



Riverside Drive, Rochdale

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

Job Number
LKC251054

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Client
Fothergill Coated Fabrics Ltd



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EXECUTIVE SUMMARY

Site Details

Location	Unit North of Riverside Drive, Rochdale. Centred at National Grid Reference: 391255E, 414845N.
Area	5,400m ² .
Topography	Approximately 130 metres Above Ordnance Datum (AOD). Site is approximately level and is raised above the access road to the south. The site is lower than adjacent properties to the north-east and north-west.
Current Site Use	Industrial unit with associated office space, car parking and storage space.
Proposed Development	Extension to the north-eastern side of the current development including the existing soft landscaping on the current slope.

Site Setting

Main Historical Features	Onsite: Undeveloped land, Spring Mill, Spring cottage, Reservoir, Unoccupied land, Building. Surrounding Area: Spring Mill, commercial/industrial building, Roach Vale Mill, Filter Tanks, Reservoirs, Reservoir/pit, Small Bridge Colliery, Old clay pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till (diamicton), Alluvium deposits encroach onto the south-western corner of the site. Secondary A aquifer (Alluvium), Secondary Undifferentiated Aquifer (Till). Bedrock: Pennine Lower Coal Measures (mudstone, siltstone and sandstone), Secondary A Aquifer.
Landfills / Infilled Ground	2no. recorded landfills. Potentially infilled ground identified.
Site Reconnaissance	A site reconnaissance was undertaken on the 19 th of March 2025. Identified the site to comprise part of a large metal industrial unit in the west. Empty shipping containers and IBCs. No spills or leaks were noted. Interceptor as part of surface water drainage identified below the building.
Recommendations	Site Investigation was recommended to further assess geo-environmental risk.

Ground Investigation Work Undertaken

Date of Investigation:	6 th & 31 st March 2026.
Intrusive Investigation Work Undertaken:	4no. window sample boreholes. 2no. hand excavated foundation pit. 2no. Soakaway tests. Contamination and geotechnical testing. Gas monitoring.

Ground Conditions

Made Ground	A layer of sandy variably silty gravel was encountered across site from the surface to between 0.40-0.70mbgl with anthropogenic material comprising quarried stone, concrete fragments and brick fragments. A second layer of made ground comprising gravelly sandy clay was encountered in WS101 and WS102 to between 1.00-1.20mbgl with anthropogenic material of brick fragments present.
Superficial	Superficial strata comprised gravelly sandy clay from 0.30-1.20mbgl to the base of the borehole in all window sample boreholes and Soakaway test locations. Sandy silty clay gravel was encountered between 4.00-5.00mbgl in WS101 and from between 3.70-4.30mbgl to the base of the borehole in WS102-WS104.
Groundwater	Perched groundwater was recorded in all window sample boreholes at 0.40-0.50mbgl. True groundwater was encountered at 2.00mbgl within WS104 and not recorded in WS101-WS103. Groundwater was encountered between 3.94 to 4.50mbgl during monitoring visits in WS101, WS102 and WS104.

Obstructions	SPT refusal against a cobble at 4.43mbgl. No shallow obstructions.
Permeability	Due to slow rate at which water drained permeability could not be calculated and test failed.

Geotechnical Assessment

Undrained Shear Strength (s_u)	In-situ tests undertaken in the cohesive strata returned undrained shear strengths ranging between 18 and 147kPa throughout the cohesive strata.
Anticipated Foundation Type	Due to the variability of the shallow deposits of made ground and variable strength cohesive material, it is considered that a ground improvement option is utilised to remove variability in the ground conditions and to allow shallow strip and pad foundations to be used.
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 DS1-AC-1s.

Contamination Risk Assessment

Pollutant Linkage		Risk	Assessment
1	Asbestos, PAHs, heavy metals, petroleum hydrocarbons, ethyl-benzene, xylene	Low	No elevated concentrations, olfactory evidence and no TVOCs therefore no remediation required.
2	PAHs: Naphthalene, Ethyl-benzene, xylene	Low	No olfactory evidence and no TVOCs therefore no remediation required.
3	Hazardous / ground gas: methane, carbon dioxide	Moderate / Low	Due to high negative flow and proposed development no remediation required.
	Radon	Low	No remediation required.
4	Heavy metals, PAHs, petroleum hydrocarbons, xylene, ethyl-benzene	Low	No evidence of significant mobile contamination therefore no remediation required.
5	PAHs: Naphthalene, petroleum hydrocarbons, ethyl-benzene, xylene	Low	If new water connections are to be installed a water pipe risk assessment may be required.

PL1= Human health risk (direct contact). PL2= Human health (vapours). PL3= Gas risk. PL4= Controlled waters risk. PL5= Potable waters risk.

Recommendations and Remedial Strategy

PL	Recommendation
1	No remediation required.
2	No remediation required.
3	No remediation expected at present, pending completion of gas monitoring.
4	No remediation required.
5	No remediation required.

PL1= Human health risk (direct contact). PL2= Human health (vapours). PL3= Gas risk. PL4= Controlled waters risk. PL5= Potable waters risk.

Other Considerations
Unexpected Contamination
Decommissioning of Boreholes
Re-use of Site Generated Material
Stockpile Management
Disposal
Health and Safety Considerations
Piling in Contaminated Land

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1. Introduction

LK Consult Ltd (LKC) has been commissioned to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Outline Remediation Strategy for Riverside Drive, Rochdale. The investigation was undertaken in support of a planning application to develop the site for industrial use.

The following work has previously been undertaken:

- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: LKC251054-A1-PRA_Riverside Drive, Rochdale R0).

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

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

A 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	Unit North of Riverside Drive, Rochdale. Centred at National Grid Reference: 391255E, 414845N.
Area	5,400m ² .
Topography	Approximately 130 metres Above Ordnance Datum (AOD). Site is approximately level and is raised above the access road to the south. The site is lower than adjacent properties to the north-east and north-west.
Current Site Use	Industrial unit with associated office space, car parking and storage space.
Proposed Development	Extension to the north-eastern side of the current development including the existing soft landscaping on the current slope.

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: Undeveloped land, Spring Mill, Spring cottage, Reservoir, Unoccupied land, Building. Surrounding Area: Spring Mill, commercial/industrial building, Roach Vale Mill, Filter Tanks, Reservoirs, Reservoir/pit, Small Bridge Colliery, Old clay pit.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Till (diamicton), Alluvium deposits encroach onto the south-western corner of the site. Secondary A aquifer (Alluvium), Secondary Undifferentiated Aquifer (Till). Bedrock: Pennine Lower Coal Measures (mudstone, siltstone and sandstone), Secondary A Aquifer.
Landfills / Infilled Ground	2no. recorded landfills. Potentially infilled ground identified.
Site Reconnaissance	A site reconnaissance was undertaken on the 19 th of March 2025. Identified the site to comprise part of a large metal industrial unit in the west. Empty shipping containers and IBCs. No spills or leaks were noted. Interceptor as part of surface water drainage identified below the building.

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

Table 2-2 summarises the geotechnical constraints.

Coal Mining	Site is not within a Development High Risk Area. No further assessment required.
Slope Stability	Steep slope at north-east boundary of site. If material being removed from toe of slope assessment may be required.
Made Ground	Unknown depth (borehole onsite recorded made ground to 1.52mbgl) and constituent of made ground across the site. Initial information indicates relatively shallow made ground but could be deep where former reservoir is located. Possible in-ground structures from previous developments. Unlikely to be a suitable founding stratum unless engineering work is undertaken.
Superficial	Unknown strength of soils for foundation design. Clay / sand anticipated below the site. Strata may be variable giving differential settlement.
Bedrock	Borehole on site recorded bedrock as shale from 18.44mbgl.
Groundwater	Unknown depth and variability of groundwater. Shallow / fluctuating groundwater can affect the strength of the soil, particularly in granular ground. Shallow groundwater can also affect construction works.
Plasticity	Plasticity of clay deposits should be confirmed, particularly where trees are present or proposed, to identify the shrink / swell risk. Clay recorded on site.
Sulphate	Unknown sulphate content of the made ground and natural.
Road / Pavement Design	Unknown CBR values for footpath and road design should be calculated.

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.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk	Assessment and Recommendations
1	Asbestos, PAHs, heavy metals, petroleum hydrocarbons, ethyl-benzene, xylene (made ground, infilled reservoir, demolished building, cotton and dyeworks mill, current chemical storage).	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust. Windblown dust.	Future site users. Offsite receptors.	Likely	Medium	Moderate	Likely probability given sites history. There is a potential source, pathway (through soft landscaping) and receptor. Recommendation: Intrusive investigation required to include soil sampling.
2	PAHs, Naphthalene (made ground, infilled reservoir, cotton and dyeworks).	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	Coal/ash derived naphthalene unlikely to generate significant vapours. Potential source associated with former mill and chemical storage Recommendation: Intrusive investigation required with soil sampling if evidence of volatile contaminants are present.
	Ethyl-benzene, xylene (current chemical storage)			Low Likelihood		Moderate/Low	
3	Hazardous / ground gas: methane, carbon dioxide (deep made ground, peat, infilled reservoir onsite).	Migration via permeable strata and preferential pathways. Inhalation of gas.	Future site users. Buildings. Offsite receptors.	Low	Severe	Moderate	Infilled reservoir and possible deep made ground on site. Recommendations: Gas monitoring required.
	Radon	Explosion in confined spaces.		Unlikely	Medium	Low	Radon is <1% of homes above action level. Recommendations: No radon protection required.
4	Heavy metals, PAHs, petroleum hydrocarbons, xylene, ethyl-benzene (made ground, infilled reservoir, cotton and dyeworks mill, current chemical storage).	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater Surface water	Low likelihood	Medium	Moderate / Low	Low likelihood given limited sources of mobile contamination and site surfaced in hardstanding. Any oil spills (if present) likely to be localised and not generate a significant risk to low sensitivity receptors. Recommendations: No water sampling or leaching tests required unless evidence of significant mobile contamination is noted in the soils on site.
5	PAHs, petroleum hydrocarbons, naphthalene, ethyl-benzene, xylene (made ground, infilled reservoir, cotton and dyeworks mill, current chemical storage).	Permeation of pipes. Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Medium	Moderate	Likely given site history and possible deep made ground. Recommendations: Sampling and analysis of soils at anticipated pipeline depths (c. 0.75-1.35mbgl). Water pipe assessment required.

