site investigation was recommended.

Below includes a summary of the recommended scope.

- 6no. site investigation locations around areas of concern WS01 (Plots 1 and 2) to target elevated naphthalene identified in the previous investigation.

- 1no. investigation location close to the previous WS04 borehole in the rear of Plot 5 to target an oily sheen and odour around previous investigation location WS4.

Due to access restrictions site investigation locations (a combination of hand dug trial holes and window sample boreholes), depending on access restrictions and ground conditions were proposed to be undertaken around the perimeter of the building Plots 1 and 2.

LKC proposed that representative soil samples were analysed for a range of contaminants depending on the material encountered onsite including:

- Plots 1 & 2 (WS01) - Basic Suite: Naphthalene and soil organic matter.
- Rear of Plot 5 (WS04) - Hydrocarbons Suite: speciated PAH, soil organic matter, banded petroleum hydrocarbons (TPHCWG), BTEX and MTBE. If evidence of significant contamination is identified SVOCs, VOCs will also be scheduled for analysis, subject to ground conditions.

The scope of the contaminated land investigation by LKC was agreed with the local authority prior to undertaking the work (email from Manchester City Council Environmental Officer dated 13th June 2023). This investigation was in line with the scope.

3 Ground Investigation

3.1 Site Investigation Design and Methodology

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

The investigation was carried out on 11th July 2023 and comprised the following:

- 1no. window sample boreholes drilled to 3.00 metres below ground level (mbgl) (ref. WS101).
- 2no. foundation pits (using hand auger/spade) excavated to 1.00mbgl (ref. FP101 to FP102).
- 4no. hand pits (using hand auger / spade) excavated to 1.10mbgl (ref. HD101 to HD104).

Foundation pits were carried out to confirm the building foundations and allow assessment of ground conditions underneath the current foundations of Plot 1. Hand dug pits were carried out to assess the ground conditions in the surrounding areas of Plot 1 and Plot 2.

WS101 was drilled to allow assessment of the ground conditions close to the area of contamination in WS04 previously identified.

All site investigation locations are shown in Figure 1.

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

3.2 Well Installations

Based on ground conditions encountered and absence of olfactory or visual contamination no wells were installed.

3.3 Sampling Protocol

3.3.1 Soil Sampling (Contamination)

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

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds (TVOCs) using a Mini Rae Lite + photoionisation detector (PID). Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665⁴ to aid in screening samples for volatile analysis.

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

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

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

⁴ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

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

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

Suites and Contaminants	No. Samples	Location & Depth	Justification
TPHCWG, BTEX, MTBE and SOM.	2	WS101 0.45-0.6m WS101 1.0-1.2m	Tested to confirm the absence of hydrocarbon contamination observed in nearby previous SI locations.
Naphthalene	3	FP101 0.5-1.0m FP102 0.2-0.8m HD104 0.0-1.0m	Assessment of contaminant of concern (naphthalene) around Plot 1.
SOM	5	FP101 0.5-1.0m FP102 0.2-0.8m HD101 0.0-1.1m HD102 0.35-0.8m HD103 0.1-1.0m	Testing to confirm the SOM content of the surrounding ground around Plot 1 and Plot 2.
PAHs -Speciated (EPA 16) by GC/MS	3	HD101 0.0-1.1m HD102 0.35-0.8m HD103 0.1-1.0m	PAHs testing to allow more detailed assessment to be undertaken, as required.

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

Notes:

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

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

3.3.2 Water Sampling / Leaching Testing

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

LKC identified a moderate risk based off previous investigation information for controlled waters (pollutant linkage 4) and further action was only recommended if significant soil contamination was identified on site. Based on the ground conditions encountered, LKC did not consider testing to be required. This is discussed further in Section 5.4.

4 Ground Conditions

4.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground underlain by natural gravelly silty clay. A summary section of the logs is provided in Plate 4-1, with additional comments below.

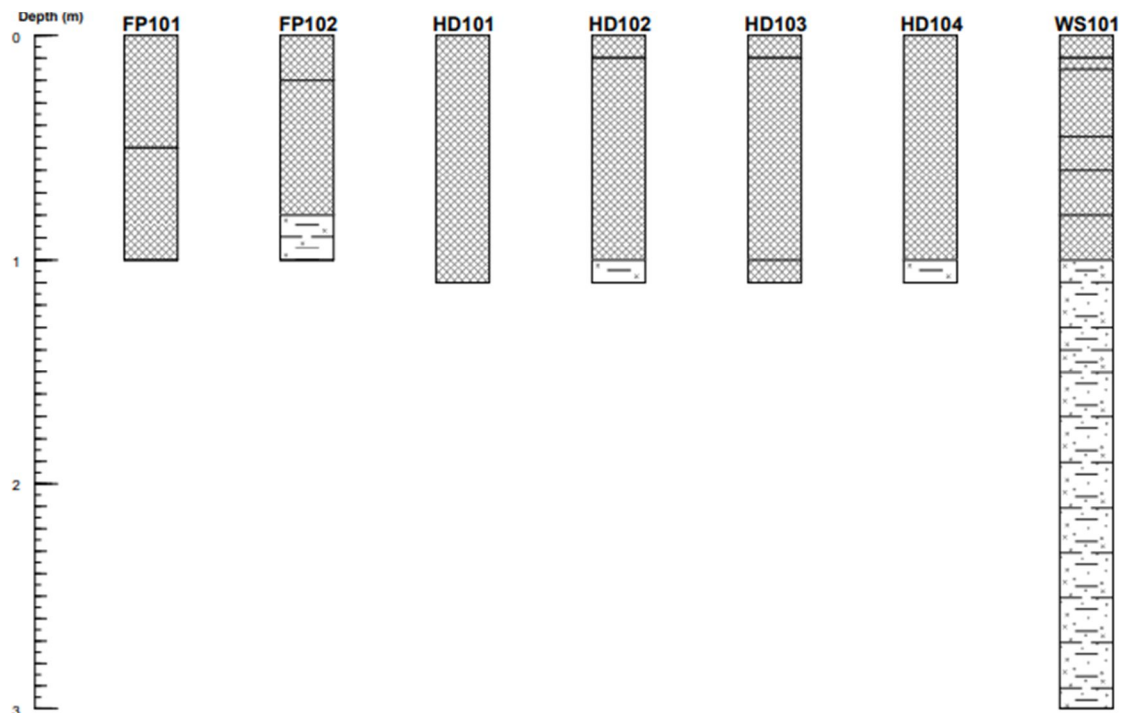


Plate 4-1: Summary of ground conditions.

