

41 Bury Old Road, Ainsworth

Phase 2 Geo-Environmental Investigation, Risk Assessment and Outline Remediation Strategy

Job Number: LKC241504

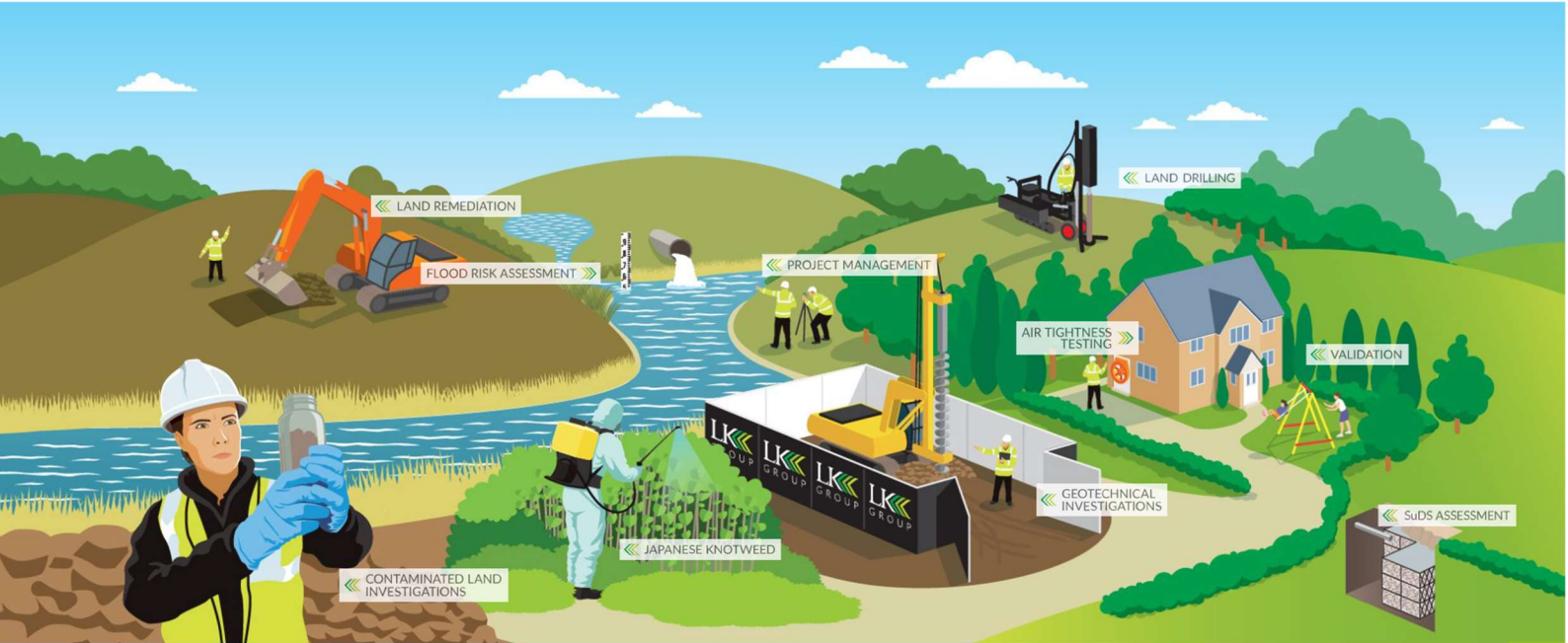
Date: May 2025

Client: Adele Warren



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EXECUTIVE SUMMARY

Site Details

Location	Land east of no.41 Bury Old Road, located to the northwest of the junction between Bury Old Road and Authur Lane (B6196), approximately 4.2km east of Bolton city centre. Centred at approximate National Grid Reference 375820E 410320N.
Area	1,400m ²
Topography	150 metres Above Ordnance Datum (AOD). Site is approximately level.
Current Site Use	A single storey shed currently being used as a car garage building with concrete and gravel hardstanding and grassed soft landscaping.
Proposed Development	1no. Dwelling with garden, soft landscaping, car parking area and associated infrastructure.

Site Setting

Main Historical Features	Onsite: Agricultural Field, unnamed buildings. Surrounding Area: Residential Buildings, Open fields.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till, Secondary Undifferentiated Aquifer Bedrock: Pennine Lower Coal Measures Formation - Cannel Rock (South Lancashire), Sandstone. Secondary A Aquifer.
Landfills / Infilled Ground	One recorded landfill site 206m NE.
Site Reconnaissance	Site currently used as car storage outside on the hard stood ground (south), car repairing on the inside of the buildings (northwest) and the remainder comprises grassed soft landscaping.
Recommendations	Site Investigation was recommended to further assess geo-environmental risk.

Ground Investigation Work Undertaken

Date of Investigation:	3rd April 2025.
Intrusive Investigation Work Undertaken:	3no. window sample boreholes. 4no. hand excavated trial pits. Contamination and geotechnical testing.

Ground Conditions

Made Ground	Recorded in WS102, WS103 and HD104 only, to depths of 0.20-0.70mbgl. The made ground comprised horizons of gravel, sand, silt, clay with bitumen, ash, clinker and metal.
Superficial	Initial strata silt to 0.40-0.70mbgl (except in WS102), underlain by soft to very stiff gravelly sandy clay, becoming firmer with depth.
Bedrock	Not proven.
Groundwater	Encountered only in WS101 at a depth of 2.50mbgl.
Obstructions	No obstructions were identified.

Geotechnical Assessment

Allowable Bearing Pressure	A conservative s_u of 50kPa has been allocated to the firm clay encountered at 1.20m, this will give an allowable bearing capacity of 86kN/m ² .
Anticipated Foundation Type	Traditional shallow foundations recommended from approximately 1.2mbgl. If soft ground is encountered, foundations may need to be deepened / widened or ground replaced with compacted granular material.
Other Considerations	Consideration of effects of trees also needs to be considered. Temporary supports of excavations may be required. Detailed design should be carried out by structural engineer. Concrete Requirements DS2-AC-1s.

Contamination Risk Assessment

Pollutant Linkage		Risk	Assessment
1	Asbestos, heavy metals, PAHs, other inorganic and organic contaminants.	Moderate	Remediation required where made ground is present in proposed garden and soft landscaping areas.
	Petroleum hydrocarbons.	Low	No remediation recommended.
2	Volatile contaminants.	Low	No remediation recommended.
3	Hazardous / ground gas: methane, carbon dioxide.	Moderate / Low	No remediation recommended.
	Radon	Low	No remediation recommended.
4	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds.	Low	No remediation recommended.
5	Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds.	Low	No remediation recommended. United Utilities Pipeline Risk Assessment may be required.

PL	Recommendation
1	Removal of made ground from within proposed soft landscaping and garden areas.
2	No remediation required.
3	No remediation required.
4	No remediation required.
5	United Utilities Pipeline Risk Assessment may be required.

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Figure 2 – Proposed Development Plan

Figure 3 – Site Investigation Location Plan

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Appendix B – Profile Logs

Appendix C – Certificates of Analysis (Soil)

Appendix D – Certificates of Analysis (Geotechnical)

Appendix E – Generic Assessment Criteria Values

Appendix F – References

1. Introduction

1.1. Background

LK Consult Ltd (LKC) has been commissioned to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy for 41 Bury Old Road, Ainsworth. The investigation was undertaken in support of a future planning application to develop the site for residential use.

The following work has previously been undertaken:

- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: CL-602-LKC 21 1502-01, dated September 2021).

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

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

The aims of this report are also to establish the feasibility of developing this site, to demonstrate to the Local Planning Authority that in accordance with the National Planning Policy Framework (NPPF)¹ the site may be developed for a residential end use and that appropriate site investigation and risk assessment works are in place to allow conditional approval of any future planning application.

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

Location	Land east of no.41 Bury Old Road, located to the northwest of the junction between Bury Old Road and Authur Lane (B6196), approximately 4.2km east of Bolton town centre. Centred at approximate National Grid Reference 375820E 410320N.
Area	1,400m ²
Topography	150 metres Above Ordnance Datum (AOD). Site is approximately level.
Current Site Use	Site currently used as car storage outside on the hard stood ground (south), car repairing on the inside of the buildings (northwest) and the remainder comprises grassed soft landscaping.
Proposed Development	1no. Dwelling with garden, soft landscaping, car parking area and associated infrastructure.

Table 1-1: Summary of site details.

2. Summary of Preliminary Risk Assessment (PRA)

2.1. Phase 1 Preliminary Risk Assessment (PRA)

Pertinent information has been summarised from the PRA in Table 2-1.

Main Historical Features	Onsite: Agricultural Field, unnamed buildings. Surrounding Area: Residential Buildings, Open fields.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till, Secondary Undifferentiated Aquifer Bedrock: Pennine Lower Coal Measures Formation - Cannel Rock (South Lancashire), Sandstone. Secondary A Aquifer.
Landfills / Infilled Ground	One recorded landfill site 206m NE.
Site Reconnaissance	Site currently used as car storage outside on the hard stood ground (south), car repairing on the inside of the buildings (northwest) and the remainder comprises grassed soft landscaping.

Table 2-1: Summary of site details, historical review, environmental settings, and site reconnaissance.

Table 2-2 summarises the geotechnical constraints. This has been updated to consider the previous site investigation work.

Coal Mining	Site is not within a Development High Risk Area. No further assessment required.
Slope Stability	Site is relatively flat. No significant slope stability risk anticipated. No further assessment required.
Made Ground	Unknown depth and constituent of made ground across the site.
Superficial	Unknown strength of soils for foundation design.
Bedrock	Clay anticipated below the site.
Groundwater	Unknown depth to bedrock.
Plasticity	Unknown depth and variability of groundwater.
Sulphate	Plasticity of clay deposits should be confirmed, particularly where trees are present or proposed, to identify the shrink / swell risk.