Table 2-3: Preliminary Contamination Conceptual Model.

3. Ground Investigation

3.1. Site Investigation Design and Methodology

The investigation was carried out on 6th of March 2026 and comprised the following:

- 4no. window sample boreholes drilled to 4.43-5.45 metres below ground level (mbgl) (ref. WS101 to WS104).
- 1no. hand dug foundation pits dug on corner of building (using hand auger / spade) excavated to 0.50-0.90mbgl (ref. FP101A and FP101B).
- 2no Soakaway tests were carried out to 1.60-1.90mbgl (ref. SA101-SA102)

All site investigation locations are shown in Figure 3.

The locations were chosen to allow adequate assessment of ground conditions across the. Table 3-1 details the site investigation locations.

Site Investigation Locations	Rationale
WS101-WS104	To assess ground conditions beneath proposed building.
FP101A & FP101B	To assess foundations of existing building.

Table 3-1: Summary of Sampling Locations.

The number of site investigation points corresponds to approximately one location per 16m 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. Well Installations

3no. of the boreholes (WS101, WS102, and WS104) were installed with monitoring wells for gas monitoring. Monitoring wells were installed in accordance with BS10175 and CIRIA C665⁷ and generally comprised approximately 1m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

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

3.3. Sampling Protocol

3.3.1. Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation⁸.

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 C665⁹ 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 (except for occasional ash and coal).

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; PAH=polycyclic aromatic hydrocarbons, SOM=Soil Organic Matter.

3.3.2. Soil Sampling (Geotechnical)

Soil samples taken during the investigation were collected in tubs and bulk bags for sent to Murray Rix Laboratories / DETS 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	4
BRE Suite Short / Full	1

Table 3-3: Summary of Geotechnical Testing Undertaken.

3.4. In-situ Testing

3.4.1. 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 and within cohesive strata.

Pocket penetrometer tests were not always possible due to the very soft nature of some of the clay deposits.

The results are provided within Appendix B.

3.4.2. Soakaway Tests

Soakaway tests were undertaken in SA101-SA102 in accordance with BRE Digest 365¹⁰ in machine excavated trial pits. The arisings were logged in accordance with BS14688-1¹¹ and BS5930.

3.5. Gas Monitoring

4no. gas monitoring visits have been undertaken over a 2-month period (19th March to 1st May 2026) in all installed boreholes.

Although this does not follow C665¹² for typical / idealised periods and frequency of monitoring for a higher gassing potential risk, this is a widely accepted industry standard (NHBC) for commercial with a very low to moderate gas generation potential. LKC will consider increasing the period and / or frequency of monitoring depending on the findings of the monitoring.

Monitoring is being undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665¹³ (flow rate measured first). The monitoring will aim to be undertaken over a range of weather conditions (including low and falling barometric pressure and heavy rain) to demonstrate worst-case conditions.

The gas monitoring results are reproduced in full in Appendix E.

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 all boreholes. Grey sandy silty gravel with anthropogenic material comprising quarried stone, concrete fragments and brick fragments was present across all boreholes and soakaways from the surface to between 0.30–0.70mbgl and within the foundation pit to 0.40mbgl, a black geotextile membrane was noted at 0.50mbgl within WS101.

In WS101 and WS102 a second layer of made ground comprising a firm to stiff brown gravelly sandy clay with anthropogenic material including rare brick fragments was present to 1.00 and 1.20mbgl respectively.

A layer of blackish brown sandy silty gravel was encountered within FP101 and FP102 from 0.40mbgl to over 0.50mbgl to 0.90mbgl in FP101A and FP101B.

4.1.2. Natural Strata

Superficial strata comprised horizons of soft to stiff clay, interbedded with horizons of medium dense variably sandy, silty, clayey gravel.

No bedrock was encountered during the investigation.

4.1.3. Contamination

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations. The PID recorded a maximum of 0.5ppm TVOC in the samples.

4.1.4. Obstructions

There was an SPT refusal at 4.43mbgl on a sandstone cobble within WS103. No shallow obstructions were present within any of the other investigation locations.

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).

Perched groundwater was recorded in all window sample boreholes at 0.40-0.50mbgl.

True groundwater strikes were not recorded in WS101-WS103, a strike at 2.00mbgl was recorded within WS104.

Groundwater monitoring within the borehole wells has been undertaken on four occasions. An oil-water interface probe was used to detect the presence of free phase hydrocarbons within each borehole. This data is provided in Appendix E. Monitoring levels were recorded between 3.94mbgl and 4.50mbgl in WS101, WS102 & WS104.

4.2.2. Contamination

No evidence of contamination was identified in the groundwater during investigation work or monitoring. No free phase hydrocarbons were detected.

4.3. Permeability Tests

4.3.1. Soakaway Tests

The results of the soakaways are presented in Appendix F.

BRE365¹⁴ indicates that the calculation of the soil infiltration rate is made from the time taken for the water level to fall from 75% to 25% effective storage depth in each pit.

$$\text{Soil infiltration rate, } f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

Where:

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth.

a_{p50} = the internal surface area of the trial pit up to 50% effective depth including the base area.

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

Due to the slow rate at which water drained, it was not feasible to undertake tests in triplicate and they were terminated before the effective depth could be reached.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise an extension to the north-eastern side of the existing industrial unit, extending into the existing soft landscaping forming the slope along the north-east boundary of the site leading upto Spring Mill Walk to the north of the site.

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. Should the development proposals or finished levels be altered then the comments/recommendations in this section may require revising

It is anticipated that some enabling works may be required to create a level developable platform. An element of cut will be required to remove the section of the slope leading upto Spring Mill Walk and the slope will require either reprofiling to a safe angle or suitably retained.

Given the nature of the proposed development the structure meets the criteria of Geotechnical Category 2 of Eurocode 7¹⁵.

5.2. Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1, and typically comprises made ground up to 1.20mbgl over natural cohesive and granular superficial deposits of sand and clay to the completion depths investigated.

5.3. Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with suitable guidance, such as Series 200 of the Specification for Highway Works¹⁶. This should include:

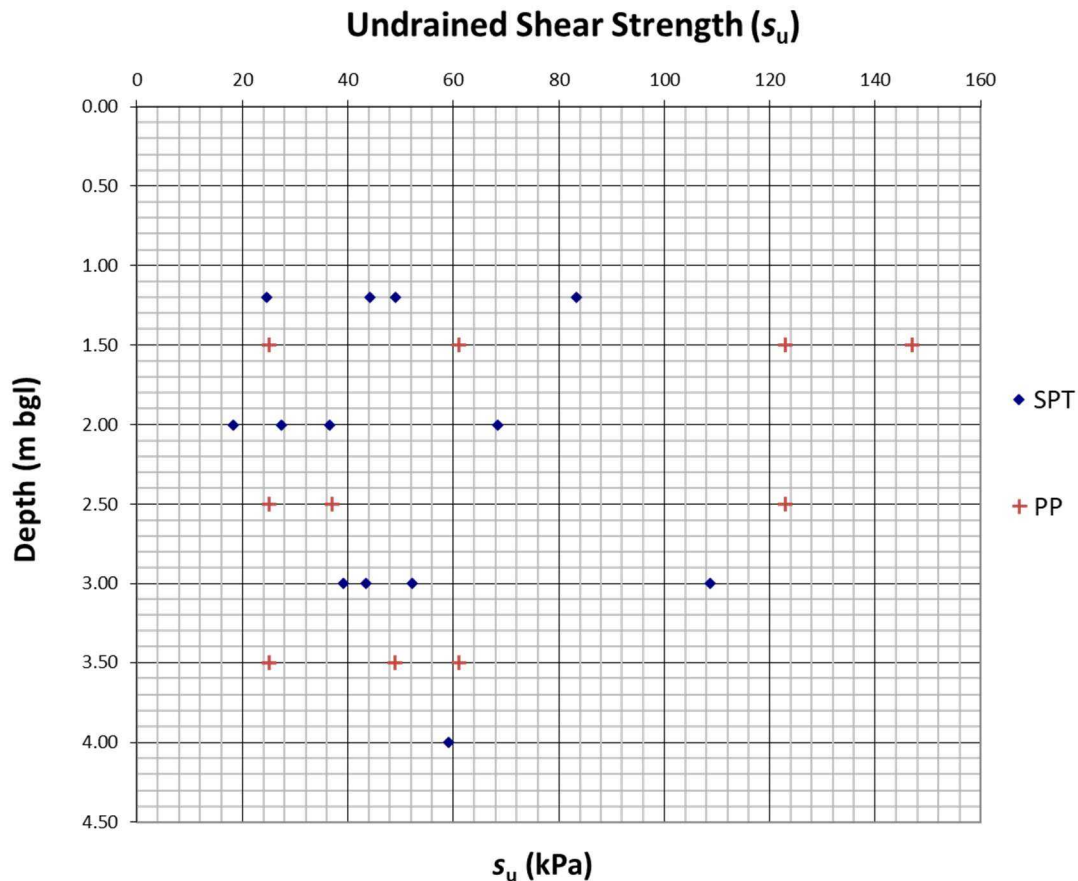
- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Based on the PRA undertaken, buried structures and old foundations can be anticipated on site although none were encountered during the intrusive investigation. If relict structures and foundations are encountered then these should be excavated from below the proposed development footprint with the resulting void backfilled.