Made Ground

Made ground was recorded in all locations to depths of 1.01-1.10mbgl. The made ground surrounding Plot 1-2 comprised generally of two types. The first type comprised a gravel of brick and concrete fragments with ash, pottery, plastic and tarmacadam fragments. The second main type was a sandy gravel comprising limestone found in FP101 and FP102. A made ground clay strata was noted in FP101 with brick fragments, coal and ash.

Natural Strata

Natural strata was identified in WS101, HD104 and FP102 and comprised firm to stiff consistency brown gravelly silty clay from 1.00mbgl. A natural silty clay was identified at 1.00mbgl in HD104.

Contamination

With the exception of the anthropogenic material encountered in the made ground (as described above), no further contamination was identified.

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations. The PID recorded a maximum of 0.1ppm TVOC in the samples.

5 Generic Risk Assessment

5.1 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 (LCRM⁵). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 5.5.

5.2 Soil Risk Assessment

5.2.1 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^{6,7}. The change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))⁸ 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 S4ULs⁹. 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^{10,11,12,13}.

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs¹⁴. 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

⁵ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

⁶ Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."

⁷ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

⁸ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

⁹ LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."

¹⁰ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

¹¹ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

¹² EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.

¹³ EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

¹⁴ CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

PAHs^{15,16} and naphthalene the most volatile and soluble¹⁷. 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 negligible¹⁸. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)¹⁹ 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 model²⁰ 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 D. ATRISK SSVs and CL:AIRE GACs were not required for this dataset and have not been included.

B(a)P as Surrogate Marker

An assessment of the data should be undertaken to confirm B(a)P is a suitable surrogate marker by assessing the ratios of carcinogenic PAHs to BaP. However, as the majority of the PAHs were recorded as less than detection limits, the assessment could not be undertaken.

5.2.2 Soil Results Comparison against Assessment Criteria

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

5.2.3 Direct Contact Risk – Pollutant Linkage 1

Elevated concentrations of metals, PAHs and trace asbestos fibres were identified during the previous investigations.

No elevated PAHs were identified across the site as part of this investigation. Naphthalene was not identified above limits of detection in any location on site.

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 home-grown produce. The principal pathways are the ingestion pathways (soil, dust and home-grown produce) and dermal contact.

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

¹⁵ EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

¹⁶ USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

¹⁷ EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5- 079/TR1.

¹⁸ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

¹⁹ HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

²⁰ EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.

Petroleum Hydrocarbons

All petroleum hydrocarbon results were below limits of detection. No visual or olfactory evidence of hydrocarbon contamination was identified in any location site.

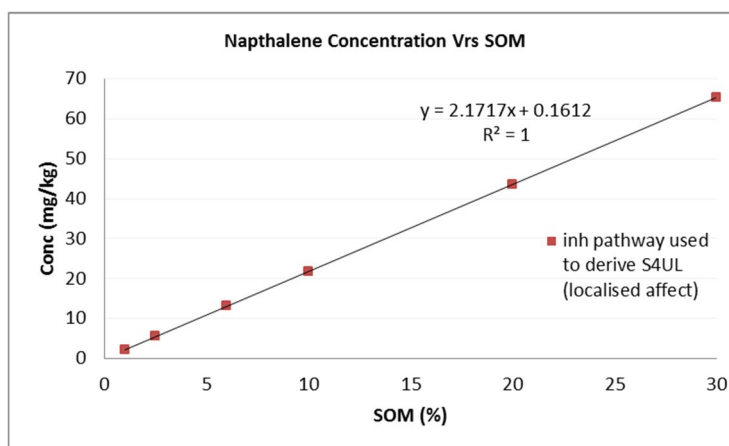
LKC considers the probability of hydrocarbon contamination affecting site users (via ingestion and dermal contact) as unlikely. Given a medium consequence a low risk is considered appropriate and no remediation is recommended.

5.2.4 Risk from Inhalation of Vapours – Pollutant Linkage 2

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

Concentrations of naphthalene greater than the assessment criteria previously reported (5.02mg/kg in WS1 at 1mbgl) were most likely impacted with small amounts of tarmacadam or ash within the sample.

LKC SOM testing of Made Ground soils around WS1 indicates concentration ranges from approximately 1.7-12.3%. There is a linear relation ($r^2=1$) between Naphthalene and SOM concentrations (see Graph 5-1).



Graph 5-1: Naphthalene vs. SOM

Based on LKC SOM results, a range of modified assessment criteria for naphthalene would be calculated as 3.85-26.9mg/kg, when using the above formula. No concentrations exceeded these modified criteria values.

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

5.3 Gas Risk Assessment

Based on previous gas risk assessment work LKC determined the low risk for ground gas to be appropriate, and no further action is required with respect to pollutant linkage 3.

5.4 Controlled Water Assessment

Based on information provided from previous site investigation LKC identified a moderate/low localised risk for controlled waters around the previous WS04 investigation location. Anecdotal evidence suggests that the material was removed from site.

During this current investigation LKC did not find any olfactory/ visual evidence of hydrocarbon contamination in the soil or water in any location across site, including the previously investigated area (WS04).

Furthermore, an unproductive aquifer is present in the superficial deposits below site and no groundwater was encountered in any location. Despite the bedrock aquifer below site being a Principal Aquifer, bedrock was only possibly identified at approximately 3.00mbgl in one location in a previous investigation (WS05). No abstractions were identified within an influencing distance in a previous phase 1 desk study.

As no significant sources of likely mobile contamination have been identified within the soils, the low sensitivity environmental setting and no perched water having been identified this confirms an unlikely probability of onsite contamination affecting controlled waters. With a medium consequence the risk is anticipated to be low and no remediation is required.

5.5 Revised Contamination Conceptual Model

The contamination conceptual model has been revised following the risk assessments undertaken in the Sections above. The revised contamination conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

The revised contamination conceptual model is presented in Table 5-1.

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

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

Further details of the remedial proposals and a remedial option appraisal are given in Section 6.