Table 2-2: Summary of geotechnical constraints.

2.2. Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM² has been summarised in Table 2-3.

Each pollutant linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552³. The risk matrix is provided in Appendix A.

Due to the minor consequence associated with the phytotoxic effect to flora (i.e., loss of plants in a landscaping scheme), the overall risk for most sites will be very low to low. here soils contain significant concentrations of heavy metals, in general there will other pollutant linkages (i.e., the risk to human health) that will trigger the requirement for remediation (e.g., a clean environmental cover system). As such the risk to flora associated with phytotoxic contaminants will not be considered further.

The risk to buildings associated with elevated sulphate will be considered as part of the geotechnical assessment and will not be included in the contamination risk assessment.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk
1	Asbestos, heavy metals, PAHs, other inorganic and organic contaminants (made ground).	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce.	Future site users. Offsite receptors.	Likely	Medium	Moderate
	Petroleum hydrocarbons (garage / car repair).	Windblown dust.		Low Likelihood	Medium	Moderate / Low
2	Volatile contaminants (garage / car repair).	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low
3	Hazardous / ground gas: methane, carbon dioxide (landfill, ponds).	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Low Likelihood	Severe	Moderate / Low
	Radon	Migration via permeable strata and preferential pathways. Exposure to radon.	Future site users. Offsite land users.	Unlikely	Medium	Low
4	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (made ground, garage / car repair).	Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater.	Low Likelihood	Medium	Moderate / Low
5	Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds (made ground, garage / car repair).	Ingestion of tainted water supply.	Future site users. Water pipes.	Low Likelihood	Medium	Moderate / Low

Table 2-3: Preliminary Contamination Conceptual Model.

3. Ground Investigation

3.1. Site Investigation Design and Methodology

The investigation was carried out on 3rd April 2025 and comprised the following:

- 3no. window sample boreholes drilled to 2.92-5.45 metres below ground level (mbgl) (ref. WS101 to WS103).
- 4no. hand pits (using spade) excavated to 0.60-0.90mbgl (ref. HD101 to HD104).

All site investigation locations are shown in Figure 3.

The locations were chosen to allow adequate assessment of ground conditions across the site as well as to target current and proposed areas. Table 3-1 details the targeted site investigation locations.

Site Investigation Locations	Rationale
WS101, WS102, WS103	Target area within proposed building.
WS103 & HD104	Target within current garage.
HD101-HD103	Target proposed garden areas.

Table 3-1: Summary of Sampling Locations.

The number of site investigation points corresponds to approximately one location per 14m square centres. This is considered to be a conservative sampling density and is in line with BS10175⁴ for a 'detailed investigation'.

All profile logs are provided in Appendix B and are in line with BS14688-1⁵ and BS5930⁶.

3.2. Sampling Protocol

3.2.1. Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation⁷.

Soil was collected for onsite testing for total volatile organic compounds (TVOCs) using a photoionisation detector (PID) fitted with a 10.6eV lamp and moisture trap. 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. Results of the PID readings are presented on the profile logs (Appendix B). The onsite monitoring was carried out in line CIRIA C665⁸ to aid in screening samples for volatile analysis.

Soil samples of approximately 500g were recovered in amber jars and plastic tubs. All the samples were sent to DETS laboratory for chemical testing.

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

Testing	No. Samples	Justification
Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen.	5	A basic suite with a broad selection of contaminants where no significant evidence of contamination was identified.
Metals / metalloids, pH, water soluble sulphate, cyanide suite, phenol, TPHCWG, BTEX, MTBE, speciated PAHs, SOM and asbestos screen.	2	A more detailed suite undertaken due to the presence of a bitumen-type odour in the made ground in WS102, and in the made ground within HD104 to confirm the contamination risk associated with the current onsite garage.

Table 3-2: Summary of Soil Testing.

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.

3.2.2. Soil Sampling (Geotechnical)

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

Further details are given in the laboratory report presented in Appendix D. Table 3-3 shows the geotechnical testing undertaken.

Testing	No. Samples
Atterberg Limits (plasticity testing)	4

Table 3-3: Summary of Geotechnical Testing Undertaken.

3.2.3. Water Sampling / Leaching Testing

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

A moderate / low risk was identified in the preliminary contamination conceptual model 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 6.4.

3.3. In-situ Testing

3.3.1. Geotechnical Testing

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. The following tests were undertaken:

- Standard Penetration Tests (SPTs) were performed in the window sample boreholes at approximately 1m intervals.
- Pocket penetrometer tests (giving undrained shear strength) were performed in the window sample boreholes within cohesive strata.

The results are provided within Appendix B.

3.4. Gas Monitoring

Gas monitoring was not carried out as part of this investigation.

A moderate / low risk was identified in the preliminary contamination conceptual model for gas (Pollutant Linkage 3) and further action was only recommended if significant organic / putrescible material was identified on site. Based on the ground conditions encountered, LKC did not consider gas monitoring to be required. This is discussed further in Section 6.3.

4. Ground Conditions

4.1. Geology

The ground conditions beneath the site are summarised below. Logs are provided in Appendix B.

4.1.1. Made Ground

Made ground was recorded in locations WS102, WS103 and HD104 to depths of 0.20-0.70mbgl. The made ground comprised horizons of gravel, sand, silt, clay with anthropogenic material which varied slightly between locations, with ash and clinker in HD104, metal in WS103 and bitumen with a basal crushed brick layer in WS102.

4.1.2. Natural Strata

Superficial strata generally comprised a silt to depths of 0.40-0.70mbgl underlain by soft to very stiff gravelly sandy clay, which became firmer with depth. Silt was not recorded in WS102, where the made ground was underlain by a firm to very stiff gravelly sandy clay to the base of the borehole.

Bedrock was not proven during the site investigation.

4.1.3. Contamination

Anthropogenic material was encountered in the made ground (as described above).

Further to this, a bituminous-type odour was noted in WS102 at 0.15-0.70mbgl with a PID value of 0.8ppm.

There was no other visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations. The PID recorded a maximum of 0.2ppm TVOC in the remainder of the samples.

4.1.4. Refusals

Window samples WS101 and WS103 did not achieve a full depth of 5.45mbgl due to refusal on very stiff clay at 2.92mbgl and 4.43mbgl respectively.

4.1.5. Obstructions

No obstructions were identified within any investigation location.

4.2. Groundwater

4.2.1. Groundwater Levels

Groundwater strikes were recorded during the investigation in boreholes. This data is provided in the profile logs (Appendix B). Groundwater strikes were recorded only in WS101 at a depth of 2.50mbgl. No groundwater strikes were recorded in the remainder of the boreholes or any of the hand dug trial pits.

4.2.2. Contamination

No evidence of contamination was identified in the groundwater during the investigation work.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise a single low rise residential dwelling with associated landscaping and infrastructure. Details of the proposed loadings are not known and therefore a line loading of 75kN/m has been assumed for preliminary assessment purposes only.

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

The depths of any underground engineering works (sewers etc.) are unknown and therefore have not been considered in the following assessment. Any such works should be designed so as not to influence, or compromise, proposed or existing foundations or ground stability.

Given the nature of the proposed development the structure meets the criteria of Geotechnical Category 1 of Eurocode 7⁹.

Given the nature of the development the acceptable risk from settlement is a total settlement value of 25mm for a masonry structure.

5.2. Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1, and typically comprises made ground between 0.50m to 0.70mbgl or SILT to 0.40-0.70mbgl over a soft, becoming stiff and very stiff CLAY to the completion depths of the exploratory holes.

5.3. Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works¹⁰. This should include:

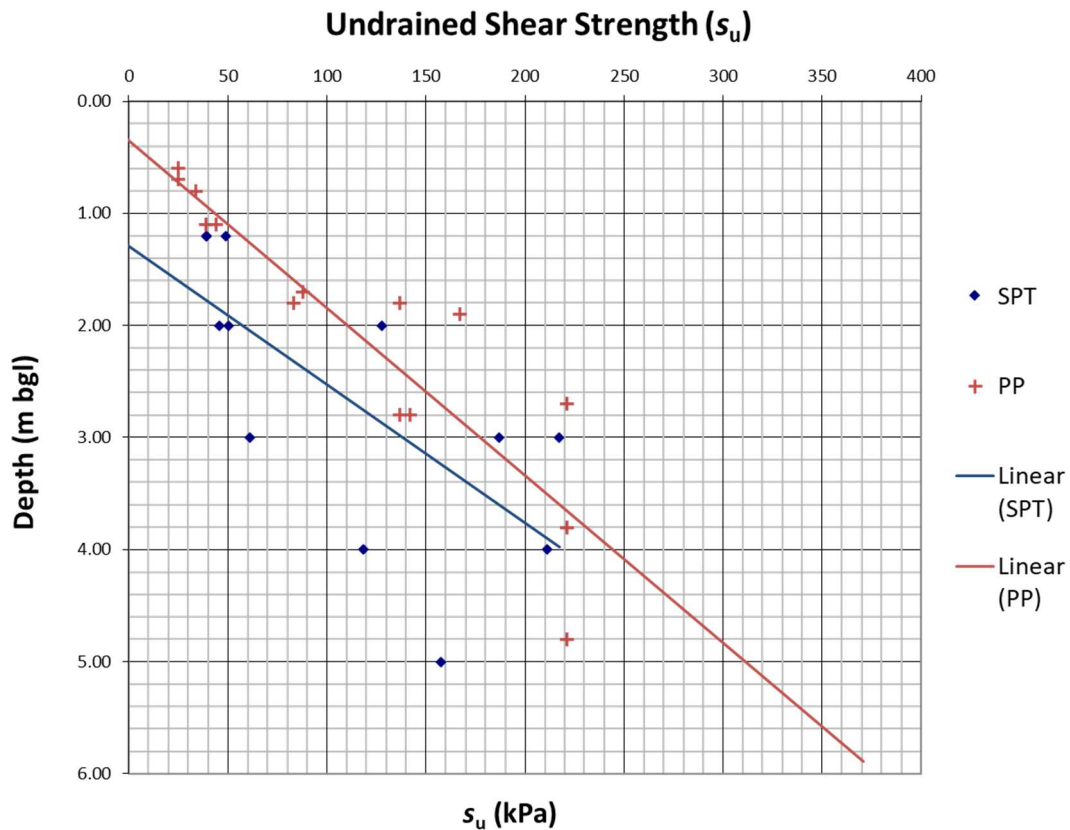
- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Buried structures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

The near surface soils may potentially be disturbed by weathering and site traffic. Precautions should be taken to avoid this, as excessive disturbance may result in more onerous floor slab design, road cap thickness and increased amount of site disposal etc.