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

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 is quite varied, with s_u 's ranging between 18 and 109kPa based on SPT results, and between 25 and 147kPa based on PP results, confirming the logs description as being soft to stiff, low to high strength.

5.4.2. Plasticity

Four clay samples were subjected to Atterberg Limits (plasticity) and Moisture Content testing. Results are provided in Appendix D.

The clay is classified as high 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 medium volume change potential with modified plasticity of between 31-33%.

5.4.3. Foundations Options

The made ground is not suitable for a founding material due to the inherent variability of the material. The natural clay is of variable strength returning a wide range of undrained shear strengths from in-situ testing.

LKC were informed by the client that archive drawings for the existing industrial unit show the entire building had Vibroflotation ground improvement undertaken on an approximate 2.70 x 2.00m grid. Historically a reservoir was recorded in north-east area of the existing building and the south-east area of the proposed extension which indicates the potential for deep made ground to be present.

Two hand excavated foundation inspection pits were undertaken at the north-east corner of the existing structure to assess the current foundation construction. The pit advanced along the north-

east facing side of the corner (FP101A) identified brick masonry substrate to a depth of 120mm, sitting on concrete extending vertically to a depth of ????. The pit advanced along the south-east facing side of the corner (FP101B) identified brick masonry substrate to a depth of 120mm, sitting on a corbelled concrete foundation which steps out 50mm, falls 100mm and steps out again by 30mm and falling a further 70mm, before stepping out a further 160mm. The base of the corbelled foundation was at a depth of 510mm below ground level. Sketches of the foundations are included in the foundation pit logs in Appendix B.

5.4.4. Ground Improvement

The findings of the site investigation undertaken for the proposed extension recorded predominantly cohesive strata underlying the made ground, with granular strata recorded at depths of between 3.70m and 4.30mbgl. The use of a ground improvement technique, such as vibro granular columns will allow shallow foundations to be utilised with the made ground and natural clay. The vibro granular columns should provide an Allowable Bearing Capacity of around 150kN/m² but will also remove variability within the shallow strata, allowing shallow foundations such as strip or pads to be used.

Vibro stone columns are not suitable in clays with a Plasticity Index greater than 40% or with an undrained shear strength of less than 30kPa. Majority of the in-situ tests undertaken returned shear strengths in excess of 30kPa and the Plasticity Index tests undertaken all returned values under 40%, it is therefore considered that a ground improvement technique will prove suitable for this site.

Specialist advice should be sought from a suitably experienced contractor with regard to whether the ground conditions are suitable, the allowable bearing capacity that can be achieved and settlements.

5.4.5. Piled Foundations

As an alternative, consideration may be given to the use of mini-piled foundations to transfer loadings through any deep made ground / poor ground conditions and bear upon the medium dense to dense granular strata recorded at depths of between 3.40m and 4.30mbgl.

Use of mini piles will reduce the amount of spoil generated from foundation trenches requiring offsite disposal, along with the amount of concrete required for the development.

Up to 1.20m of made ground has been recorded within the exploratory holes and consideration must be given to the potential for negative skin friction to influence the piles.

Pile design should be undertaken by a specialist contractor to allow them to reduce the Factor of Safety based on their extensive pile testing data.

Should a pile foundation solution be the preferred option, then warranty providers such as Premier or LABC, may require further information on ground conditions to a minimum of 5m below the base of the pile.

5.4.6. Foundation Recommendation

Archive drawings for the existing structure show that it is constructed upon ground which had been improved by vibroflotation. It is considered that at the location of the proposed extension, due to variability in strength of the cohesive strata identified from this ground investigation and the potential for made ground in the south-east of the proposed extension from the PRA, a ground improvement option should be applied. A ground improvement technique, such as vibroflotation, will match the ground conditions of the original structure restricting the potential for differential settlements.

5.5. Ground Floor Slabs

Due to the presence of 1.20m of made ground across the site identified during the ground investigation, and the potential for substantial made ground from the infilling of the former reservoirs, ground bearing floor slabs whilst viable, will require detailed design to accommodate variability of the formation and account for differential settlement. Also, the presence of high plasticity clay with a

moderate volume change potential can pose a significant risk to ground bearing floor slabs. It is recommended that suspended floor slabs are used, such as suspended concrete slabs or precast beams to span over specialised compressible infill materials allowing some movement of the ground.

If vibro granular columns are used for the foundations, then this could be extended to the floor slab to improve formation conditions and reduce the risk of damage from settlement.

Where suspended floor slabs are employed ventilation of the under-floor void will be required to address condensation issues.

5.6. Pavement Construction

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 are not considered frost susceptible.

5.7. Drainage

The soil infiltration tests show the underlying clay is likely to be of low permeability. Therefore it is not recommended that soakaways are used for disposal of surface water runoff.

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-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

5.9. Excavations and Retaining Walls

Site observations indicated that excavations should be feasible in the near surface with normal plant.

The exploratory holes were observed to be stable during the excavation/drilling and the made ground and natural deposits included granular strata containing perched groundwater. The short- and long-term stability of near vertically sided excavations can not be guaranteed and random and sudden instability within these soils should be anticipated. All excavations should be supported or battered back in accordance with guidance contained in CIRIA R97¹⁷.

The proposed extension will extend into the slope in the north-east of the site and it is considered that the ground will require preparation to facilitate a developable platform for the construction works, requiring an element of cut.

The cut material will result in a steep sided excavation and due to limitations in site space, it is considered unlikely that the excavation can be profiled to form a safe angle of repose. It is therefore considered that the area of cut will be stabilised utilising a retaining structure, such as a gravity wall, or gabion baskets. Retaining structures should include adequate drainage (gravel back fill, weep holes) to prevent hydrostatic pressure (gabion baskets are considered free draining), structural stability etc. and should be designed by a suitably qualified and experienced engineer.

5.10. Construction Activity and Inspection

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

- Due to the variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction.
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97¹⁸ 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 (LCRM¹⁹). 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) ^{20, 21}.
- LQM Suitable 4 Use Levels (S4ULs) ^{22, 23, 24, 25}.

The proposed development is for an extension to the existing warehouse therefore the assessment criteria for commercial land use has been used.

All criteria have been generated using the CLEA V1.06 model²⁶ 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 G.

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^{27,28} and naphthalene the most volatile and soluble²⁹. 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 negligible³⁰. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)³¹ 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*³², which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two-year carcinogenicity study.

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

6.2.2. Soil Results Comparison against Assessment Criteria

All analysis sheets are presented in Appendix C.

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

No asbestos was identified in any soil samples analysed.

6.2.3. Direct Contact Risk – Pollutant Linkage 1

No metals or PAHs were identified within samples tested, therefore the probability of these contaminants posing a risk to site users is considered unlikely. No petroleum hydrocarbons, ethylbenzene or xylene observed during investigation and not TVOCs 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.

No asbestos was identified in any of the samples; therefore, the probability of asbestos affected site users is considered to be unlikely. With a medium consequence, the risk is low. At this stage, a low risk is assumed (as no asbestos identified) and remediation is not required. However, as a precaution, construction workers should be and vigilant for any suspected ACM during groundworks.

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.

LKC therefore consider the probability of volatile PAHs, ethyl-benzene and xylene 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

4no. gas monitoring visits have been undertaken on the study site. Gas monitoring results are presented in Appendix E and summarised in Table 6-1. Following guidance set out in CIRIA C665³⁴ and BS8485³⁵ peak methane and carbon dioxide concentrations have been used in the gas risk assessment. In addition, and as per guidance, flow rates were measured first.

Borehole Ref.	Visit	Peak CH ₄ (%v/v)	Peak CO ₂ (%v/v)	Min O ₂ (%v/v)	Steady Flow (l/h)	Groundwater Level (mbgl)	Pressure (mb)	Prev 24hr Pressure Trend
WS101	1	<0.1	0.1	20.4	-0.1	4.30	1014	Rising
	2	0.1	0.8	20.1	-1.5	4.25	1014	Rising
	3	0.1	3.0	16.7	-1.4	4.26	999	Variable
	4	<0.1	2.8	18.9	-1.4	Dry	1001	Falling
WS102	1	<0.1	4.3	5.5	-2.1	Dry	1014	Rising
	2	<0.1	5.1	6.3	-1.6	3.94	1014	Rising
	3	<0.1	5.9	5.5	-1.5	3.94	999	Variable
	4	<0.1	6.6	12.6	-1.5	Dry	1001	Falling
WS104	1	<0.1	0.8	20.3	-0.1	4.35	1034	Rising
	2	<0.1	2.5	19.1	-1.7	4.50	1014	Rising
	3	<0.1	0.6	19.6	-1.7	4.36	999	Variable
	4	<0.1	4.2	16.8	-1.7	Dry	1001	Falling

Table 6-1: Gas Monitoring Results.

The boreholes have been installed between 1.00-5.00mbgl (WS101), 2.00-4.00mbgl (WS102) and 1.00-4.00mbgl (WS104) predominantly within the natural clay strata. WS101 and WS102 also encroach into the underlying gravel strata from 4.00 and 3.90mbgl respectively.

The peak flow encountered was -2.2 l/hr recorded within WS102 (during visit 1), all visits recorded a negative steady flow measurement between -0.1 to -2.1l/hr in WS101 visit 1 and WS102 visit 1 respectively.

CO₂ was recorded between 0.1 to 5.9%v/v in WS101 visit 1 and WS102 visit 3 respectively, CO₂ is elevated in WS102 relative to the rest of the wells.