Pollutant Linkage		Risk	Recommendations
PL1: Contaminants posing a risk to future site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and home-grown produce).	ACM, heavy metals, non-volatile PAHs	Moderate	Elevated concentrations of metals and non-volatile PAHs identified in made ground soils likely associated with presence of ash and clinker. Asbestos fibres also encountered. Recommendation: Clean cover soils in gardens and soft landscaping recommended and agreed with regulators.
	Petroleum hydrocarbons	Low	No elevated concentrations identified. Recommendation: No remediation required. Clean cover soils in gardens and soft landscaping considered sufficient.
PL2: Volatile contaminants posing a risk to future site users via the inhalation of vapours.	Naphthalene	Low	No elevated concentrations identified. Recommendation: No remediation required.
PL3: Gas (carbon dioxide and methane) posing a risk to buildings and future site users via the migration of gas into building causing explosion and asphyxiation.		Moderate / Low	Gas risk assessment included in Site Investigation undertaken to date. Recommendation: Low risk appropriate. No further work required.
PL4: Mobile contamination posing a risk to controlled waters via the migration through permeable strata.		Low	No evidence of contamination identified. Low sensitivity environmental setting. Anecdotal evidence contamination has been removed. Recommendation: No remediation required.

Table 5-1: Revised Conceptual Model

6 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.

A summary of remediation requirements is included in Table 6-1.

PL	Recommendation
1	Environmental cover system required in soft landscaped and garden areas
2	No remediation required.
3	No remediation required.
4	No remediation required.

Table 6-1: Remediation summary.

6.1 Remediation and Validation Recommendations

6.1.1 Environmental Cover System (PL1)

In gardens and soft landscaping areas, an environmental cover system will be required and should comprise 600mm depth in private back gardens and 450mm in private front gardens / soft landscaping. The environmental cover system should be constructed as shown in Plate 6-1:

Either (physical break layer)		Or (geotextile membrane)	
600mm rear gardens. 450mm front gardens & shared landscaping (minimum)	Chemically validated TOPSOIL ¹	600mm rear gardens. 450mm front gardens & shared landscaping (minimum)	Chemically validated TOPSOIL ¹
	Chemically validated SUBSOIL		Chemically validated SUBSOIL
	100mm (minimum) PHYSICAL BREAK LAYER ²		GEOTEXTILE MEMBRANE (at base of subsoil)
Existing MADE GROUND			

Plate 6-1: Typical Environmental Cover System Construction.

Notes:

Hardstood Areas – No Remediation Required.

¹ NHBC recommend 150mm minimum topsoil depth.

² Gravel break layer, minimal fines.

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

Chemical validation of imported soils is required, details are included in Section 6.3.

6.2 Other Considerations

6.2.1 Earthworks Inspections / Unexpected Contamination

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

and the Local Authority should be informed, and further assessment of the material may be required.

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

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

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

6.2.2 *Re-use of Site Generated Material*

To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used²¹):

- 5,000 tonnes (c. 2,500m³) treatment of crushed concrete / stone.
- 1,000 tonnes (c. 500m³) use of non-hazardous soil
- 5,000 tonnes (c. 2,500m³) use of clays, sand, gravel, brick, concrete, stone etc.
- 50,000 tonnes (c. 25,000m³) use of bituminous material to be used in roadways.

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

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

For all the above material will need to be tested at the rate and analytical suites presented in Table 9-1.

6.2.3 *Stockpile Management*

Stockpiled material should be suitably managed. Material should be segregated by type and source. For example, construction / demolition arisings, site won subsoil. The source of each stockpile should be recorded and appropriate validation testing for the proposed re-use or potential offsite disposal should be undertaken as required.

6.2.4 *Disposal*

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

²¹ <https://www.gov.uk/guidance/register-your-waste-exemptions-environmental-permits>

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

6.2.5 Health & 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 guidance²²) should be adopted by all workers involved with site enabling and construction works.

6.3 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 6-2, based on MCC 'Guidelines to Developer' (2021)²³. However, LKC consider no testing, but proof of provenance is sufficient for natural, virgin, quarried material.

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

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

Table 6-2: Sampling requirements for imported and site won soils.

Notes:

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

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

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

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

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882²⁴). LKC advise this information is provided by the supplier before material is imported onto site.

²² HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

²³ YALPAG (2021). "Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners and Consultants." Yorkshire and Lincolnshire Pollution Advisory Group. V. 4.1-June 2021.

²⁴ BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

Imported material to be used in gardens will be compared against residential with plant uptake criteria.

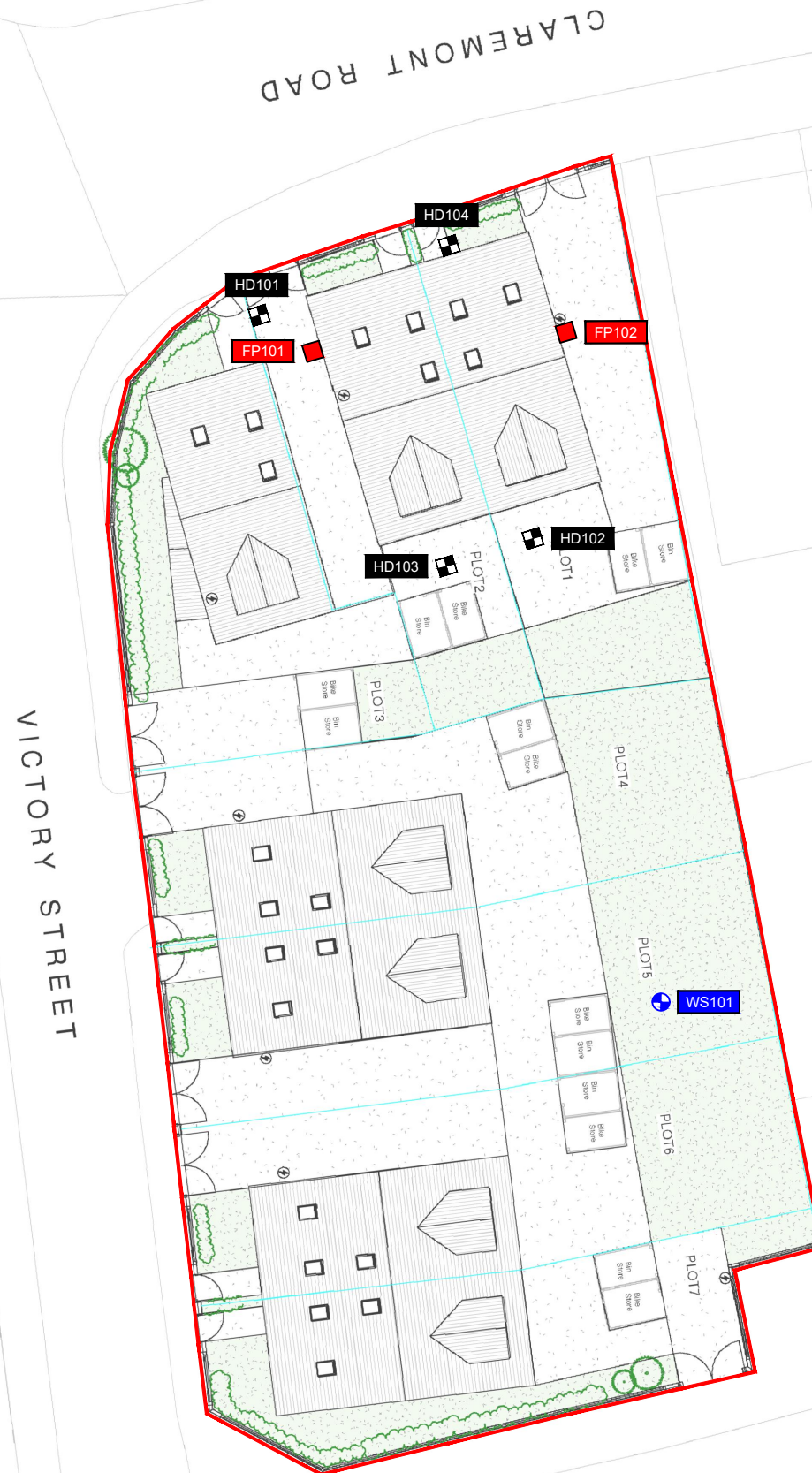
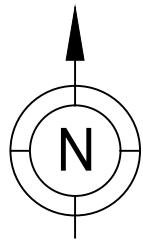
6.4 Site Completion Report