5.4. Foundation Conditions and Bearing Capacity

5.4.1. General

The natural cohesive material has been assessed using in-situ testing by SPT and Pocket Penetrometer (PP) to obtain the undrained shear strength (s_u) of the material. The results of the testing have been plotted against depth and is shown in Graph 5-1.



Graph 5-1: Summary of s_u Vs. Depth from In-Situ SPT and PP Testing.

Graph 5-1 demonstrates that the strength of the cohesive deposits typically increases with depth, with the results of the Pocket Penetrometer (PP) testing returning more competent shear strengths.

A conservative s_u of 50kPa is assigned to the cohesive material from a depth of c. 1.20mbgl for the natural superficial deposits.

5.4.2. Plasticity

Clay samples were subjected to Atterberg Limits (plasticity) and Moisture Content testing. Results are provided in Appendix C.

The clay is classified as low plasticity.

The modified plasticity index as detailed in Chapter 4.2-D5 of the NHBC standards (modified plasticity index = plasticity index x % less than 425 μ m sieve / 100%) characterises the clay as having a low volume change potential.

5.4.3. Strip Foundations

Strip foundations should be constructed at least 150mm into the underlying firm clay from 1.20m depth. At this depth an Allowable Bearing Capacity of 86kN/m² has been calculated using a Factor of Safety of 3 and an undrained shear strength of 50kN/m² taken from Graph 5-1.

Atterberg Limit determinations, summarised in Section 5.4.2, show the clay to be of low plasticity and as such the sides of the foundations should not require any protection using clay board or similar.

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

5.5. Ground Floor Slabs

Warranty providers such as NHBC will require suspended floor slabs where made ground is in excess of 600mm. Due to the presence of varying thickness' up to 0.70m depth of made ground across the site, it is considered that a suspended floor slab may be required for the proposed structures.

Where suspended floor slabs are employed ventilation of the under-floor void will be required to address condensation issues. This would also assist in the mitigation of potential gas ingress issues.

5.6. Pavement Construction

Topsoil is not suitable for use as a sub-grade. Untreated made ground is considered unsuitable as a sub-grade due to its potential variability and potentially low strength/high compressibility. It should be removed to a depth of 0.5m below formation level and sorted to remove any unsuitable or deleterious materials. The sub formation should be rolled, and suitable excavated material can then be replaced, up to formation level, in fully compacted thin layers. Any deficit should be made up with suitable imported fill compacted as above. Following this treatment an overall design CBR of 2-5% should be available, although this will require confirmation through in-situ CBR tests.

Based on the plasticity index the soils may be frost susceptible. Frost action can cause differential heaving, surface roughness and cracking, blocked drainage, and a reduction in Bearing Capacity during thaw periods. In areas of proposed roads and car parking it may be necessary to remove the frost susceptible soils and replace with non-frost susceptible material to the expected frost depth penetration.

Following excavation, the sub formation should be proof rolled and any soft material inspected and removed.

5.7. Drainage

Although in-situ permeability tests have not been undertaken as part of this assessment, the site is underlain at shallow depth (<0.70mbgl) by firm becoming very

stiff clay of perceived low permeability and it is considered that the site will not be suitable for the application of soakaway drainage.

5.8. Concrete Durability

Based upon the results of the chemical analyses (Appendix C), subsurface concrete can be designed in accordance with Design Sulphate Class DS-2, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.9. Excavations

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

Groundwater seepage was recorded in exploratory hole WS101 only, at a depth of 2.50m and is co-incident with a pocket of the strata which was logged as being very granular. It is considered that this strike is evident of isolated perched water in the glacial till. Generally exploratory holes were stable.

It is recommended that due to the presence of the made ground to c.0.70mbgl, all excavations should be supported or battered back in accordance with guidance contained in CIRIA R97¹¹.

5.10. Construction Activity and Inspection

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

- it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction.
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97¹² utilised.
- De-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
- Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results.
- The presence of potential contamination and mitigation measures should be addressed as part of the Construction Stage Health and Safety Plan and should include measures to design out the risks, reduce their impact and finally the use of Personnel Protective Equipment (PPE).

6. Generic Risk Assessment

6.1. Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM¹³). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

6.2. Soil Risk Assessment

6.2.1. Methodology

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

- Category 4 Screening Levels (C4SLs) ^{14, 15}.
- LQM Suitable 4 Use Levels (S4ULs) ^{16, 17, 18, 19}.

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.

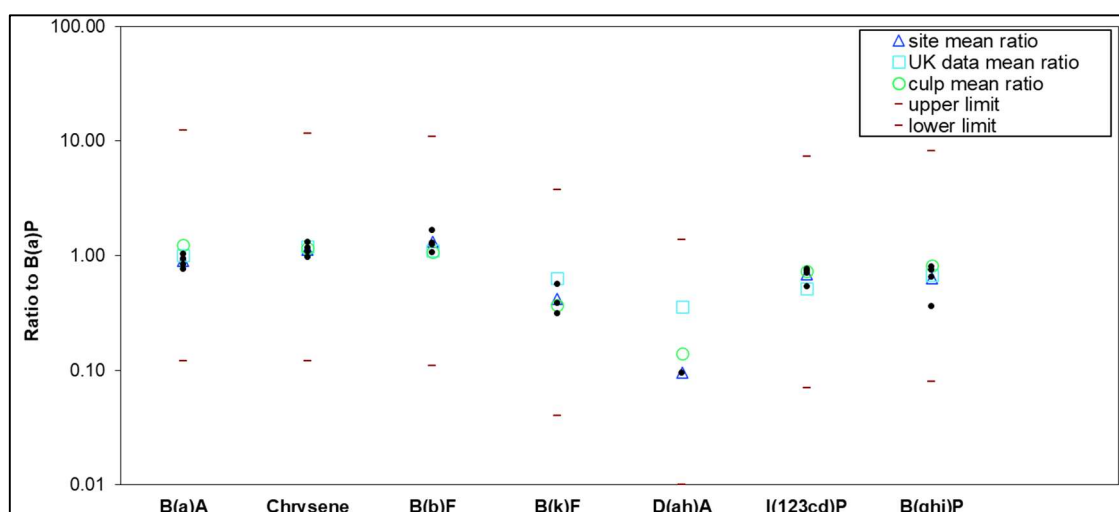
A summary of the generic assessment criteria used in this assessment is provided in Appendix E.

B(a)P as Surrogate Marker

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 PAHs^{21,22} and naphthalene the most volatile and soluble²³. The 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 negligible²⁴. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)²⁵ and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

LKC undertook an assessment of the PAH 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.*²⁶, which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two-year carcinogenicity study.

Graph 6-1 summarises the study site data with respect to how the ratios of carcinogenic PAHs relate to B(a)P, within the confidence limits provided in the HPA document.



Graph 6-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 7 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.

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

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

6.2.2. Soil Results Comparison against Assessment Criteria

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

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

Sample Location / Depth (mbgl)	Contaminant	Criteria (6%)	Total No. of Samples Tested	Sample Result > Criteria
WS102 / 0.15-0.70	Lead	200	7	261
	Benzo(a)pyrene	5	7	22.50

Table 6-1: Summary of Elevated Results.

Notes:

All units in mg/kg.

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 for the assessment criteria hierarchy described in Section 6.2.

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

Sample Location	ID	Type	Total Asbestos (%)
WS103 (0.50-1.00m)	Chrysotile	Fibre bundles	0.001

Table 6-2: Details of Asbestos Identified.

6.2.3. Direct Contact Risk – Pollutant Linkage 1

No elevated petroleum hydrocarbons, BTEX or MTBE were identified, therefore the probability of these contaminants posing a risk to site users is considered unlikely. With

a medium consequence, the risk is considered to be low, and no remediation is recommended.

Elevated PAHs and lead and bundles of asbestos have been identified in the made ground on site.

Where this material remains below buildings and hardstanding there is no direct pathway between the contaminated soil and the site users. However, this material is present in proposed garden and soft landscaping areas.

With a likely probability in these areas and a medium consequence, the risk is considered to be moderate and remediation is required in proposed garden and soft landscaping areas.

Additional consideration should also be given to the risk to workers and offsite receptors during groundworks and construction. This is discussed further in Section 7.3.

6.2.4. Risk from Inhalation of Vapours – Pollutant Linkage 2

No visual / olfactory evidence of volatile contaminants was identified during the investigation. The PID did not detect any significant TVOCs. Confirmatory soil analysis did not detect any potentially volatile PAHs or hydrocarbon fractions above assessment criteria.

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

6.3. Gas Risk Assessment (Pollutant Linkage 3)

Gas monitoring was not carried out as part of this assessment. The PRA identified a moderate / low risk and recommended gas monitoring if a significant depth of organic / putrescible material was identified.

No organic / putrescible material was encountered on site. Made ground was encountered to a maximum depth of 0.70mbgl, and comprised horizons of gravel, sand, silt, clay with anthropogenic material including bitumen, ash, clinker and metal.