O₂ was recorded between 5.5 to 20.4%v/v in WS102 visit 1 and WS101 visit 1 respectively, O₂ is lower in WS102 relative to the rest of the wells, 5.5 and 6.3%v/v.

CO and CH₄ were recorded as less than the limits of detection for the majority of visits and wells with CO 1ppm encountered in WS101 and WS102 on visit 1 and CH₄ of 0.1%v/v in WS101 on visit 1 and 2.

The high negative flow readings between -0.1 to -2.2 l/hr are expected to be as a result of drilling. RB17 highlights there can be high airflow through granular layers giving high positive or negative flows as a result. All wells have been drilled through granular material between 3.90 to 4.30mbgl thereby giving

a pathway for gasses to escape producing a negative flow. This is most apparent in WS102 where the well is dry and intersects the granular layer at it's base, the peak flow is -2.2 l/hr.

Gas Screening Value

In accordance with CIRIA C665³⁶, a Gas Screening Value (GSV) may be calculated. Due to the high negative flows a flow of 0.1l/hr has been assumed.

Assuming worst-case scenario maximum gas concentrations and a flow of 0.1l/hr for each borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS).

Table 6-2 shows the maximum GSV for each borehole for all visits and the appropriate characteristic situation (based on GSV only). An overall site assessment (WS101, WS102 & WS104) has also been included (worst case values across the site).

Boreholes	Max GSV (l/hr)	CS
WS101	0.0008	CS1
WS102	0.0066	CS1
WS104	0.0042	CS1
WS101, WS102 & WS104	0.0001 (CH ₄) 0.0066 (CO ₂)	CS1

Table 6-2: Summary of Worst-Case Gas Screening Values (GSV).

Notes:

CS = Characteristic Situation; TL= Traffic Light.

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

Carbon dioxide concentrations were recorded above 5% in WS102. The levels are only marginally elevated, and the concentrations recorded are relatively consistent. LKC consider it unlikely that concentrations significantly higher than those recorded will be found on site. Taking this into account and the very low flow rates recorded, LKC consider that CS1 would be appropriate for the site.

Given the generally low gas concentrations and negative flow, and given the proposed development being that of a warehouse extension meaning the space is expected to be large, well ventilated and with limited small and enclosed spaces for gases to accumulate. A low / moderate risk is considered most appropriate based on current gas results, and no remediation would be required.

6.4. Controlled Water Assessment

The PRA identified a moderate / low risk with respect to controlled waters with groundwater testing only to be undertaken if there was evidence of mobile contamination.

No evidence of significant mobile contamination was identified on the site.

The absence of mobile contamination and the presence of clay provide an impermeable layer cut of the possible pathway into the Secondary A aquifers. The surface water is not considered to be a significant receptor.

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

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.

No elevated VOCs (based on naphthalene only) have been identified. Based on the ground conditions encountered, this is likely to be widespread across the site.

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.

If new water connection is required a UU Water Pipe Risk Assessment in line with the utility provider may need to 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 6.1-6.5. The revised contamination conceptual model follows the same methodology and guidance used in the preliminary contamination conceptual model. The risk matrix is provided in Appendix A.

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

Where a very low risk 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, PAHs, heavy metals, petroleum hydrocarbons, ethyl-benzene, xylene	Dermal contact. Inhalation of soil, fibres, and dust. Ingestion of soils, dust. Windblown dust.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No elevated concentrations, olfactory evidence and no TVOCs therefore no remediation required.
2	PAHs: Naphthalene, Ethyl-benzene, xylene	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users. Offsite receptors.	Unlikely	Medium	Low	No olfactory evidence and no TVOCs therefore no remediation required.
3	Hazardous / ground gas: methane, carbon dioxide	Migration via permeable strata and preferential pathways. Inhalation of gas.	Future site users. Buildings. Offsite receptors.	Unlikely	Severe	Moderate / Low	Due to high negative flow and proposed development no remediation required.
	Radon	Explosion in confined spaces.		Unlikely	Medium	Low	No remediation required.
4	Heavy metals, PAHs, petroleum hydrocarbons, xylene, ethyl-benzene	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater Surface water	Unlikely	Medium	Low	No evidence of significant mobile contamination therefore no remediation required.
5	PAHs: Naphthalene, petroleum hydrocarbons, ethyl-benzene, xylene	Permeation of pipes. Ingestion of tainted water supply.	Future site users. Water pipes.	Unlikely	Medium	Low	If new water connections are to be installed a water pipe risk assessment may be required.

Table 6-3: Revised Contamination Conceptual Model.

7. Conclusions

7.1. Ground Conditions

Ground conditions are summarised in Table 7-1 below.

Made Ground	A layer of sandy variably silty gravel was encountered across site from the surface to between 0.40-0.70mbgl with anthropogenic material comprising quarried stone, concrete fragments and brick fragments. A second layer of made ground comprising gravelly sandy clay was encountered in WS101 and WS102 to between 1.00-1.20mbgl with anthropogenic material of brick fragments present.
Superficial	Superficial strata comprised gravelly sandy clay from 0.40-1.20mbgl to the base of the borehole in WS101. Sandy silty clay gravel was encountered between 4.00-5.00mbgl in WS101 and from between 3.70-4.30mbgl to the base of the borehole in WS102-WS104.
Groundwater	Perched groundwater was recorded in all window sample boreholes at 0.40-0.50mbgl. Groundwater was encountered at 2.00mbgl within WS104 and not recorded in WS101-WS103. Groundwater was encountered between 3.94 to 4.50mbgl during monitoring visits in WS101, WS102 and WS104.
Obstructions	SPT refusal against a cobble at 4.43mbgl. No shallow obstructions.
Permeability	Due to slow rate at which water drained permeability could not be calculated and test failed.

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.

Exposed Existing Foundations	Two foundation inspection pits (FP101A & FP101B) were advanced at the eastern corner of the existing building to establish the foundation construction. A stepped concrete footing was recorded in TP101B, extending to a depth of 390mm.
Undrained Shear Strength (s_u)	In-situ tests undertaken in the cohesive strata returned undrained shear strengths ranging between 18 and 147kPa throughout the cohesive strata.
Anticipated Foundation Type	Due to the variability of the shallow deposits of made ground and variable strength cohesive material, it is considered that a ground improvement option is utilised to remove variability in the ground conditions and to allow shallow strip and pad foundations to be used.
Plasticity	Consideration will need to be given to the shrink / swell of the clay strata if it is to be used as founding strata, particularly where trees/hedges are present. Foundations may need to be deepened. A medium volume change potential has been calculated for the site.
Shallow Groundwater	Perched groundwater was recorded within the granular made ground, perched on the underlying clay of perceived low permeability. Groundwater recorded at 2.00mbgl within the natural clay in WS104 is considered representative of a perched groundwater pocket.
Concrete Requirements	Based on BRE Digest 2005 ³⁸ – DS-1 AC-1s recommended.
Services	Consideration to the presence of services running through the site. Services may need to be re-routed.
Temporary support of excavation	Will be required; Exploratory hole were generally recorded as stable however it is recommended that suitable guidance is followed, such as CIRIA R97, to allow safe working. The proposed extension will extend into the slope forming the north-east boundary of the site, an element of cut will be required to form a developable platform. The cut material will result in a steep sided excavation and due to

	limitations in site space, it is considered unlikely that the excavation can be profiled to form a safe angle of repose. It is therefore considered that the area of cut will be stabilised utilising a retaining structure, such as a gravity wall, or gabion baskets
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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, PAHs, heavy metals, petroleum hydrocarbons, ethyl-benzene, xylene	Low	No elevated concentrations, olfactory evidence and no TVOCs therefore no remediation required.
2	PAHs: Naphthalene, Ethyl-benzene, xylene	Low	No olfactory evidence and no TVOCs therefore no remediation required.
3	Hazardous / ground gas: methane, carbon dioxide	Moderate / Low	Due to high negative flow and proposed development no remediation required.
	Radon	Low	No remediation required.
4	Heavy metals, PAHs, petroleum hydrocarbons, xylene, ethyl-benzene	Low	No evidence of significant mobile contamination therefore no remediation required.
5	PAHs: Naphthalene, petroleum hydrocarbons, ethyl-benzene, xylene	Low	If new water connections are to be installed a water pipe risk assessment may be required.

Table 7-3: Summary Risk Table.

PL=Pollutant Linkage.

PL1= Human health risk (direct contact). PL2= Human health (vapours). PL3= Gas risk. PL4= Controlled waters risk. PL5= Potable waters risk.

8. Recommendations and Remediation Strategy

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

A summary of remediation requirements is included in Table 8-1.

PL	Recommendation
1	No remediation required.
2	No remediation required.
3	No remediation required.
4	No remediation required.
5	No remediation required.

Table 8-1: Remediation Summary.

PL1= Human health risk (direct contact). PL2= Human health (vapours). PL3= Gas risk. PL4= Controlled waters risk. PL5= Potable waters risk.

Based on the findings of the site investigation and risk assessment, at this point no remediation is required. A watching brief for any unexpected contamination should be maintained during groundworks (refer to Section 7.2.), and any imported soils brought to site for use in soft landscaping should be validated to ensure they are suitable for use.

8.1.1. 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.

8.1.2. Decommissioning of Boreholes

Decommission all existing groundwater sampling, ground gas monitoring and groundwater level monitoring wells by grouting should be undertaken to ensure no contamination of aquifers. Any other boreholes or borehole installations encountered during groundworks should also to be decommissioned.

All borehole and borehole installation decommissioning is to be undertaken in accordance with current EA guidelines³⁹.