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

- » Provision of waste transfer documents.
- » Validation of environmental cover system.
- » Verification testing of all imported soil for garden and soft landscaping areas.
- » Details of any unexpected contamination identified onsite, suitably risk assessed and / or validated.

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

Figures



KEY

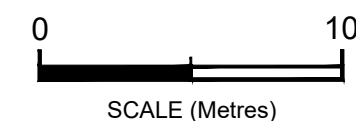
-  Site Boundary
-  Window Sample Borehole (WS)
-  Foundation Inspection Pit (FP)
-  Hand Dug Trial Pit (HD)
-  Plot Boundary
-  *ROLEC WALLPOD:EV* Electric charging point
-  Turf
-  Shrub / herbaceous planting
-  Tree
-  ULTIDRIVE asphalt tarmac for driveway

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: Crown Advisory			
Site: Claremont Road, Rusholme			
Title: Site Investigation Location Plan			
Job No.: LKC 23 1097	Scale (See Scale Bar): 1:250 @ A3	Figure: 1	Revision:
Drawn By: AC	Checked By: RW	Drawn: Jul 2023	

Extract from: Create It Studios - Architects & Designers
Drawing Ref: Proposed Landscape Plan, No.A1344(02)005, Rev:B (25/06/2021)



Appendix A

Risk Matrix

Risk Evaluation

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552²⁵. It involves the classification of the:

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

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

Table A. Classification of Consequence

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

²⁵ CIRIA C552 (2001) Contaminated Land Risk Assessment - A Guide to Good Practice.

Unlikely	- There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur in the very long term.
-----------------	---

Table B. Classification of Probability.

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

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

Table C. Comparison of Consequence against Probability

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

Risk	Action Required
Very High Risk	- There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that 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

Excavation Method
Hand excavated to 1.00mbgl.

Dimensions
0.50m x 0.50m x 1.00m

Ground Level (mOD)
Client
Crown Advisory

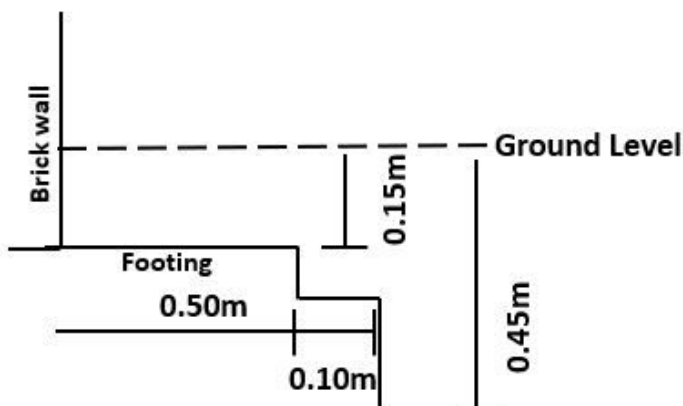
Job Number
LKC 23 1097

Location
Dates
11/07/2023

Engineer
LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-1.00	ES PID=<0.1ppm				(0.50)	MADE GROUND: Grey sandy GRAVEL comprising limestone. Sand is fine to medium. Gravel is fine to medium, subangular.		
					0.50	MADE GROUND: Soft consistency dark brown silty CLAY with occasional brick fragment, ash and coal.		
					(0.50)	Made ground noted under footing.		
					1.00	Complete at 1.00m		


Remarks

Footing continues down by 0.20mbgl. Stepping out by 0.10m down to 0.45mbgl.
Pit was dry and stable.
Drainage pipe noted at 0.50mbgl, 0.20m away from footing.
Footing encountered 0.15mbgl, stepping out by 0.50m.

Scale (approx)

1:20

Logged By

RW

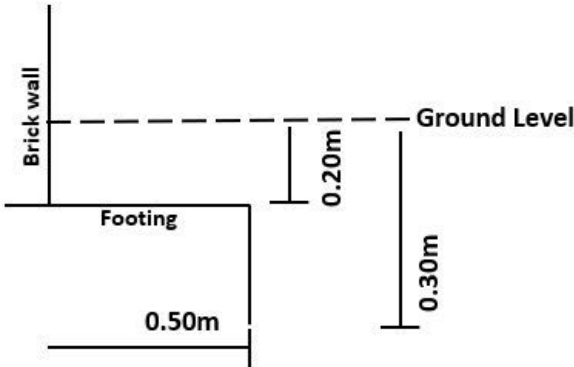
Figure No.

LKC 23 1097.FP101



Excavation Method Hand excavated to 1.00mbgl.		Dimensions 0.60m x 0.40m x 1.00m		Ground Level (mOD)		Client Crown Advisory		Job Number LKC 23 1097	
		Location		Dates 11/07/2023		Engineer LKC		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.80	ES PID=<0.1ppm				(0.20)	MADE GROUND: Grey sandy GRAVEL comprising limestone. Sand is fine to coarse. Gravel is fine to medium, subangular.		
					0.20	MADE GROUND: Dark brown sandy silty GRAVEL comprising concrete fragments and brick fragments with occasional ash and clinker. Sand is fine to medium. Gravel is fine to coarse, subangular.		
0.80-1.00	D				(0.60)	Layer of bricks noted at 0.60mbgl.		
					0.80	Firm consistency brown silty CLAY.		
					(0.20)			
					1.00	Complete at 1.00m		



Remarks Pit was dry and stable. Footing encountered 0.20mbgl. Stepping out by 0.50m. Finished at 0.30mbgl.		
Scale (approx)	Logged By	Figure No.
1:20	RW	LKC 23 1097.FP102

Excavation Method

Hand excavated to 1.10mbgl.