The NHBC 2023 document discusses how made ground soils are not inherently a source of hazardous gas and that substantial portions of putrescible materials such as vegetation, food waste, paper, cardboard and wood would be required to be a source of gas. No such material was recorded within the borehole / hand pit logs as part of the site investigation, as well as only a limited (<1.00m) depth of made ground. Therefore, the onsite made ground is not considered a significant source of hazardous gas.

Given the ground conditions encountered, LKC considers the probability of gas posing a risk to site users as unlikely. The consequence is severe, which gives a moderate / low risk, and no further action is required with respect to Pollutant Linkage 3.

6.4. Controlled Water Assessment (Pollutant Linkage 4)

The PRA identified a low risk with respect to controlled waters as no significant source of mobile contamination was anticipated. A Secondary A Bedrock Aquifer is present below the site, no abstractions have been identified within influencing distance and the

site is not located in a Source Protection Zone. The surface water is not considered to be a significant receptor.

No evidence of significant mobile contamination was identified on the site. Although elevated lead and PAHs were identified within the soils, the source is anticipated to be bitumen fragments noted within the made ground. Contamination associated with bitumen is not anticipated to be mobile due to the residual crystalline nature of the matrix. Furthermore, the underlying clay is considered to be impermeable and will limit migration of any mobile contamination.

The site investigation did not identify any significant sources of likely mobile contamination within the soils. 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.

6.5. Potable Water Supply (Pollutant Linkage 5)

Soil results were compared to United Utilities (UU) guidelines for the selection of potable water pipes in land potentially affected by contamination. Only contaminants of concern, based on the preliminary conceptual model and ground conditions encountered, were analysed.

Made ground was encountered to a maximum depth of 0.70mbgl. Therefore, pipelines are expected to be installed within the natural clay underlying the made ground. No elevated contaminants were identified at pipeline depth. Therefore, the probability of organic contaminants affecting potable water pipes is unlikely. Given the consequence is considered to be medium, the risk (Pollutant Linkage 5) is anticipated to be low and no remediation is likely to be required.

Once details of the pipeline location and depths are known a UU Water Pipe Risk Assessment in line with the utility provider should be undertaken to confirm the most appropriate pipework for potable water.

6.6. Revised Contamination Conceptual Model

The preliminary contamination conceptual model (Table 2-3) has been revised following the risk assessments undertaken in Sections 6.1-6.4. The revised contamination conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

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

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

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

PL	Contaminants of Concern	Pathway	Receptor	Probability	Consequence	Risk	Recommendations
1	Asbestos, heavy metals, PAHs,	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust, home-grown produce, soil attached to home-grown produce. Windblown dust.	Future site users. Offsite receptors.	Likely	Medium	Moderate	Remediation required where made ground is present in proposed garden and soft landscaping areas.
	BTEX, MTBE, Petroleum hydrocarbons.			Unlikely	Medium	Low	No remediation recommended.
2	Volatile contaminants.	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No remediation recommended.
3	Hazardous / ground gas: methane, carbon dioxide.	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings. Offsite receptors.	Unlikely	Severe	Moderate / Low	No remediation recommended.
	Radon	Migration via permeable strata and preferential pathways. Exposure to radon.	Future site users. Offsite land users.	Unlikely	Medium	Low	No remediation recommended.
4	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds.	Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Unlikely	Medium	Low	No remediation recommended.
5	Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds.	Ingestion of tainted water supply.	Future site users. Water pipes.	Unlikely	Medium	Low	No remediation recommended. United Utilities Pipeline Risk Assessment may be required.

Table 6-33: Revised Contamination Conceptual Model.

7. Summary Conclusions

7.1. Ground Conditions

Ground conditions are summarised in Table 7-1 below.

Made Ground	Recorded in WS102, WS103 and HD104 only, to depths of 0.20-0.70mbgl. The made ground comprised horizons of gravel, sand, silt, clay with bitumen, ash, clinker and metal.
Superficial	Initial strata silt to 0.40-0.70mbgl (except in WS102), underlain by soft to very stiff gravelly sandy clay, becoming firmer with depth.
Bedrock	Not proven.
Groundwater	Encountered only in WS101 at a depth of 2.50mbgl.
Obstructions	No obstructions were identified.

Table 7-1: Summary of Ground Conditions.

7.2. Geotechnical

Geotechnical observations and conclusions are contained in Table 7-2 below, more detailed discussions are contained within Section 5.

Allowable Bearing Pressure	A conservative s_u of 50kPa has been allocated to the firm clay encountered at 1.20mbgl, this will give an allowable bearing capacity of 86kN/m ² .
Anticipated Foundation Type	Traditional shallow foundations recommended from approximately 1.20mbgl. If soft ground is encountered, foundations may need to be deepened / widened or ground replaced with compacted granular material.
Plasticity	Consideration will need to be given to the shrink / swell of the clay 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.
Shallow Groundwater	Groundwater was encountered as a perched water pocket within the Glacial till in one location (WS101) at a depth of 2.50mbgl. Shallow groundwater is not considered to pose a constraint to the development.
Concrete Requirements	Based on BRE Digest 2005 ²⁷ – DS-2 AC-1s is recommended.
Services	Services – consideration to the presence of services running through the site. Services may need to be re-routed.
Temporary support of excavation	It is recommended that due to the presence of the made ground to c.0.70mbgl, all excavations should be supported or battered back in accordance with guidance contained in CIRIA R97.

Table 7-2: Geotechnical Conclusions Table.

7.3. Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 7-3 below (more detailed model provided in Section 6).

PL	Contaminant	Risk	Recommendations
1	Asbestos, heavy metals, PAHs, other inorganic and organic contaminants.	Moderate	Remediation required where made ground is present in proposed garden and soft landscaping areas.
	Petroleum hydrocarbons.	Low	No remediation recommended.
2	Volatile contaminants.	Low	No remediation recommended.
3	Hazardous / ground gas: methane, carbon dioxide.	Moderate / Low	No remediation recommended.
	Radon	Low	No remediation recommended.
4	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds.	Low	No remediation recommended.
5	Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds.	Low	No remediation recommended. United Utilities Pipeline Risk Assessment may be required.

Table 7-3: Summary Risk Table.

PL=Pollutant Linkage, see Table 6-3 for details.

7.4. Recommendations

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 7-4.

PL	Recommendation
1	Removal of made ground from within proposed soft landscaping and garden areas.
2	No remediation required.
3	No remediation required.
4	No remediation required.
5	United Utilities Pipeline Risk Assessment may be required.

Table 7-4: Remediation Summary.

The local authority is likely to require a standalone Build-Phase Remediation Strategy and Verification Plan in accordance with LCRM Stage 3 remediation and verification²⁸. This should be produced once details of design, contractors and installation are known.

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

A watching brief for any unexpected contamination should also be maintained during groundworks, and any imported soils brought to site for use in gardens / soft landscaping should be validated to ensure they are suitable for use against the criteria detailed in Section 6.2.1. Confirmation of appropriate testing suites and verification sampling verification should be sought from the local authority.

7.5. Other Considerations

7.5.1. *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.

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.

7.5.2. *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.

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.

7.5.3. *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 guidance²⁹) should be adopted by all workers involved with site enabling and construction works.

7.5.4. *Asbestos in Soils 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.

LKC recommend that an appropriate 'Asbestos Management Strategy' is developed in line with CIRIA C733³⁰.

Figures



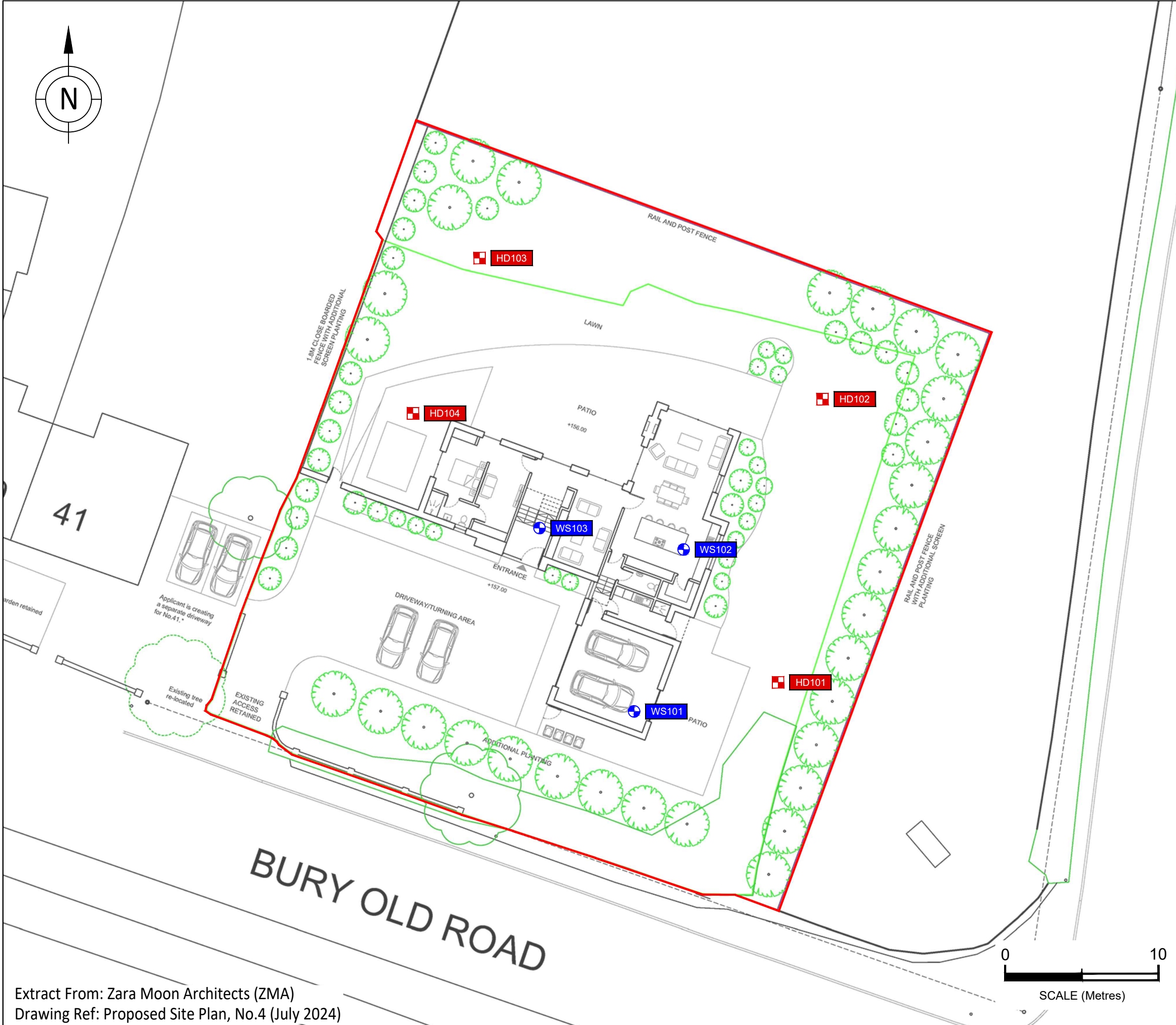
Client: Adele Warren				Title: Site Location & Boundary Plan							
Site: 41 Bury Old Road, Ainsworth				Scale (see scale bar): 1:25,000 & 1:500 @ A4							
Drawn By: JW				Checked By: CC		Drawn: April 2025				Figure: 1	
No.: LKC241504								Revision:			