8.1.3. Re-use of Site Generated Material

To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used⁴⁰):

- 5,000 tonnes (c. 2,500m³) treatment of crushed concrete / stone.
- 1,000 tonnes (c. 500m³) use of non-hazardous soil.
- 5,000 tonnes (c. 2,500m³) use of clays, sand, gravel, brick, concrete, stone etc.

- 50,000 tonnes (c. 25,000m³) use of bituminous material to be used in roadways.

A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice⁴¹ may be required if volumes exceed exemption limits. This must be registered before material movement starts onsite.

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

For all the above material will need to be tested at the rate and analytical suites presented in Table 8-2.

8.1.4. Stockpile Management

Stockpiled material should be suitably managed. Material should be segregated by type and source. For example, construction / demolition arisings, site won subsoil. Stockpiles may also require covering to minimise the generation of vapours, fibres, dust, and possible nuisance to adjacent receptors, and to prevent rainwater ingress. The source of each stockpile should be recorded and appropriate validation testing for re-use or potential offsite disposal should be undertaken as required.

8.1.5. 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.

8.1.6. 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 guidance⁴²) should be adopted by all workers involved with site enabling and construction works.

8.1.7. Piling in Contaminated Land

If a piled foundation is being considered this may provide a preferential pathway for contaminants to the underlying aquifer. A piling risk assessment may be required. Good practice for the drilling of piles on contaminated sites should be adhered to, such as guidance provided by the Environment Agency⁴³.

8.2. Validation of Imported / Site Won Soils

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

A summary of the required imported material sampling requirements is presented in Table 8-2 and is based on the slightly modified YALPAG guidance (2021)⁴⁴ based on a general worst-case scenario. Ideally, the material should be sampled at source to prevent double handling if soil fails, with confirmatory sampling undertaken on importation to site. Where this is not possible then material imported should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens to ensure suitability for use.

Material Type	Source	Suite of Analysis	Sampling Rate
Virgin Quarried Material	First generation quarried material (stone / subsoil)	Suite A	1 or 2 depending upon the type of stone / subsoil utilised to confirm the inert nature of the material.
Crushed Hardcore Stone and Brick (excluding asphalt)	Recycled (no volatile staining)	Suite A*	1 sample per 500m ³
General Fill	Imported fill – Greenfield / manufactured	Suite A*	1 sample per 500m ³
	Imported fill - Brownfield	Suite B*	
Topsoil / Subsoil	Greenfield / manufactured / natural site-won soil	Suite A*	^A 1 sample per 50m ³
	Brownfield / Screened Soils / site won made ground	Suite B**	^B 1 sample per 50m ³

Table 8-2: Sampling Requirements for Imported and Site Won Soils.

Notes:

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

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

*Minimum sampling rate of 3 samples per source.

**Minimum sampling rate of 6 samples per source.

^A YAPALG states Between 1 sample per 50m³ and 1 sample per 250m³. Worst case assumed.

^B YAPALG states Between 1 sample per 50m³ and 1 sample per 100m³. Worst case assumed.

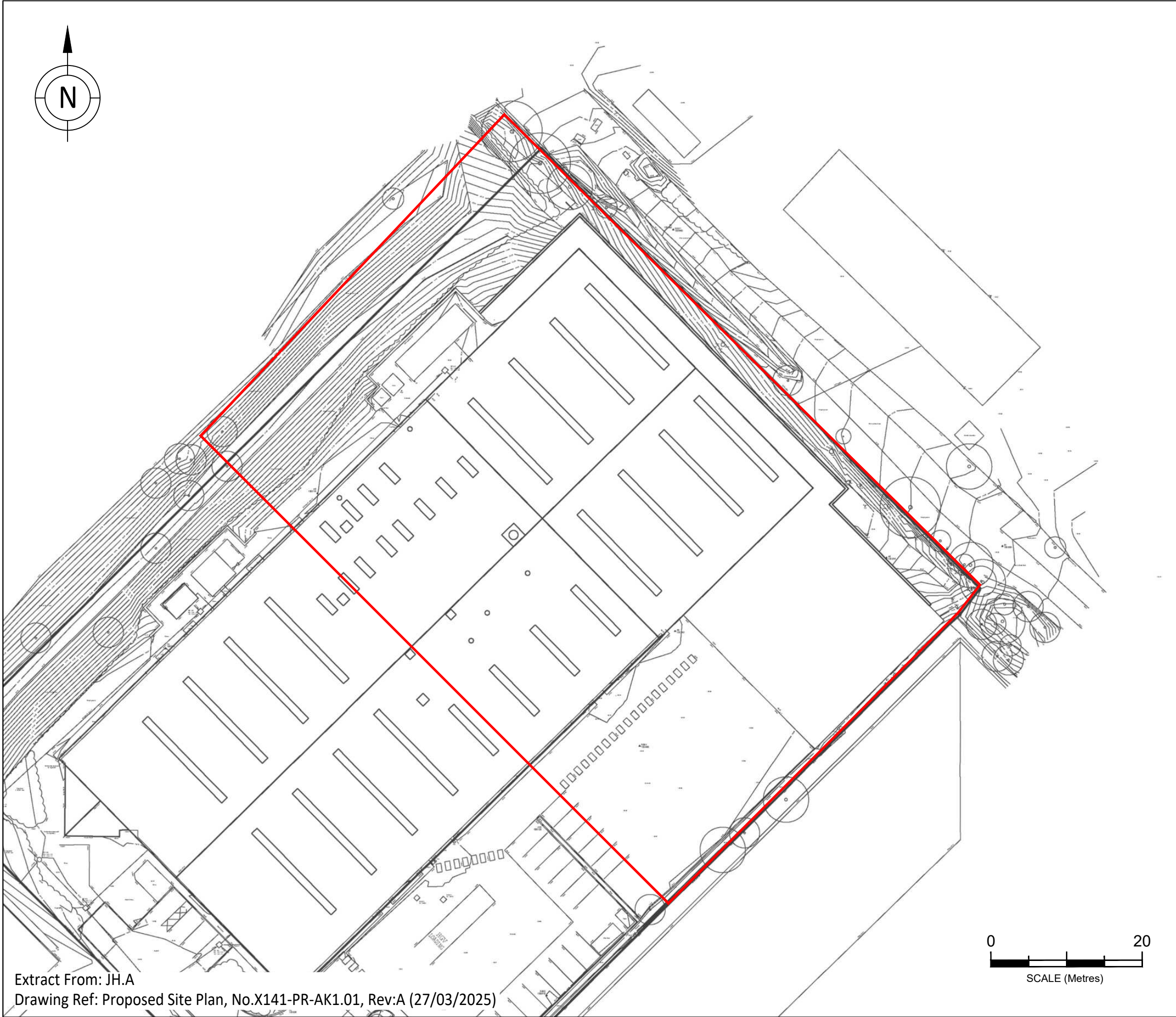
Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

It should be ensured that the matrix of imported topsoil is suitable as a growing medium in line with BS3882⁴⁵. Topsoil soil shall be free of weeds, roots or perennial weeds, pests, diseases, debris, tree roots, sticks, subsoil and foreign matter and shall be capable of being broken down to a fine tilth. LKC advise this information is provided by the supplier before material is imported onto site.

Figures



Client: Fothergill Coated Fabrics Ltd				Title: Site Location & Boundary Plan		 LK CONSULT	
Site: Riverside Drive, Rochdale				Scale (see scale bar): 1:25,000 & 1:1250 @ A4			
Drawn By: MB		Checked By: PD		Figure: 1			
Drawn: April 2025		Revision:					
D o b No.: LKC 251054							



Extract From: JH.A
Drawing Ref: Proposed Site Plan, No.X141-PR-AK1.01, Rev:A (27/03/2025)