Dimensions

0.30m x 0.30m x 1.10m

Ground Level (mOD)
Client

Crown Advisory

**Job
Number**

LKC 23 1097

Location
Dates

11/07/2023

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.10	ES PID=<0.1ppm					MADE GROUND: Dark brown sandy silty GRAVEL comprising bricks and brick fragments with occasional ash, plastic, pottery and rare tarmacadam fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular. (1.10) 1.10 Complete at 1.10m		


Remarks

Pit was dry and stable.
Service encountered at side of pit at 0.70mbgl.

Scale (approx)

1:20

Logged By

RW

Figure No.

LKC 23 1097.HD101

Excavation Method

Hand excavated to 1.10mbgl.

Dimensions

0.40m x 0.40m x 1.10m

Ground Level (mOD)
Client

Crown Advisory

**Job
Number**

LKC 23 1097

Location
Dates

11/07/2023

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.35	D				(0.10) 0.10	MADE GROUND: Tarmacadam (bad condition).		
0.35-0.80	ES PID=<0.1ppm				(0.90)	MADE GROUND: Dark brown sandy GRAVEL with frequent brick fragments, tarmacadam fragments, occasional ash, slate and pottery. Sand is fine to coarse. Gravel is fine to medium, subangular comprising mudstone and sandstone.		
0.80-1.00	D				1.00 (0.10) 1.10	Soft consistency silty CLAY.	x x	
						Complete at 1.10m		


Remarks

Pit was dry and stable.

Scale (approx)

1:20

Logged By

RW

Figure No.

LKC 23 1097.HD102

Excavation Method

Hand excavated to 1.10mbgl.

Dimensions

0.40m x 0.40m x 1.10m

Ground Level (mOD)
Client

Crown Advisory

**Job
Number**

LKC 23 1097

Location
Dates

11/07/2023

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.35-0.80	ES PID=<0.1ppm				(0.10) 0.10	MADE GROUND: Tarmacadam (bad condition).		
					(0.90)	MADE GROUND: Dark brown sandy GRAVEL with frequent brick fragments, tarmacadam fragments, occasional glass, ash, slate and pottery. Sand is fine to coarse. Gravel is fine to medium, subangular comprising mudstone and sandstone.		
0.80-1.00	ES PID=<0.1ppm				1.00 (0.10) 1.10	MADE GROUND: Soft consistency silty CLAY with rare brick fragments.		
						Complete at 1.10m		


Remarks

Pit was dry and stable.

Scale (approx)

1:20

Logged By

RW

Figure No.

LKC 23 1097.HD103

Excavation Method

Hand excavated to 1.1mbgl.

Dimensions

0.40m x 0.40m x 1.10m

Ground Level (mOD)
Client

Crown Advisory

**Job
Number**

LKC 23 1097

Location
Dates

01/07/2023

Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	ES PID=<0.1ppm					MADE GROUND: Dark brown sandy clayey GRAVEL with occasional whole bricks, pottery and ash. Sand is fine to medium. Gravel is fine to coarse, subangular comprising mudstone and sandstone.		
					(1.00)			
					1.00 (0.10) 1.10	Stiff consistency brown silty CLAY.	x — x	
						Complete at 1.10m		


Remarks

Pit was dry and stable.

Scale (approx)

1:20

Logged By

RW

Figure No.

LKC 23 1097.HD104

Excavation Method

Window sampler driven to 3.00mbgl.

Dimensions
Ground Level (mOD)
Client

Crown Advisory

Job Number
LKC 23 1097

Location
Dates

11/07/2023

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.15 0.15-0.45	D PID=<0.1ppm ES PID=<0.1ppm				0.10 0.15 (0.30)	MADE GROUND: Tarmacadam.		
0.45-0.60 0.60-0.80 0.80-1.00	ES PID=<0.1ppm ES PID=<0.1ppm ES PID=<0.1ppm				0.45 0.60 (0.15) (0.20) (0.80) 1.00	MADE GROUND: Brown sandy GRAVEL comprising sandstone. Sand is fine to medium. Gravel is fine to coarse, subangular.		
1.00-1.20	ES PID=<0.1ppm					MADE GROUND: Dark brown sandy silty GRAVEL comprising sandstone and brick fragments with frequent ash and clinker. Sand is fine to coarse. Gravel is fine to coarse, subangular.		
						MADE GROUND: Soft consistency silty CLAY with rare brick fragments.		
						MADE GROUND: Brown SAND with frequent brick fragments and rare ash. Sand is fine to coarse.		
					(2.00)	MADE GROUND: Organic soft consistency dark brown silty CLAY with occasional brick fragments, shale and ash. Noted to be damp.		
						Firm to stiff consistency brown with grey mottling gravelly silty CLAY with rare rootlets. Gravel is fine to medium, subrounded to subangular comprising mudstone and sandstone.		
					3.00	Complete at 3.00m		

Remarks

Borehole stable.
No water strikes noted, strata damp at 0.80mbgl.
Borehole drilled for contamination samples only.

Scale (approx)

1:50

Logged By

RW

Figure No.

LKC 23 1097.WS101

Appendix C

Certificates of Analysis – Soil



Peter Dunn
LK Consult Limited
Unit 29 Eton Business Park
Eton Hill Road
Manchester
M26 2ZS

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

DETS Report No: 23-09318

Site Reference: Claremont Road, Rusholme

Project / Job Ref: LKC 23 1097

Order No: LKC 23 1097 / PD

Sample Receipt Date: 18/07/2023

Sample Scheduled Date: 18/07/2023

Report Issue Number: 2

Reporting Date: 28/07/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.
This report supersedes 23-09318, issue no.1.

Reason for re-issue:
Naphthalene results added.