- KEY**
- Site Boundary
 - Application Boundary (based on previously approved application)
 - Previously developed land
 - Domestic Curtilage (based on previously approved application)

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:				Adele Warren	
Site:				41 Bury Old Road, Ainsworth	
Title:				Proposed Development Plan	
Job No.:	LKC241504	Scale (See Scale Bar):	1:250 @ A3	Figure:	2
Drawn By:	AC	Checked By:	JW	Drawn:	Apr 2025



KEY

- Site Boundary
- Window Sample Borehole (WS)
- Hand Dug Trial Pit (HD)

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

LK CONSULT LIMITED

Client: Adele Warren

Site: 41 Bury Old Road, Ainsworth

Title: Site Investigation Location Plan

Job No.: LKC241504	Scale (See Scale Bar): 1:250 @ A3	Figure: 3	Revision:
Drawn By: AC	Checked By: JW	Drawn: Apr 2025	

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 552³¹. It involves the classification of the:

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

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

Table A. Classification of Consequence

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

Table B. Classification of Probability.

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.

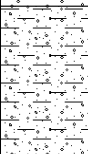
Where a very low risk is identified no specific remediation is required.

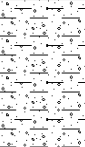
Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

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

 LK CONSULT		Trial Pit Log					Location Number: HD101		
Project: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025			
Project No. : LKC241504			Contractor: D & I Drilling Ltd						
Equipment: Hand Excavation Tools			Level	Logged By JW		Scale 1:10	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description				Level (m)	
0.00 - 0.40 0.00 - 0.40	ES D PID=0.0ppm			Dark brown slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.					
		0.40		Firm consistency gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			0.5		
		0.60		End of Trial Pit at 0.60m					
							1.0		
							1.5		
							2.0		
			Pit Dimensions				Pit Stability		
			Length (m)		Width (m)		Depth (m)		Stable
			0.30		0.30		0.60		
			Remarks: Hand excavated trial pit undertaken to 0.60mbgl. Hand excavated trial pit dry.						

 LK CONSULT		Trial Pit Log					Location Number: HD102	
Project: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025		
Project No. : LKC241504			Contractor: D & I Drilling Ltd					
Equipment: Hand Excavation Tools			Level	Logged By JW	Scale 1:10	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description			Level (m)	
0.00 - 0.60 0.00 - 0.60	ES D PID=0.0ppm			Dark brown slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			0.5	
0.60 - 0.80 0.60 - 0.80	ES D PID=0.0ppm	0.60		Firm consistency gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
		0.80		End of Trial Pit at 0.80m				
							1.0	
							1.5	
							2.0	
			Pit Dimensions			Pit Stability		
			Length (m)	Width (m)	Depth (m)	Stable		
			0.30	0.30	0.80			
			Remarks:					
Hand excavated trial pit undertaken to 0.80mbgl.								
Hand excavated trial pit dry.								

LK CONSULT		Trial Pit Log					Location Number: HD103	
Project: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025		
Project No. : LKC241504			Contractor: D & I Drilling Ltd					
Equipment: Hand Excavation Tools			Level	Logged By JW	Scale 1:10	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description				Level (m)
0.00 - 0.50 0.00 - 0.50	ES PID=0.0ppm			Dark brown slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
		0.50		Firm consistency gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			0.5	
		0.70		End of Trial Pit at 0.70m				
							1.0	
							1.5	
							2.0	
			Pit Dimensions			Pit Stability		
			Length (m)	Width (m)	Depth (m)	Stable		
			0.30	0.30	0.70			
			Remarks:					
Hand excavated trial pit undertaken to 0.70mbgl.								
Hand excavated trial pit dry.								

LK CONSULT		Trial Pit Log					Location Number: HD104	
Project: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025		
Project No. : LKC241504			Contractor: D & I Drilling Ltd					
Equipment: Hand Excavation Tools			Level	Logged By HD	Scale 1:10	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description				Level (m)
0.15 - 0.50 0.15 - 0.50	ES D PID=0.7ppm	0.08		CONCRETE				
		0.15		MADE GROUND: Grey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone. Probable sub-base.				
				MADE GROUND: Dark grey sandy silty GRAVEL with occasional ash and clinker. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
0.50 - 0.70 0.50 - 0.70	ES D PID=0.1ppm	0.50		Soft consistency dark grey clayey SILT.			0.5	
0.70 - 0.90	D	0.70		Firm consistency gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
		0.90		End of Trial Pit at 0.90m			1.0	
							1.5	
							2.0	
				Pit Dimensions			Pit Stability	
				Length (m)	Width (m)	Depth (m)	Stable	
				0.30	0.30	0.90		
				Remarks:				
Hand excavated trial pit undertaken to 0.90mbgl.								
Hand excavated trial pit dry.								

 LK CONSULT		Window Sample Borehole Log				Location Number: WS101	
Project Name: 41 Bury Old Road, Ainsworth			Client: Adele Warren		Date: 03/04/2025		
Project No. : LKC241504			Contractor: D & I Drilling Ltd				
Equipment: Window Sample Rig: Competitor Dart			Level	Logged By JW	Scale 1:40	Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Water Strikes
0.00 - 0.40 0.00 - 0.40	ES D PID=0.0ppm	0.40		Dark brown slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			
0.60	PP=24.5kPa			Soft to very stiff consistency gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone. 0.40m to 1.00mbgl - Soft consistency low strength.			
1.10 1.20 - 1.65	PP=39.2kPa N=8 (1,1/2,2,2,2)			1.00m to 1.65mbgl - Firm to stiff consistency medium to high strength.			
1.70 1.90 2.00 - 2.45	PP=88.3kPa PP=166.8kPa N=28 (3,4/4,4,10,10)			1.80m to 2.92mbgl - very stiff consistency very high strength.			
2.70 2.80	PP=220.7kPa 50 (25 for 85mm/50 for 30mm)	2.92		2.50m to 2.92mbgl - Strata is very gravelly and wet.			
End of Borehole at 2.92m							
Remarks: Window sample borehole undertaken in a previously excavated area at 0.30m below the surrounding ground level. Sampler refusal at 2.80mbgl. Groundwater strike at 2.50mbgl. Borehole stable.							

 LK CONSULT		Window Sample Borehole Log				Location Number: WS102					
Project Name: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025					
Project No. : LKC241504			Contractor: D & I Drilling Ltd								
Equipment: Window Sample Rig: Competitor Dart			Level		Logged By JW		Scale 1:40		Page Number Sheet 1 of 1		
Depth (m)		Samples / Tests		Depth (m)	Legend	Stratum Description					Level (m)
0.00 - 0.15		ES D		0.15		MADE GROUND: Brown SAND. Sand is fine to coarse.					
0.00 - 0.15		PID=0.1ppm				MADE GROUND: Dark grey slightly bituminous odoured sandy silty GRAVEL with frequent bitumen fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.					
0.15 - 0.70		ES D									
0.15 - 0.70		PID=0.8ppm									
0.70 - 1.00		ES D		0.70		0.60m to 0.70mbgl - Frequent brick fragments present.					
0.70 - 1.00		PID=0.0ppm				Firm to very stiff consistency medium to high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				1	
0.80		PP=34.3kPa									
1.20		SPT				0.70m to 1.60mbgl - Brown grey mottled in colour.					
1.20 - 1.65		N=8 (1,1/2,2,2,2)				0.70m to 1.80mbgl - Firm consistency medium strength.					
						1.60m to 2.90mbgl - Brown in colour.					
1.80		PP=137.3kPa				1.80m to 2.80mbgl - Stiff consistency high strength				2	
2.00		SPT									
2.00 - 2.45		N=10 (1,2/2,2,3,3)									
											
2.80		PP=142.2kPa									
3.00		SPT				2.80m to 5.45mbgl - Very stiff consistency high to very high strength				3	
3.00 - 3.45		N=14 (2,3/3,3,4,4)				2.90m to 5.45mbgl - Reddish brown in colour.					
											
3.80		PP=220.7kPa									
4.00		SPT								4	
4.00 - 4.45		N=28 (4,6/6,6,8,8)									
											
4.80		PP=220.7kPa									
5.00		SPT								5	
5.00 - 5.45		N=38 (6,6/8,9,10,11)									
				5.45		End of Borehole at 5.45m				6	
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											

Remarks:
Borehole dry and stable.