KEY

 Site Boundary

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



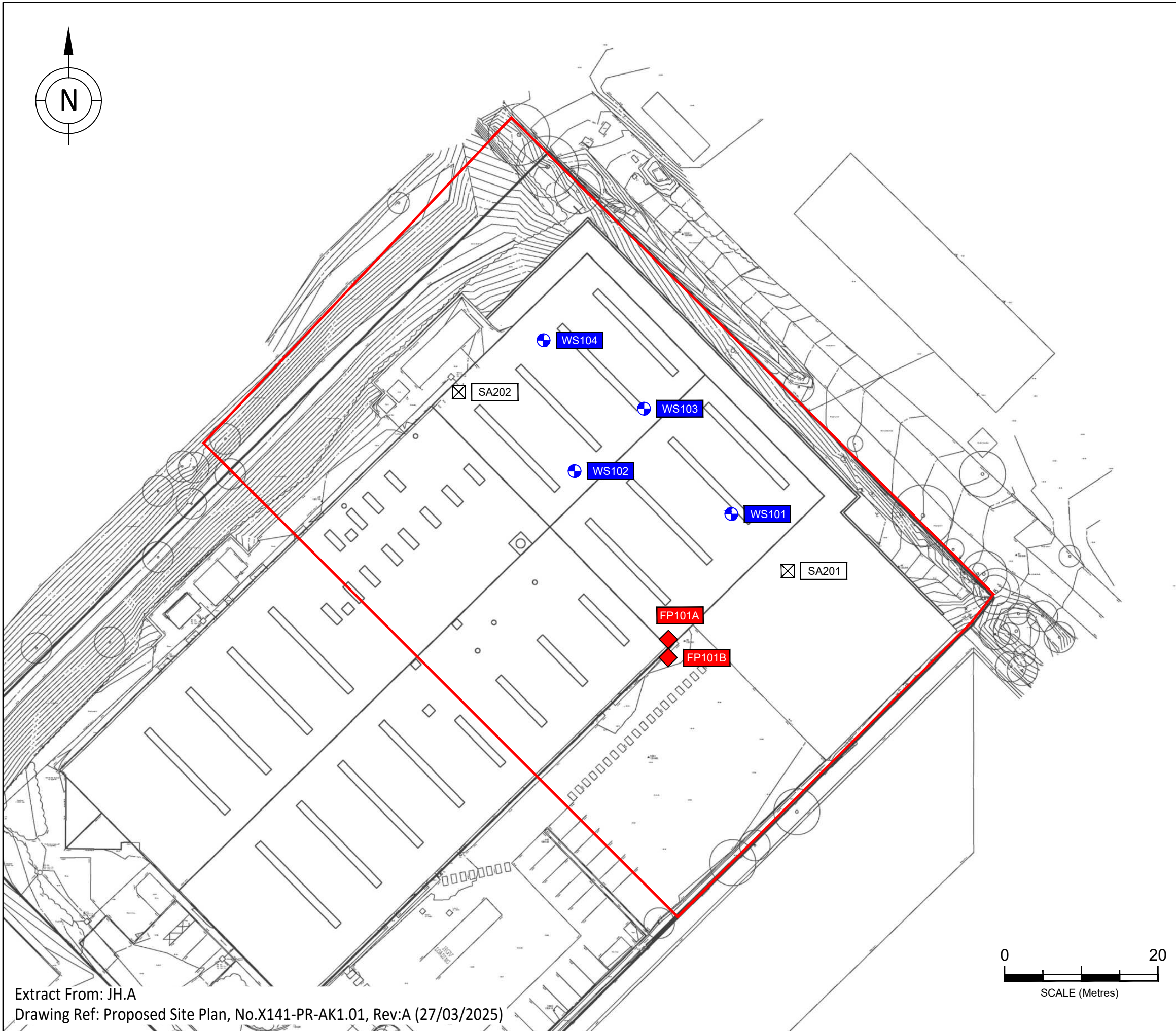
LK CONSULT

Client:
Fothergill Coated Fabrics

Site:
Riverside Drive, Rochdale

Title:
Proposed Development Plan

Job No.:	LKC251054	Scale (See Scale Bar):	1:500 @ A3	Figure:	2	Revision:	
Drawn By:	AC	Checked By:	MB	Drawn:	Apr 2025		



Extract From: JH.A
Drawing Ref: Proposed Site Plan, No.X141-PR-AK1.01, Rev:A (27/03/2025)

KEY

- Site Boundary
- Window Sample Borehole (WS)
- Foundation Inspection Pit (FP)
- Soakaway Test (SA)

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

Client: Fothergill Coated Fabrics Ltd			
Site: Riverside Drive, Rochdale			
Title: Site Investigation Location Plan			
Job No.: LKC251054	Scale (See Scale Bar): 1:500 @ A3	Figure: 3	Revision:
Drawn By: AC	Checked By: AE	Drawn: Apr 2026	

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 552⁴⁶. 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.

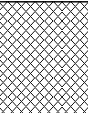
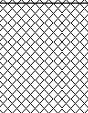
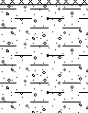
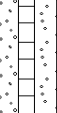
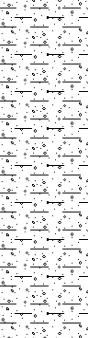
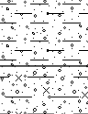
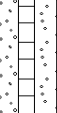
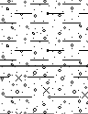
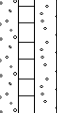
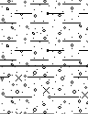
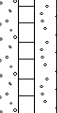
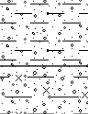
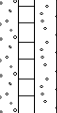
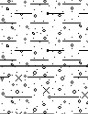
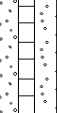
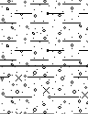
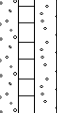
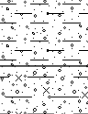
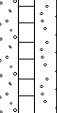
Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

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 Window Sample Borehole Log		Location Number: WS101					
Project Name: Riverside Drive, Rochdale		Client: Fothergill Coated Fabrics		Date: 06/03/2026			
Project No. : LKC251054		Contractor: D & I Drilling Ltd					
Equipment: Window Sample Rig: Competitor Dart		Level	Logged By AE	Scale 1:40	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	Level (m)	Water Strikes	Well
0.00-0.50 0.00-0.50	ES PID=0.2ppm	0.50		MADE GROUND: Grey sandy silty GRAVEL with abundant quarried stone, occasional concrete fragments, rare brick fragments and rare fabric. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising anthropogenic material.			
0.50-1.00 0.50-1.00 0.50-1.00	D ES PID=0.2ppm			0.49m to 0.50mbgl - Black geotextile membrane present.			
1.20 1.20	D N=17 (2,2/4,4,4,5)	1.00		MADE GROUND: Firm consistency grey gravelly slightly sandy CLAY with rare brick fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone and quartzite.	1		
1.50-2.00 1.50 1.50-2.00	D PP=122.6kPa PID=0.0ppm			Soft to stiff consistency low to high strength brownish grey gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone and quartzite.	2		
2.00 2.00	D N=15 (4,4/3,4,4,4)						
2.50-3.00 2.50	D PP=122.6kPa						
3.00 3.00	D N=10 (1,2/1,2,3,4)				3		
3.50-4.00 3.50	D PP=24.5kPa			3.50m to 4.00mbgl - Strata is soft consistency low strength.			
4.00 4.00	D N=23 (4,4/5,6,6,6)	4.00		Medium dense brown sandy silty clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.	4		
4.50-5.00	D						
5.00 5.00	D N=45 (11,9/10,10,12,13)	5.00		Very stiff consistency brown very gravelly sandy CLAY.	5		
		5.45		End of Borehole at 5.45m			
					6		
					7		
					8		
Remarks: Borehole stable. Perched water strike at 0.40mbgl.							

 LK CONSULT		Window Sample Borehole Log					Location Number: WS102	
Project Name: Riverside Drive, Rochdale			Client: Fothergill Coated Fabrics			Date: 06/03/2026		
Project No. : LKC251054			Contractor: D & I Drilling Ltd					
Equipment: Window Sample Rig: Competitor Dart			Level	Logged By AE	Scale 1:40	Page Number Sheet 1 of 1		
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Water Strikes	Well
0.00-0.50 0.00-0.50 0.00-0.50	D ES PID=0.4ppm	0.60		MADE GROUND: Grey sandy GRAVEL with abundant quarried stone and frequent brick fragments. Sand is fine to coarse. Gravel is fine to medium, subangular to subrounded comprising anthropogenic material.	1			
0.60-1.00 0.60-1.00 0.60-1.00	D ES PID=0.5ppm			MADE GROUND: Stiff brown very gravelly sandy CLAY with rare brick fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
1.20 1.20	D N=5 (1,1/1,1,1,2)	1.20		Soft to firm consistency low to medium strength gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.	2			
1.50-2.00 1.50 1.50-2.00	D PP=24.5kPa PID=0.0ppm	3.90		3.50m to 3.90mbgl - Strata is firm consistency medium strength				
2.00 2.00	D N=8 (1,1/2,2,2,2)			Medium dense brown very sandy slightly silty slightly clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.	3			
2.50-3.00 2.50	D PP=24.5kPa		3.50m to 3.90mbgl - Strata is firm consistency medium strength	4				
3.00	N=9 (1,1/2,2,2,3)		3.50m to 3.90mbgl - Strata is firm consistency medium strength	5				
3.50-3.90 3.50	D PP=49.0kPa		3.50m to 3.90mbgl - Strata is firm consistency medium strength	6				
4.00	N=28 (8,8/6,8,8,6)		3.50m to 3.90mbgl - Strata is firm consistency medium strength	7				
4.50-5.00	D		3.50m to 3.90mbgl - Strata is firm consistency medium strength	8				
5.00	N=27 (5,4/4,5,7,11)		3.50m to 3.90mbgl - Strata is firm consistency medium strength	End of Borehole at 5.45m				
		5.45						
Remarks: Borehole stable. Perched water strike at 0.40mbgl. Water strike at 2.00mbgl.								



LK CONSULT

Window Sample Borehole Log

Location Number:
WS103

Project Name: Riverside Drive, Rochdale

Client: Fothergill Coated Fabrics

Date: 06/03/2026

Project No. : LKC251054

Contractor: D & I Drilling Ltd

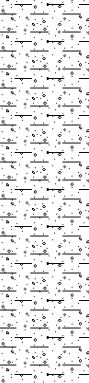
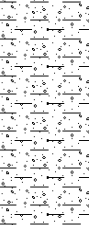
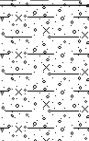
Equipment: Window Sample Rig: Competitor Dart