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



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



Soil Analysis Certificate						
DETS Report No: 23-09318	Date Sampled	11/07/23	11/07/23	11/07/23	11/07/23	11/07/23
LK Consult Limited	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Claremont Road, Rusholme	TP / BH No	WS101	WS101	FP101	FP102	HD101
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: LKC 23 1097 / PD	Depth (m)	0.45 - 0.60	1.00 - 1.20	0.50 - 1.00	0.20 - 0.80	0.00 - 1.10
Reporting Date: 28/07/2023	DETS Sample No	664636	664637	664638	664639	664640

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Organic Matter (SOM)	%	< 0.1	MCERTS	3.3	1.7	3.8	3.3	3.2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)

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



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



Soil Analysis Certificate						
DETS Report No: 23-09318	Date Sampled	11/07/23	11/07/23	11/07/23		
LK Consult Limited	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Claremont Road, Rusholme	TP / BH No	HD102	HD103	HD104		
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: LKC 23 1097 / PD	Depth (m)	0.35 - 0.80	0.10 - 1.00	0.00 - 1.00		
Reporting Date: 28/07/2023	DETS Sample No	664641	664642	664643		

Determinand	Unit	RL	Accreditation			
Organic Matter (SOM)	%	< 0.1	MCERTS	10	2.3	12.3

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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



Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-09318	Date Sampled	11/07/23	11/07/23	11/07/23	11/07/23	11/07/23
LK Consult Limited	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Claremont Road, Rusholme	TP / BH No	FP101	FP102	HD101	HD102	HD103
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: LKC 23 1097 / PD	Depth (m)	0.50 - 1.00	0.20 - 0.80	0.00 - 1.10	0.35 - 0.80	0.10 - 1.00
Reporting Date: 28/07/2023	DETS Sample No	664638	664639	664640	664641	664642

Determinand	Unit	RL	Accreditation	(n)				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS		0.30	0.34	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS		0.47	0.59	0.20	0.20
Pyrene	mg/kg	< 0.1	MCERTS		0.46	0.58	0.19	0.19
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS		0.26	0.31	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS		0.25	0.25	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS		0.23	0.21	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS		0.23	0.21	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS		0.11	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS		< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS		2.3	2.5	< 1.6	< 1.6

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



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



Soil Analysis Certificate - Speciated PAHs

DETS Report No: 23-09318	Date Sampled	11/07/23				
LK Consult Limited	Time Sampled	None Supplied				
Site Reference: Claremont Road, Rusholme	TP / BH No	HD104				
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied				
Order No: LKC 23 1097 / PD	Depth (m)	0.00 - 1.00				
Reporting Date: 28/07/2023	DETS Sample No	664643				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS				
Acenaphthene	mg/kg	< 0.1	MCERTS				
Fluorene	mg/kg	< 0.1	MCERTS				
Phenanthrene	mg/kg	< 0.1	MCERTS				
Anthracene	mg/kg	< 0.1	MCERTS				
Fluoranthene	mg/kg	< 0.1	MCERTS				
Pyrene	mg/kg	< 0.1	MCERTS				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS				
Chrysene	mg/kg	< 0.1	MCERTS				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS				



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 23-09318	Date Sampled	11/07/23	11/07/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Claremont Road, Rusholme	TP / BH No	WS101	WS101			
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied	None Supplied			
Order No: LKC 23 1097 / PD	Depth (m)	0.45 - 0.60	1.00 - 1.20			
Reporting Date: 28/07/2023	DETS Sample No	664636	664637			

Determinand	Unit	RL	Accreditation	(n)		
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	
Aliphatic >C34 - C44	mg/kg	< 10	NONE	< 10	< 10	
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	< 3	< 3	
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	< 10	
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21	
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21	
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42	< 42	
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42	< 42	

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



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-09318	Date Sampled	11/07/23	11/07/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Claremont Road, Rusholme	TP / BH No	WS101	WS101			
Project / Job Ref: LKC 23 1097	Additional Refs	None Supplied	None Supplied			
Order No: LKC 23 1097 / PD	Depth (m)	0.45 - 0.60	1.00 - 1.20			
Reporting Date: 28/07/2023	DETS Sample No	664636	664637			

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

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



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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-09318	
LK Consult Limited	
Site Reference: Claremont Road, Rusholme	
Project / Job Ref: LKC 23 1097	
Order No: LKC 23 1097 / PD	
Reporting Date: 28/07/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
664636	WS101	None Supplied	0.45 - 0.60	21	Grey clay with brick
664637	WS101	None Supplied	1.00 - 1.20	19.6	Grey clay
664638	FP101	None Supplied	0.50 - 1.00	19.5	Brown sandy clay with stones and brick
664639	FP102	None Supplied	0.20 - 0.80	14.5	Brown sandy clay with stones and concrete
664640	HD101	None Supplied	0.00 - 1.10	11.5	Brown sandy gravel with stones and concrete
664641	HD102	None Supplied	0.35 - 0.80	15.7	Black gravelly sand with stones and concrete
664642	HD103	None Supplied	0.10 - 1.00	6.7	Black gravelly sand with stones and concrete
664643	HD104	None Supplied	0.00 - 1.00	19.8	Black gravelly sand with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-09318

LK Consult Limited

Site Reference: Claremont Road, Rusholme

Project / Job Ref: LKC 23 1097

Order No: LKC 23 1097 / PD

Reporting Date: 28/07/2023

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

D Dried
AR As Received



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List of HWOL Acronyms and Operators
DETS Report No: 23-09318
LK Consult Limited
Site Reference: Claremont Road, Rusholme
Project / Job Ref: LKC 23 1097
Order No: LKC 23 1097 / PD
Reporting Date: 28/07/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