 LK CONSULT		Window Sample Borehole Log				Location Number: WS103					
Project Name: 41 Bury Old Road, Ainsworth			Client: Adele Warren			Date: 03/04/2025					
Project No. : LKC241504			Contractor: D & I Drilling Ltd								
Equipment: Window Sample Rig: Competitor Dart			Level		Logged By JW		Scale 1:40		Page Number Sheet 1 of 1		
Depth (m)		Samples / Tests		Depth (m)	Legend	Stratum Description					Level (m)
0.20 - 0.50 0.20 - 0.50		ES D PID=0.2ppm		0.10 0.20		CONCRETE.					
				0.50		MADE GROUND: Dark grey sandy GRAVEL with frequent metal sheet fragments and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.					
0.70		PP=24.5kPa				Soft consistency dark grey clayey SILT.					
1.10 1.20 - 1.65		PP=44.1kPa N=10 (1,1/2,3,3)				Soft to very stiff consistency low to very high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				1	
						0.50m to 0.80mbgl - Soft consistency low strength.					
						0.50m to 1.10mbgl - Brown grey mottled in colour.					
						0.80m to 1.70mbgl - Firm consistency medium strength.					
1.80 2.00 - 2.45		PP=83.4kPa N=11 (1,2/2,3,3,3)				1.10m to 2.70mbgl - Brown in colour.					
						1.70m to 2.80mbgl - Stiff consistency high strength,				2	
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
Remarks: Borehole dry and stable.											

Appendix C – Certificates of Analysis (Soil)

Joe Walker
LK Consult Limited
Unit 29 Eton Business Park
Eton Hill Road
Manchester
M26 2ZS

Normec DETS Limited
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 25-03868

Site Reference: 41 Bury Old Road, Ainsworth

Project / Job Ref: LKC241504

Order No: PO-C001159

Sample Receipt Date: 07/04/2025

Sample Scheduled Date: 07/04/2025

Report Issue Number: 1

Reporting Date: 15/04/2025

Authorised by:



Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

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.

Soil Analysis Certificate						
DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25	03/04/25	03/04/25	03/04/25
LK Consult Limited	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	HD101	HD102	HD103	WS101	WS102
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: PO-C001159	~Depth (m)	0.00 - 0.40	0.00 - 0.60	0.00 - 0.50	0.00 - 0.40	0.15 - 0.70
Reporting Date: 15/04/2025	DETS Sample No	772152	772153	772154	772155	772156

Determinand	Unit	RL	Accreditation					
Asbestos Screen ⁽⁵⁾	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Sample Matrix ⁽⁵⁾	Material Type	N/a	NONE					
Asbestos Type ⁽⁵⁾	PLM Result	N/a	ISO17025					
Asbestos Quantification ⁽⁵⁾	%	< 0.001	ISO17025					
pH	pH Units	N/a	MCERTS	6.2	6.6	6.0	6.9	8.2
Total Cyanide	mg/kg	< 1	NONE					< 1
Free Cyanide	mg/kg	< 1	NONE					< 1
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	48	37	133	38	712
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.04	0.13	0.04	0.71
Organic Matter (SOM)	%	< 0.1	MCERTS	6.3	8.5	6.7	9.2	10.3
Arsenic (As)	mg/kg	< 2	MCERTS	15	18	12	23	21
W/S Boron	mg/kg	< 1	NONE					< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	0.5	0.4	0.4	0.4
Chromium (Cr)	mg/kg	< 2	MCERTS	11	17	13	14	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	28	41	54	57	49
Lead (Pb)	mg/kg	< 3	MCERTS	54	88	86	94	261
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	10	11	11	13	18
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	25	24	19	28	30
Zinc (Zn)	mg/kg	< 3	MCERTS	63	151	153	78	279
Total Phenols (monohydric)	mg/kg	< 2	NONE					< 2

Soil Analysis Certificate

DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25			
LK Consult Limited	~Time Sampled	None Supplied	None Supplied			
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	WS103	HD104			
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied			
~Order No: PO-C001159	~Depth (m)	0.50 - 1.00	0.15 - 0.40			
Reporting Date: 15/04/2025	DETS Sample No	772157	772158			

Determinand	Unit	RL	Accreditation	Detected	Not Detected			
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Detected	Not Detected			
Sample Matrix ^(S)	Material Type	N/a	NONE	Chrysotile present as fibre bundles				
Asbestos Type ^(S)	PLM Result	N/a	ISO17025	Chrysotile				
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	0.001				
pH	pH Units	N/a	MCERTS	6.0	8.3			
Total Cyanide	mg/kg	< 1	NONE		< 1			
Free Cyanide	mg/kg	< 1	NONE		< 1			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	23	180			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.18			
Organic Matter (SOM)	%	< 0.1	MCERTS	1.4	16.4			
Arsenic (As)	mg/kg	< 2	MCERTS	7	16			
W/S Boron	mg/kg	< 1	NONE		< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.3			
Chromium (Cr)	mg/kg	< 2	MCERTS	14	13			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	22	121			
Lead (Pb)	mg/kg	< 3	MCERTS	12	54			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	14	28			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2			
Vanadium (V)	mg/kg	< 1	MCERTS	15	38			
Zinc (Zn)	mg/kg	< 3	MCERTS	42	104			
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2			

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25	03/04/25	03/04/25	03/04/25
LK Consult Limited	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	HD101	HD102	HD103	WS101	WS102
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: PO-C001159	~Depth (m)	0.00 - 0.40	0.00 - 0.60	0.00 - 0.50	0.00 - 0.40	0.15 - 0.70
Reporting Date: 15/04/2025	DETS Sample No	772152	772153	772154	772155	772156

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.42	0.69
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.23
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	6.77
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	5.23
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.33	0.19	0.30	20.80
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	9.74
Fluoranthene	mg/kg	< 0.1	MCERTS	0.24	0.67	0.37	0.47	63.60
Pyrene	mg/kg	< 0.1	MCERTS	0.21	0.62	0.37	0.47	52.80
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.32	0.20	0.23	23.40
Chrysene	mg/kg	< 0.1	MCERTS	0.16	0.40	0.26	0.39	21.70
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.18	0.44	0.30	0.50	24.10
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.13	< 0.1	0.17	7.02
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.15	0.34	0.24	0.30	22.50
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.25	0.17	0.23	12.10
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	2.15
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.22	0.18	0.24	8.14
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	3.7	2.3	3.7	281

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25			
LK Consult Limited	~Time Sampled	None Supplied	None Supplied			
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	WS103	HD104			
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied			
~Order No: PO-C001159	~Depth (m)	0.50 - 1.00	0.15 - 0.40			
Reporting Date: 15/04/2025	DETS Sample No	772157	772158			

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.82		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.32		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.15		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.13		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.12		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6		

Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25			
LK Consult Limited	~Time Sampled	None Supplied	None Supplied			
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	WS102	HD104			
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied			
~Order No: PO-C001159	~Depth (m)	0.15 - 0.70	0.15 - 0.40			
Reporting Date: 15/04/2025	DETS Sample No	772156	772158			

Determinand	Unit	RL	Accreditation					
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	18	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	61	< 3			
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	70	< 3			
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	520	< 10			
Aliphatic >C34 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	157	< 10			
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	829	< 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	51	5			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	326	< 3			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	924	< 10			
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	236	< 10			
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	1537	< 21			
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	2366	< 42			

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 25-03868	~Date Sampled	03/04/25	03/04/25			
LK Consult Limited	~Time Sampled	None Supplied	None Supplied			
~Site Reference: 41 Bury Old Road, Ainsworth	~TP / BH No	WS102	HD104			
~Project / Job Ref: LKC241504	~Additional Refs	None Supplied	None Supplied			
~Order No: PO-C001159	~Depth (m)	0.15 - 0.70	0.15 - 0.40			
Reporting Date: 15/04/2025	DETS Sample No	772156	772158			

Determinand	Unit	RL	Accreditation				
Benzene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	< 2		
Toluene : HS_1D_MS	µg/kg	< 5	MCERTS	< 5	< 5		
Ethylbenzene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	< 2		
p & m-xylene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	3		
o-xylene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	< 2		
MTBE : HS_1D_MS	µg/kg	< 5	MCERTS	< 5	< 5		

Soil Analysis Certificate - Sample Descriptions

DETS Report No: 25-03868	
LK Consult Limited	
~Site Reference: 41 Bury Old Road, Ainsworth	
~Project / Job Ref: LKC241504	
~Order No: PO-C001159	
Reporting Date: 15/04/2025	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
772152	HD101	None Supplied	0.00 - 0.40	18	Brown sandy loam with stones and vegetation
772153	HD102	None Supplied	0.00 - 0.60	17.6	Brown loamy sand with vegetation
772154	HD103	None Supplied	0.00 - 0.50	16.4	Brown sandy clay
772155	WS101	None Supplied	0.00 - 0.40	25.6	Brown sandy clay
772156	WS102	None Supplied	0.15 - 0.70	4.7	Black loamy sand with stones and concrete
772157	WS103	None Supplied	0.50 - 1.00	12.3	Light brown sandy clay
772158	HD104	None Supplied	0.15 - 0.40	18.1	Black loamy sand with stones and concrete

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

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 25-03868
LK Consult Limited
~Site Reference: 41 Bury Old Road, Ainsworth
~Project / Job Ref: LKC241504
~Order No: PO-C001159
Reporting Date: 15/04/2025

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 diphénylcarbazide 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

List of HWOL Acronyms and Operators	
DETS Report No: 25-03868	
LK Consult Limited	
~Site Reference: 41 Bury Old Road, Ainsworth	
~Project / Job Ref: LKC241504	
~Order No: PO-C001159	
Reporting Date: 15/04/2025	

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
~	Sample details provided by customer and can affect the validity of results