Level

Logged By
AE

Scale
1:40

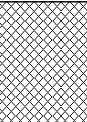
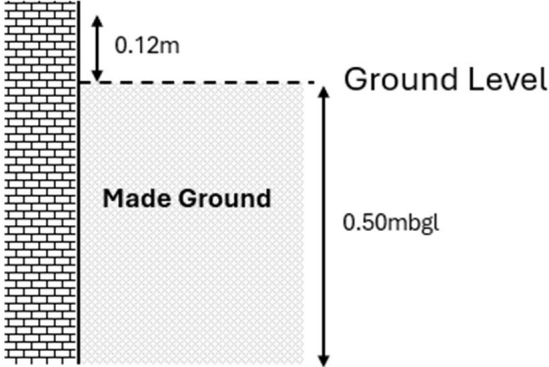
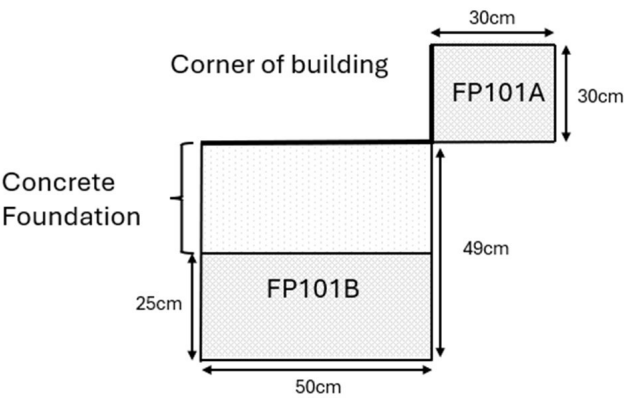
Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	Level (m)	Water Strikes
0.00-0.40	D	0.40		MADE GROUND: Grey sandy GRAVEL with abundant quarried stone and frequent brick fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising anthropogenic material.	1	
0.00-0.40	ES			Soft to firm consistency low to medium strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is is fine to coarse, subangular to subrounded comprising sandstone.		
0.00-0.40	PID=0.4ppm					
0.50-1.00	D					
0.50-1.00	ES					
0.60-1.00	PID=0.0ppm					
1.20	D	3.70		2.50m to 3.00mbgl - Strata is soft consistency, too soft for penetrometer readings.	2	
1.20	N=9 (2,2/2,2,2,3)					
1.50-2.00	D					
1.50	PP=61.3kPa					
2.00	D					
2.00	N=4 (1,1/1,1,1,1)					
2.50-3.00	D	3.70		3.00m to 3.70mbgl - Strata is firm consistency medium strength.	3	
3.00	D					
3.00	N=25 (2,2/4,5,7,9)					
3.50	PP=61.3kPa					
3.70-4.00	D					
4.00	N=50 (25 for 135mm/50 for 295mm)					
		4.43		End of Borehole at 4.43m	4	
					5	
					6	
					7	
					8	

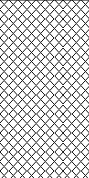
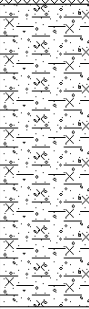
Remarks:

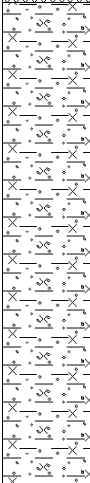
Borehole stable.
Perched water strike at 0.40mbgl.
Strata too soft for pocket penetrometer readings at 2.50mbgl.
SPT refusal at 4.43mbgl on sandstone cobble.

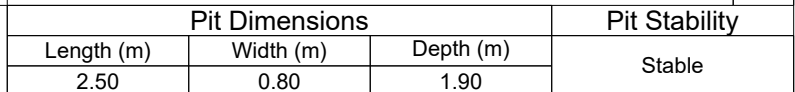
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 LK CONSULT		Trial Pit Log				Location Number: FP101A					
Project: Riverside Drive, Rochdale			Client: Fothergill Coated Fabrics			Date: 06/03/2026					
Project No. : LKC251054			Contractor: D & I Drilling Ltd								
Equipment: Hand Excavation Tools					Logged By AE		Scale 1:25		Page Number Sheet 1 of 1		
Depth (m)		Samples / Tests		Depth (m)		Legend		Stratum Description			
				0.40				MADE: Greyish brown sandy silty GRAVEL with abundant quarried stone, occasional brick fragments and concrete fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			
				0.50				MADE GROUND: Blackish brown sandy silty GRAVEL with frequent ash, occasional clinker, brick fragments and concrete fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			
								End of Trial Pit at 0.50m			
								0.5 1.0 1.5 2.0 2.5			
 0.12m Ground Level Made Ground 0.50mbgl						 Corner of building Concrete Foundation FP101A FP101B 30cm 30cm 25cm 50cm 49cm					
Pit Dimensions								Pit Stability			
Pit Length (m)		Pit Width (m)		Pit Depth (m)		Stable					
0.30		0.30		0.50							
Remarks: Pit dry.											

LK CONSULT		Trial Pit Log				Location Number: FP101B		
Project: Riverside Drive, Rochdale			Client: Fothergill Coated Fabrics			Date: 06/03/2026		
Project No. : LKC251054			Contractor: D & I Drilling Ltd					
Equipment: Hand Excavation Tools					Logged By AE	Scale 1:25	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	B ES			MADE: Greyish brown sandy silty GRAVEL with abundant quarried stone, occasional brick fragments and concrete fragments. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.				
0.50-0.90 0.50-0.90	B ES	0.40		MADE GROUND: Blackish brown sandy silty GRAVEL with frequent ash, occasional clinker, brick fragments, concrete fragments and rare fabric. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			0.5	
		0.90		End of Trial Pit at 0.90m			1.0	
							1.5	
							2.0	
							2.5	
Pit Dimensions						Pit Stability		
Pit Length (m)		Pit Width (m)		Pit Depth (m)		Stable		
0.50		0.50		0.90				
Remarks: Pit dry.								

LK CONSULT		Trial Pit Log				Location Ref: SA201	
Project: Riverside Drive, Rochdale			Client: Fothergill Coated Fabrics		Date: 31/03/2026		
Project No. : LKC251054			Contractor: H & C Plant Hire				
Equipment: Excavator: JCB 3CX				Logged By AE	Scale 1:25	Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description			
0.60-1.60	D	0.60		MADE GROUND: Grey sandy silty GRAVEL with abundant quarried stone, occasional concrete fragments, rare brick fragments and rare fabric. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising anthropogenic material.			0.5
		1.60		Firm consistency brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising sandstone.			1.0
End of Trial Pit at 1.60m						1.5	
						2.0	
						2.5	
						3.0	
						3.5	
						4.0	
						4.5	
			Pit Dimensions			Pit Stability	
			Length (m)	Width (m)	Depth (m)	Stable	
			2.00	0.70	1.60		
			Remarks:				
Soakaway undertaken between 0.80-1.60mbgl. Black membrane noted at 0.60mbgl.							

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	
1.00-1.90	D	0.30		MADE GROUND: Grey sandy silty GRAVEL with abundant quarried stone, occasional concrete fragments, rare brick fragments and rare fabric. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded comprising anthropogenic material.	
				Firm consistency brown slightly gravelly silty CLAY. Gravel is fine to coarse, subangular to subrounded comprising sandstone.	0.5 1.0 1.5
		1.90		End of Trial Pit at 1.90m	2.0 2.5 3.0 3.5 4.0 4.5



Soakaway undertaken between 0.90-1.90mbgl.

Appendix C – Certificates of Analysis (Soil)

Certificate of Analysis

Certificate Number 26-05682

Issued: 19-Mar-26

Client LK Consult Limited
Unit 29
Eton Business Park
Eton Hill Road
Radcliffe
Manchester
M26 2ZS

Our Reference 26-05682

Client Reference ~ LKC251054

Order No ~ PO-C002589

Contract Title ~ Riverside Drive, Rochdale

Description 6 Soil samples.

Date Received 10-Mar-26

Date Started 10-Mar-26

Date Completed 19-Mar-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 26-05682

Client Ref ~ LKC251054

Contract Title ~ Riverside Drive, Rochdale

Lab No	2653672	2653673	2653674	2653675	2653676	2653677
Sample ID ~	FP101B	WS101	WS102	WS102	WS103	WS104
Depth ~	0.50-0.90	0.50-1.00	0.00-0.50	1.20-1.65	0.00-0.40	0.00-0.50
Other ID ~						
Sample Type ~	ES	ES	ES	D	ES	ES
Sampling Date ~	06/03/2026	06/03/2026	06/03/2026	06/03/2026	06/03/2026	06/03/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Preparation									
Moisture Content	DETSC 1004	0.1	%	7.1	19	7.9		6.6	5.9
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	6.9	7.9	3.0		2.0	2.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.9	0.1	0.2		< 0.1	0.1
Chromium	DETSC 2301#	0.15	mg/kg	15	21	17		15	16
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	33	27	17		12	12
Lead	DETSC 2301#	0.3	mg/kg	57	25	15		8.1	7.6
Magnesium Aqueous Extract (2:1)	DETSC 2076*	10	mg/l				< 10		
Mercury	DETSC 2325#	0.05	mg/kg	0.12	< 0.05	< 0.05		< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17	21	23		21	23
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	19	25	16		14	15
Zinc	DETSC 2301#	1	mg/kg	78	60	68		50	55
Inorganics									
pH	DETSC 2008#		pH	8.1	8.0	8.8	8.4	8.8	8.9
Organic matter	DETSC 2002#	0.1	%	2.4	1.4	0.6		0.5	0.4
Chloride Aqueous Extract (2:1)	DETSC 2055	1	mg/l				8.1		
Nitrate Aqueous Extract as NO3 (2:1)	DETSC 2055	1	mg/l				< 1.0		
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	30	19	23	44	< 10	15
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	0.39	< 0.03	< 0.03		< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03		< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.69	0.03	< 0.03		< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.59	0.03	< 0.03		< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	3.7	0.16	0.06		< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	0.92	0.05	< 0.03		< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	4.3	0.32	0.07		< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	3.8	0.29	0.06		< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	1.5	0.10	0.03		< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	1.2	0.09	< 0.03		< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	1.5	0.11	0.03		< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.51	0.04	< 0.03		< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	1.1	0.07	< 0.03		< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.40	0.03	< 0.03		< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.09	< 0.03	< 0.03		< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.50	0.03	< 0.03		< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	21	1.2	0.26		< 0.10	< 0.10

Summary of Asbestos Analysis Soil Samples

Our Ref 26-05682

Client Ref ~ LKC251054

Contract Title ~ Riverside Drive, Rochdale

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2653672	FP101B 0.50-0.90	SOIL	NAD	none	Michael Kay
2653673	WS101 0.50-1.00	SOIL	NAD	none	Michael Kay
2653674	WS102 0.00-0.50	SOIL	NAD	none	Michael Kay
2653676	WS103 0.00-0.40	SOIL	NAD	none	Michael Kay
2653677	WS104 0.00-0.50	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 26-05682
 Client Ref ~ LKC251054
 Contract ~ Riverside Drive, Rochdale

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2653672	FP101B 0.50-0.90 SOIL	06/03/26	GJ 250ml, GJ 60ml, PT 1L		
2653673	WS101 0.50-1.00 SOIL	06/03/26	GJ 250ml, GJ 60ml, PT 1L		
2653674	WS102 0.00-0.50 SOIL	06/03/26	GJ 250ml, GJ 60ml, PT 1L		
2653675	WS102 1.20-1.65 SOIL	06/03/26	PT 1L		
2653676	WS103 0.00-0.40 SOIL	06/03/26	GJ 250ml, GJ 60ml, PT 1L		
2653677	WS104 0.00-0.50 SOIL	06/03/26	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

- ~ Sample details are provided by the client and can affect the validity of the results
- * -not accredited.
- # -MCERTS (accreditation only applies if report carries the MCERTS logo).
- \$ -subcontracted.
- n/s -not supplied.
- I/S -insufficient sample.
- U/S -unsuitable sample.
- t/f -to follow.
- nd -not detected.