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

Appendix D

Generic Assessment Criteria Values

Generic Assessment Criteria Values

Contaminant	SOM	Res +	Res -	Allot.	Comm.	pos resi	pos park	Source	
Metals	Inorganic Arsenic	N/A	37	40	49	640	79	168	DEFRA C4SL
	Beryllium	N/A	1.7	1.7	35	12	2.2	63	LQM S4UL
	Boron	N/A	290	11,000	45	240,000	21,000	46,000	LQM S4UL
	Cadmium	N/A	26	149	4.9	410	220	880	DEFRA C4SL
	Chromium (III)	N/A	910	910	18,000	8,600	1,500	33,000	LQM S4UL
	Chromium (VI)	N/A	21.0	21.0	170.0	49	23.0	250	DEFRA C4SL
	Copper	N/A	2,400	7,100	520	68,000	12,000	44,000	LQM S4UL
	Lead	N/A	200	310	80	2,330	630	1,300	DEFRA C4SL
	Elemental Mercury	N/A	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}	LQM S4UL
	Inorganic Mercury	N/A	40	56	19	1,100	120	240	LQM S4UL
	Methylmercury	N/A	11	15	6.0	320	40	68	LQM S4UL
	Nickel	N/A	180	180	230	980	230	3,400	LQM S4UL
	Selenium	N/A	250	430	88	12,000	1,100	1,800	LQM S4UL
	Vanadium	N/A	410	1,200	91	9,000	2,000	5,000	LQM S4UL
	Zinc	N/A	3,700	40,000	620	730,000	81,000	170,000	LQM S4UL
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000	LQM S4UL
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000	LQM S4UL
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000	LQM S4UL
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000	LQM S4UL
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000	LQM S4UL
		2.5%	5,400	35,000	950	540,000	74,000	150,000	LQM S4UL
		6%	11,000	37,000	2,200	540,000	74,000	150,000	LQM S4UL
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49	LQM S4UL
		2.5%	11	14	6.5	170	29	56	LQM S4UL
		6%	13	15	13	180	29	62	LQM S4UL
	Benzo(a)pyrene (only)	1%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		2.5%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		6%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13	LQM S4UL
		2.5%	3.3	4.0	2.1	44	7.2	15	LQM S4UL
		6%	3.7	4.0	3.9	45	7.2	16	LQM S4UL
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400	LQM S4UL
		2.5%	340	360	470	4,000	640	1,500	LQM S4UL
		6%	350	360	640	4,000	640	1,600	LQM S4UL
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370	LQM S4UL
		2.5%	93	110	75	1,200	190	410	LQM S4UL
		6%	100	110	130	1,200	190	440	LQM S4UL
	Chrysene	1%	15	30	4.1	350	57	93	LQM S4UL
		2.5%	22	31	9.4	350	57	110	LQM S4UL
		6%	27	32	19	350	57	120	LQM S4UL
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1	LQM S4UL
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3	LQM S4UL
		6%	0.3	0.32	0.43	3.6	0.58	1.4	LQM S4UL
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300	LQM S4UL
		2.5%	560	1,600	130	23,000	3,100	6,300	LQM S4UL
		6%	890	1,600	290	23,000	3,100	6,400	LQM S4UL
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000	LQM S4UL
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000	LQM S4UL
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000	LQM S4UL
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150	LQM S4UL
		2.5%	36	46	21	510	82	170	LQM S4UL
		6%	41	46	39	510	82	180	LQM S4UL
	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}	LQM S4UL
		2.5%	5.6 ^f	5.6 ^f	10 ^f	460 ^f (183) ^{sol}	4,900 ^f	1,900 ^f (183) ^{sol}	LQM S4UL
		6%	13 ^f	13 ^f	24 ^f	1,100 ^f (432) ^{sol}	4,900 ^f	3,000	LQM S4UL
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200	LQM S4UL
		2.5%	220	1,500	38	22,000	3,100	6,200	LQM S4UL
		6%	440	1,500	90	22,000	3,100	6,300	LQM S4UL
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000	LQM S4UL
		2.5%	1,200	3,800	270	54,000	7,400	15,000	LQM S4UL
		6%	2,000	3,800	620	54,000	7,400	15,000	LQM S4UL
	Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4	LQM S4UL
		2.5%	0.98	1.2	0.67	15	2.2	4.7	LQM S4UL
		6%	1.1	1.2	1.2	15	2.2	4.8	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}	Source
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90	LQM S4UL
		2.5%	0.17	0.70	0.034	47	72	100	LQM S4UL
		6%	0.37	1.4	0.075	90	73	110	LQM S4UL
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}	LQM S4UL
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920)	LQM S4UL
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360)	LQM S4UL
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}	LQM S4UL
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220)	LQM S4UL
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840)	LQM S4UL
	o-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}	LQM S4UL
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}	LQM S4UL
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}	LQM S4UL
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}	LQM S4UL
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470)	LQM S4UL
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460)	LQM S4UL
	p-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}	LQM S4UL
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}	LQM S4UL
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}	LQM S4UL
Petroleum Hydrocarbons	Aliphatic								
	EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304) ^{sol}	95,000 (304) ^{sol}	LQM S4UL
	EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}	LQM S4UL
	EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}	LQM S4UL
	EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}	LQM S4UL
	EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}	LQM S4UL
	EC>16-35	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL
	EC>35-44	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL
	Aliphatic								
	EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}	LQM S4UL
	EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}	LQM S4UL
	EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}	LQM S4UL
	EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}	LQM S4UL
	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}	LQM S4UL
	EC>16-35	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL
	EC>35-44	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL
	Aliphatic								
	EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150)	LQM S4UL
	EC>6-8	6%	530	530	13,000	40,000 (736) ^{sol}	620,000	320,000 (736) ^{sol}	LQM S4UL
	EC>8-10	6%	150	150	1,700	11,000 (451) ^{vap}	13,000	21,000 (451) ^{vap}	LQM S4UL
	EC>10-12	6%	760 (283) ^{vap}	760 (283) ^{vap}	7,300	47,000 (283) ^{vap}	13,000	24,000 (283) ^{vap}	LQM S4UL
	EC>12-16	6%	4,300 (142) ^{sol}	4,400 (142) ^{sol}	13,000	90,000 (142) ^{sol}	13,000	26,000 (142) ^{sol}	LQM S4UL
	EC>16-35	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f	LQM S4UL
	EC>35-44	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f	LQM S4UL
	Aromatic								
	EC5-7(benzene as	1%	70	370	13	26,000 (1,220) ^{sol}	56,000	76,000 (1,220) ^{sol}	LQM S4UL
	EC>7-8(toluene)	1%	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}	LQM S4UL
	EC>8-10	1%	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}	LQM S4UL
	EC>10-12	1%	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}	LQM S4UL
	EC>12-16	1%	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000	LQM S4UL