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH - Aliphatic >C34 - C44 - raw data - EH_CU_1D_AL
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 >C34 - C44 - 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 - 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 >C35 - C44 - 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 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

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

Certificate Key

Symbol	Description
F	Filtered sample
UF	Unfiltered sample
D	Dried sample
AR	As received sample
RL	Reporting limit
~	Sample details provided by customer and can affect the validity of results
M/S	Missing Sample
n	Please note that we are MCERTS soil accredited (UK soils only) for sand, loam, and clay, and UKAS accredited for groundwater, tap water, surface water, and generated leachates. Other matrices are outside our scope of accreditation.
S	Subcontracted analysis
M	MCERTS accredited test
U	UKAS accredited test

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 24 1504 -
41 Bury Old Road, Ainsworth

Job Number MRN 25007/49
Date of Issue 29 April 2025
Page 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

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



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

Also at: London: 020 8523 1999

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MURRAY RIX

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



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

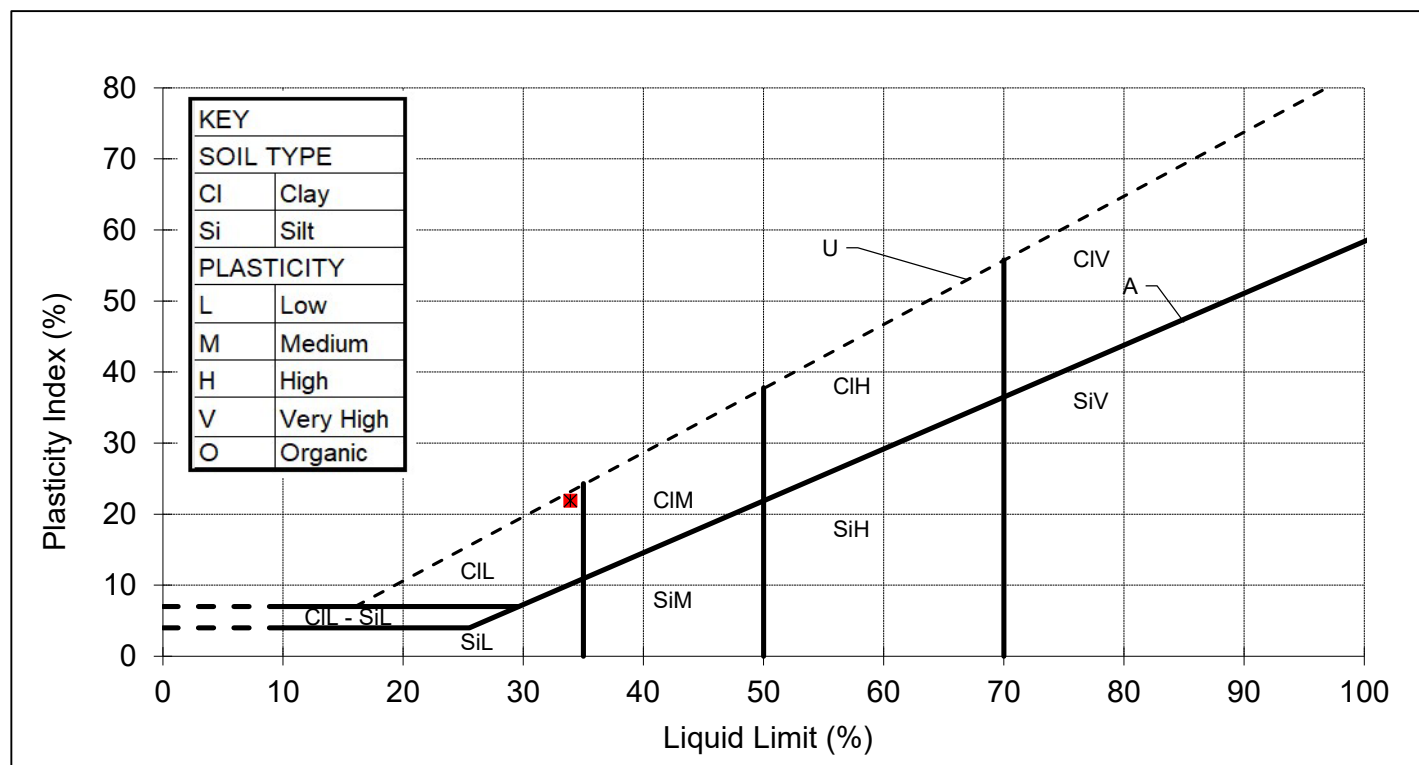
CLIENT	LK Consult Ltd
SITE	LKC 24 1504 - 41 Bury Old Road, Ainsworth
JOB NUMBER	MRN 25007/49

SAMPLE LABEL	WS101 1.2m D	DATE SAMPLED	03-Apr-25
SAMPLE No.	5055001	DATE RECEIVED	03-Apr-25
DATE TESTED	08-Apr-25	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.5	33.8	1.008	
Determination 2 (avg)	19.4	33.5		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12.8	34	12	22	86



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

29-Apr-25

MURRAY RIX

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



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

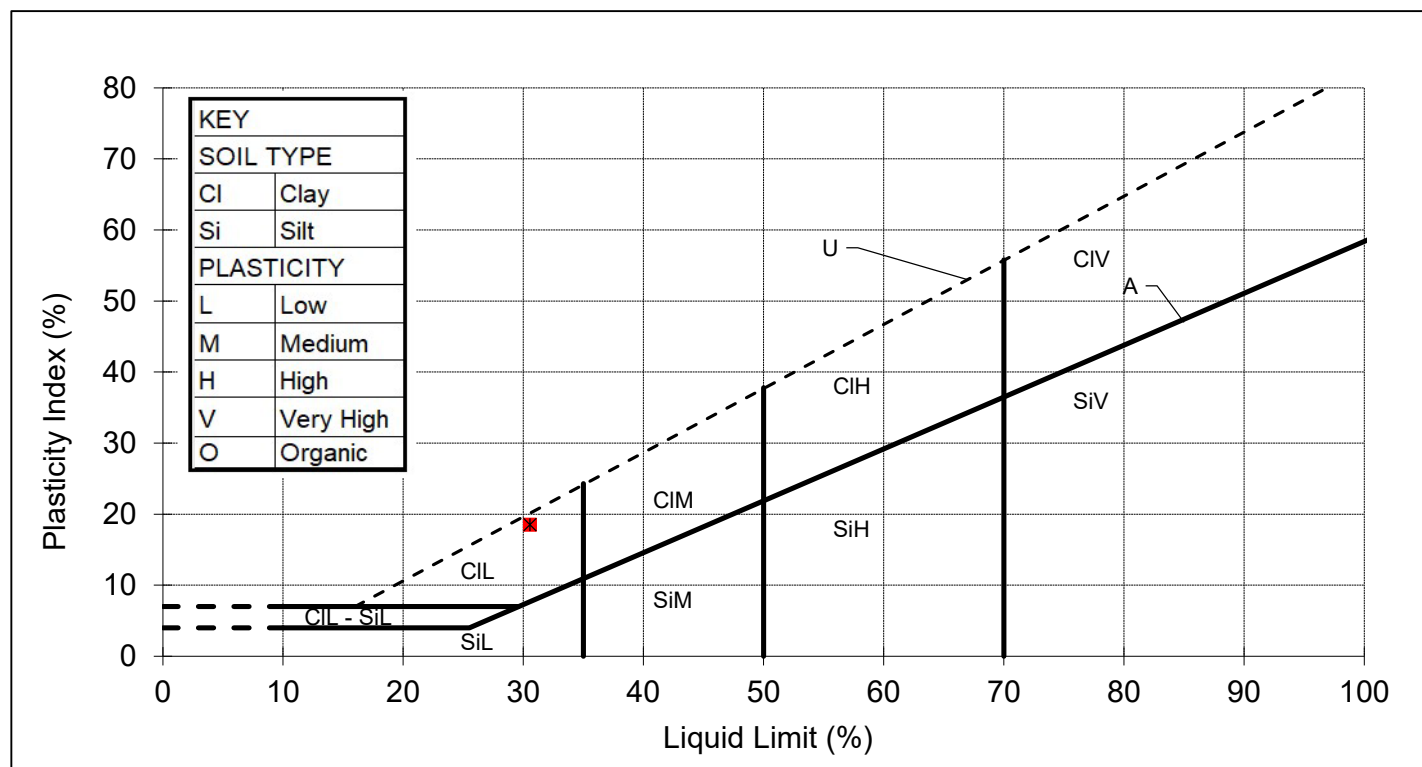
CLIENT	LK Consult Ltd
SITE	LKC 24 1504 - 41 Bury Old Road, Ainsworth
JOB NUMBER	MRN 25007/49

SAMPLE LABEL	WS101 2.0m D	DATE SAMPLED	03-Apr-25
SAMPLE No.	5055002	DATE RECEIVED	03-Apr-25
DATE TESTED	08-Apr-25	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.6	29.9	1.022	
Determination 2 (avg)	18.5	29.9		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12.5	31	12	19	80



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

29-Apr-25

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

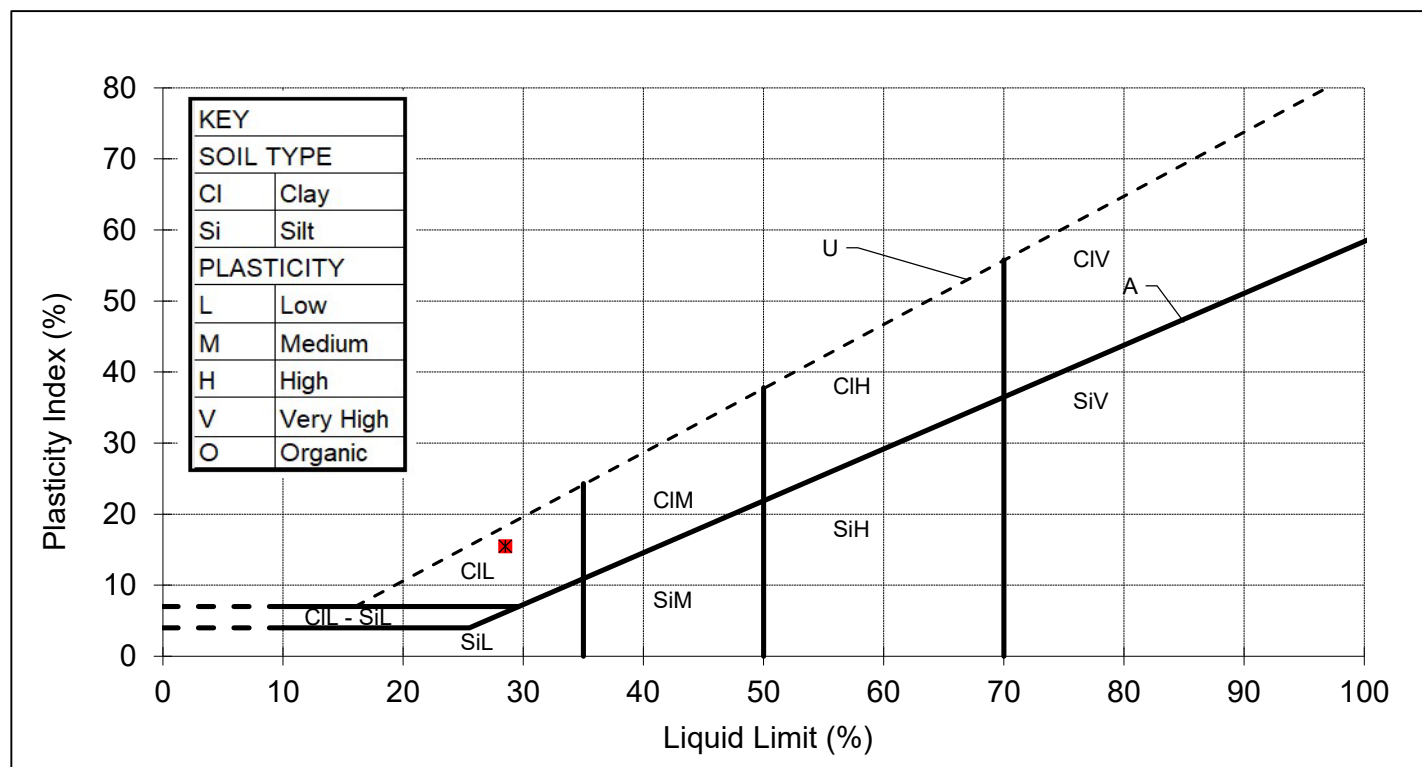
CLIENT	LK Consult Ltd
SITE	LKC 24 1504 - 41 Bury Old Road, Ainsworth
JOB NUMBER	MRN 25007/49

SAMPLE LABEL	WS102 1.2m D	DATE SAMPLED	03-Apr-25
SAMPLE No.	5055003	DATE RECEIVED	03-Apr-25
DATE TESTED	08-Apr-25	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)	Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.9	28.5	
Determination 2 (avg)	19.9	28.4	

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.1	28	13	15	94



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

29-Apr-25

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

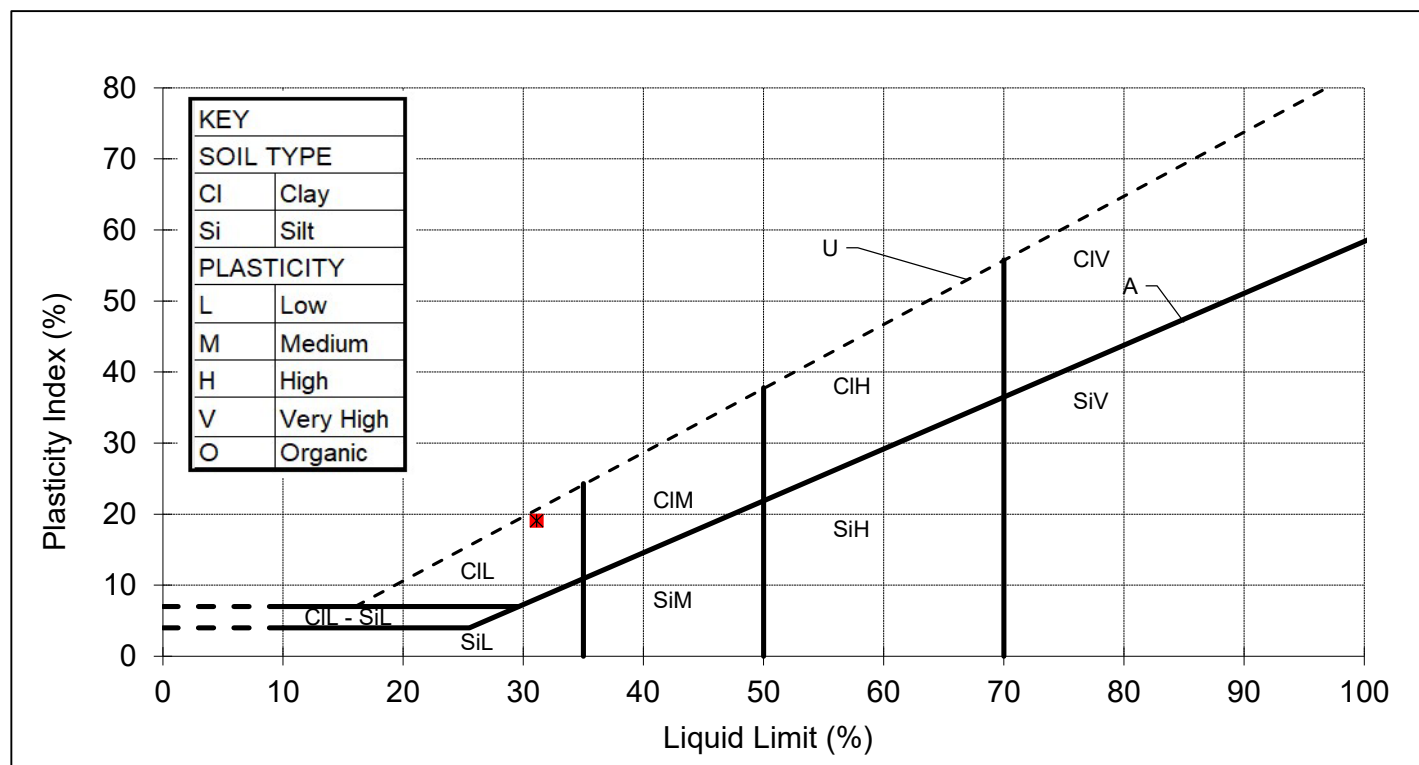
CLIENT	LK Consult Ltd
SITE	LKC 24 1504 - 41 Bury Old Road, Ainsworth
JOB NUMBER	MRN 25007/49

SAMPLE LABEL	WS103 2.0m D	DATE SAMPLED	03-Apr-25
SAMPLE No.	5055004	DATE RECEIVED	03-Apr-25
DATE TESTED	08-Apr-25	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.2	31.2	1.000	
Determination 2 (avg)	19.8	31.0		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
13.1	31	12	19	97



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

29-Apr-25

Appendix E – 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 (2015 update)	N/A	130	180	53	980	230	800	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(a)pyrene (surrogate marker Coal Tar)	1%	0.8	1.2	0.32	15	2.2	4	LQM S4UL
		2.5%	1.0	1.2	0.67	15	2.2	5	LQM S4UL
		6%	1.1	1.2	1.20	15	2.2	5	LQM S4UL
	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%	15	15	65	1,600*	11,000*	8,400*	DEFRA C4SL
		2.5%	36	36	130	3,700*	15,000*	17,00*	DEFRA C4SL
		6%	85	85	200	8,400*	1,200*	1,900*	DEFRA C4SL
	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%	0.87	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) ^{vap}	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) ^{vap}	LQM S4UL
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}	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) ^{vap}	LQM S4UL
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}	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
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 non-	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 non-	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 non-	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 ^{res} i	POS ^{res} 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) ^{vap}	LQM S4UL
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) ^{vap}	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
	cis 1,2-dichloroethene	1%	0.46	0.50	0.890	38	3,800	2,000	DEFRA C4SL
		2.5%	0.78	0.84	1.70	64	3,800	2,400	DEFRA C4SL
		6%	1.50	1.60	3.60	120	3,900	3,100	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
	Trans-1,2 Dichloroethene	1%	0.9	0.9	3.7	69	13,000	5,600	DEFRA C4SL
		2.5%	1.6	1.7	7.5	120	13,000	7,000	DEFRA C4SL
		6%	3.3	3.4	16.0	260	13,000	9,100	DEFRA C4SL
	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
	Endosulfans (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.	POSresi	POSpark	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%	120	440 (460)	23	440 ^{dir} (26,000)	440 ^{dir} (10,000)	440 ^{dir} (7,600)	LQM S4UL
		2.5%	200	690	42	690 ^{dir} (30,000)	690 ^{dir} (10,000)	690 ^{dir} (8,300)	LQM S4UL
		6%	380	1,200	83	1,300 ^{dir} (34,000)	1,300 ^{dir} (10,000)	1,300 ^{dir} (9,300)	LQM S4UL
sol/vap = solubility/vapour limit (potentially use if free product identified, although highly conservative)									
* = naphthalene C4SL exceeds the CLEA calculated soil saturation concentration (76 mg kg-1 for 1% SOM, 183 mg kg-1 for 2.5% SOM and 432 mg kg-1 for 6% SOM)									
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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- » Contaminated
- » SuDS & Flood Risk
- » Project Management
- » Land Remediation
- » Land Drilling
- » Japanese Knotweed
- » Air Tightness Testing