	EC>16-21	1%	260 ^f	1,900 ^f	46 ^f	28,000 ^f	3,800 ^f	7,600 ^f	LQM S4UL
	EC>21-35	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	EC>35-44	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	Aromatic								
	EC5-7(benzene as	2.5%	140	690	27	46,000 (2,260) ^{sol}	56,000	84,000 (2,260) ^{sol}	LQM S4UL
	EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) ^{sol}	56,000	95,000 (1,920) ^{sol}	LQM S4UL
	EC>8-10	2.5%	83	110	21	8,100 (1,500) ^{vap}	5,000	8,500 (1,500) ^{vap}	LQM S4UL
	EC>10-12	2.5%	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (899) ^{sol}	LQM S4UL
	EC>12-16	2.5%	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000	LQM S4UL
	EC>16-21	2.5%	540 ^f	1,900 ^f	110 ^f	28,000 ^f	3,800 ^f	7,700 ^f	LQM S4UL
	EC>21-35	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	EC>35-44	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	Aromatic								
	EC5-7(benzene as	6%	300	1,400	57	86,000 (4,710) ^{sol}	56,000	92,000 (4,710) ^{sol}	LQM S4UL
	EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360)	LQM S4UL
	EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}	LQM S4UL
	EC>10-12	6%	380	1,200	4	34,000 (2,150) ^{sol}	5,000	10,000	LQM S4UL
	EC>12-16	6%	660	2,500	130	38,000	5,100	10,000	LQM S4UL
	EC>16-21	6%	930 ^f	1,900 ^f	260 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	EC>21-35	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL
	EC>35-44	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL
	Aliphatic +Aromatic >EC44	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
		2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
		6%	1,900 ^f	1,900 ^f	3,000 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}	Source
Chloroalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	0.0071	0.0092	0.0046	0.67	29	21	LQM S4UL
		2.5%	0.0110	0.0130	0.0083	0.97	29	24	LQM S4UL
		6%	0.0190	0.0230	0.0160	1.7	29	28	LQM S4UL
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425)	LQM S4UL
		2.5%	18	18	110	1,300	140,000	76,000 (2,915)	LQM S4UL
		6%	39	40	240	3,000	140,000	100,000 (6,392)	LQM S4UL
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800	LQM S4UL
		2.5%	3.4	8.0	0.89	550	1,400	2,100	LQM S4UL
		6%	7.5	17	2.0	1,100	1,400	2,300	LQM S4UL
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500	LQM S4UL
		2.5%	2.8	3.5	1.9	250	1,400	1,800	LQM S4UL
		6%	6.4	8.2	4.4	560	1,400	2,100	LQM S4UL
	Tetrachloroethene (PCE)	1%	0.31	0.32	2.00	24	3,200	1400	DEFRA C4SL
		2.5%	0.70	0.71	4.8	55	3,300	1900	DEFRA C4SL
		6%	1.60	1.60	11.0	130	3,400	2,500	DEFRA C4SL
	Tetrachloromethane (carbon tetrachloride)	1%	0.03	0.03	0.45	2.9	890	190	LQM S4UL
		2.5%	0.06	0.06	1.0	6.3	920	270	LQM S4UL
		6%	0.13	0.13	2.4	14	950	400	LQM S4UL
	Trichloroethene (TCE)	1%	0.009	0.010	0.032	0.7	76.0	41.0	DEFRA C4SL
		2.5%	0.020	0.020	0.072	1.5	78.0	51.0	DEFRA C4SL
		6%	0.043	0.045	0.160	3.4	79.0	69.0	DEFRA C4SL
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600	LQM S4UL
		2.5%	1.7	2.1	0.83	170	2,500	2,800	LQM S4UL
		6%	3.4	4.2	1.7	350	2,500	3,100	LQM S4UL
	Chloroethene (vinyl chloride)	1%	0.006	0.015	0.0017	1.1E+00	7.8	18.0	DEFRA C4SL
		2.5%	0.010	0.019	0.0031	1.4E+00	7.8	19.0	DEFRA C4SL
		6%	0.017	0.029	0.0058	2.20	7.8	19.0	DEFRA C4SL
	2,4,6-Trinitrotoluene (TNT)	1%	1.6	65	0.24	1,000	130	260	LQM S4UL
		2.5%	3.7	66	0.58	1,000	130	270	LQM S4UL
		6%	8.1	66	1.4	1,000	130	270	LQM S4UL
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) ^{sol}	LQM S4UL
		2.5%	250	13,000	38	210,000	26,000	51,000	LQM S4UL
		6%	540	13,000	85	210,000	27,000	53,000	LQM S4UL
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) ^{vap}	LQM S4UL
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) ^{vap}	LQM S4UL
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) ^{vap}	LQM S4UL
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30	LQM S4UL
		2.5%	6.6	7.4	6.1	170	18	31	LQM S4UL
		6%	7.1	7.5	9.8	170	18	31	LQM S4UL
	Dieldrin	1%	0.97	7.0	0.17	170	18	30	LQM S4UL
		2.5%	2.0	7.3	0.41	170	18	30	LQM S4UL
		6%	3.5	7.4	0.96	170	18	31	LQM S4UL
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300	LQM S4UL
		2.5%	7.8	620	1.2	9,400	1,200	2,400	LQM S4UL
		6%	17.4	620	2.7	9,400	1,200	2,400	LQM S4UL
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26	LQM S4UL
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26	LQM S4UL
		6%	0.14	6.6	2.2E-02	140	16	27	LQM S4UL
	Endosulfanns (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300	LQM S4UL
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400	LQM S4UL
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500	LQM S4UL
Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15	LQM S4UL	
	2.5%	0.2	3.8	3.2E-02	65	8.1	15	LQM S4UL	
	6%	0.46	3.8	7.7E-02	65	8.1	16	LQM S4UL	
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}	LQM S4UL
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}	LQM S4UL
		6%	2.4	2.4	32	290	14,000	2,900	LQM S4UL
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}	LQM S4UL
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}	LQM S4UL
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}	LQM S4UL
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}	LQM S4UL
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}	LQM S4UL
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}	LQM S4UL
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}	LQM S4UL
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120	LQM S4UL
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130	LQM S4UL
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190	LQM S4UL
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190	LQM S4UL
		6%	22	38	7.0	830	100	190	LQM S4UL
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30	LQM S4UL
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30	LQM S4UL
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	^{POS} resi	^{POS} park	Source
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100	LQM S4UL
		2.5%	2.0	150	0.30	4,000	620	1,100	LQM S4UL
		6%	4.5	210	0.70	4,300	620	1,100	LQM S4UL
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110	LQM S4UL
		2.5%	0.52	29	8.0E-02	400	60	120	LQM S4UL
		6%	1.2	31	0.19	400	60	120	LQM S4UL
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300	LQM S4UL
		2.5%	0.29	0.29	10	22	11,000	1,900	LQM S4UL
		6%	0.62	0.62	23	47	11,000	2,700	LQM S4UL
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48	LQM S4UL
		2.5%	0.7	0.78	0.61	66	25	50	LQM S4UL
		6%	1.6	1.8	1.4	120	25	51	LQM S4UL
	Phenol	1%	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)	LQM S4UL
		2.5%	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir}	1,500 ^{dir} (9,700)	LQM S4UL
		6%	1,100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir}	3,200 ^{dir} (11,000)	LQM S4UL
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									
f = oral, dermal and inhalation exposures compared to oral HCV									
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-tetrachlorophenol									

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