End of Report Ver 26.03.14

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 25 1054, Riverside Drive, Rochdale

Job Number MRN 26004/24
Date of Issue 25 March 2026
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+A1:2021 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



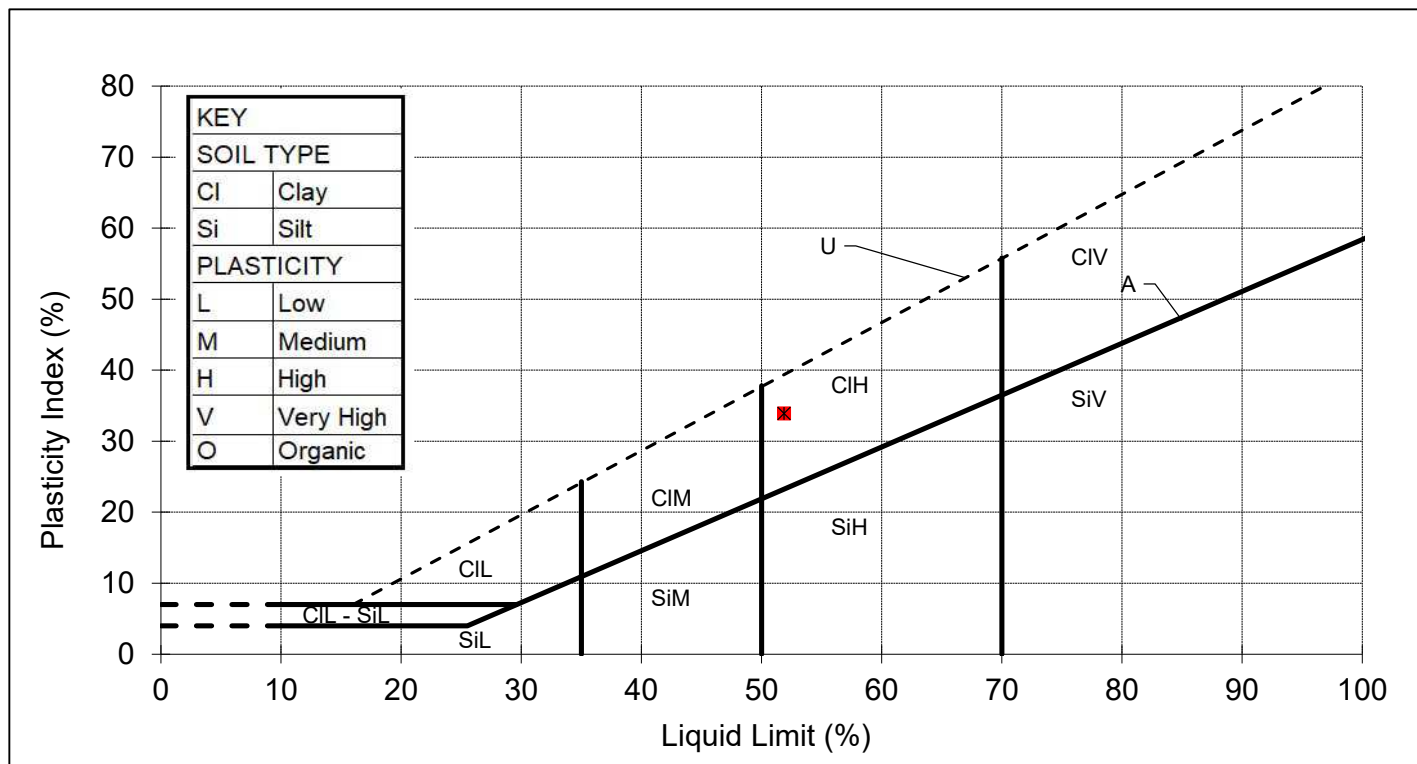
CLIENT	LK Consult Ltd
SITE	LKC 25 1054, Riverside Drive, Rochdale
JOB NUMBER	MRN 26004/24

SAMPLE LABEL	WS01 1.2-1.65m	DATE SAMPLED	06-Mar-26
SAMPLE No.	6048401	DATE RECEIVED	10-Mar-26
DATE TESTED	16-Mar-26	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Hand picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.8	52.6	0.987	
Determination 2 (avg)	20.8	52.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22.0	52	18	34	95



REMARKS

SIGNED

NAME

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

DATE

25-Mar-26

MURRAY RIX

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



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 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

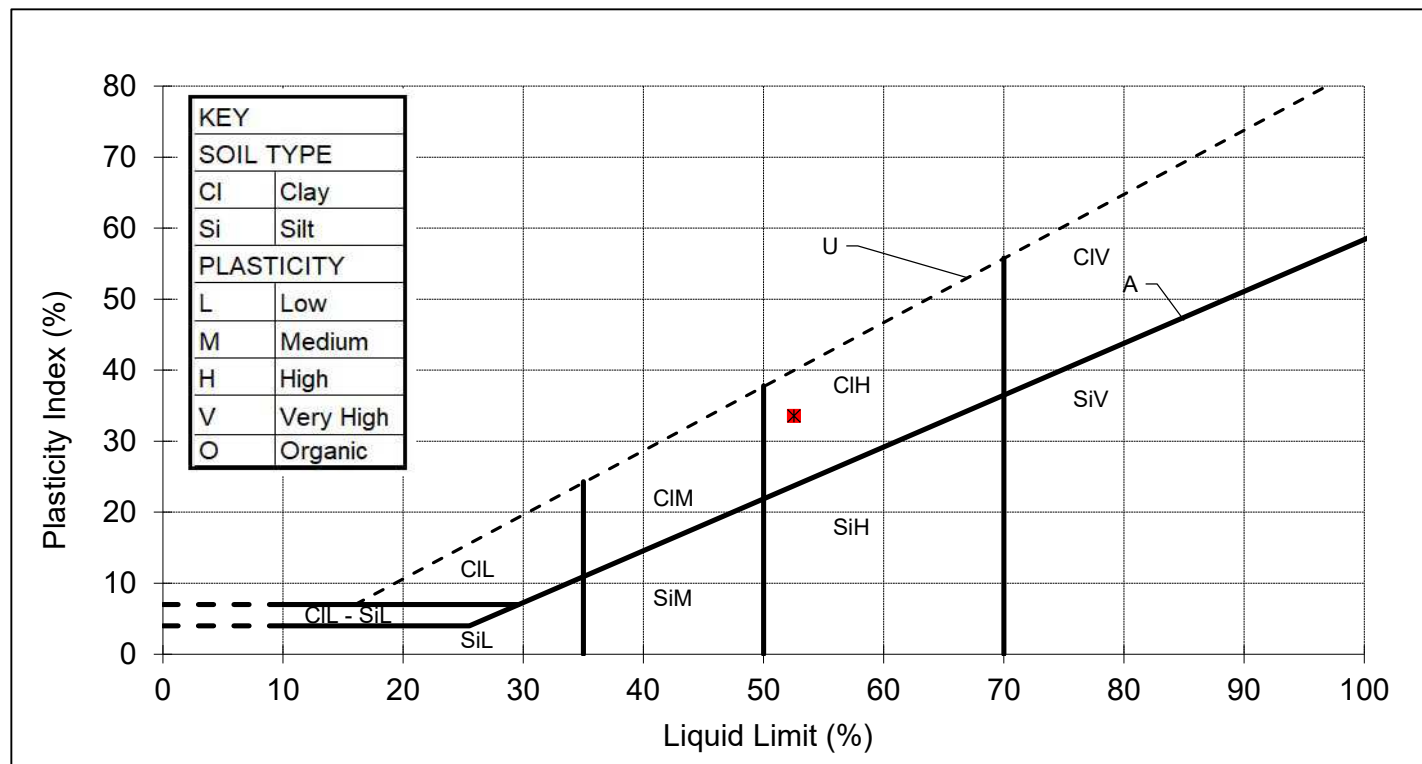
CLIENT	LK Consult Ltd
SITE	LKC 25 1054, Riverside Drive, Rochdale
JOB NUMBER	MRN 26004/24

SAMPLE LABEL	WS02 1.5-2.0m	DATE SAMPLED	06-Mar-26
SAMPLE No.	6048402	DATE RECEIVED	10-Mar-26
DATE TESTED	16-Mar-26	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Hand picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.6	52.1	1.007	
Determination 2 (avg)	19.6	52.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
31.3	53	19	34	98



REMARKS

SIGNED

NAME

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

DATE

25-Mar-26

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 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

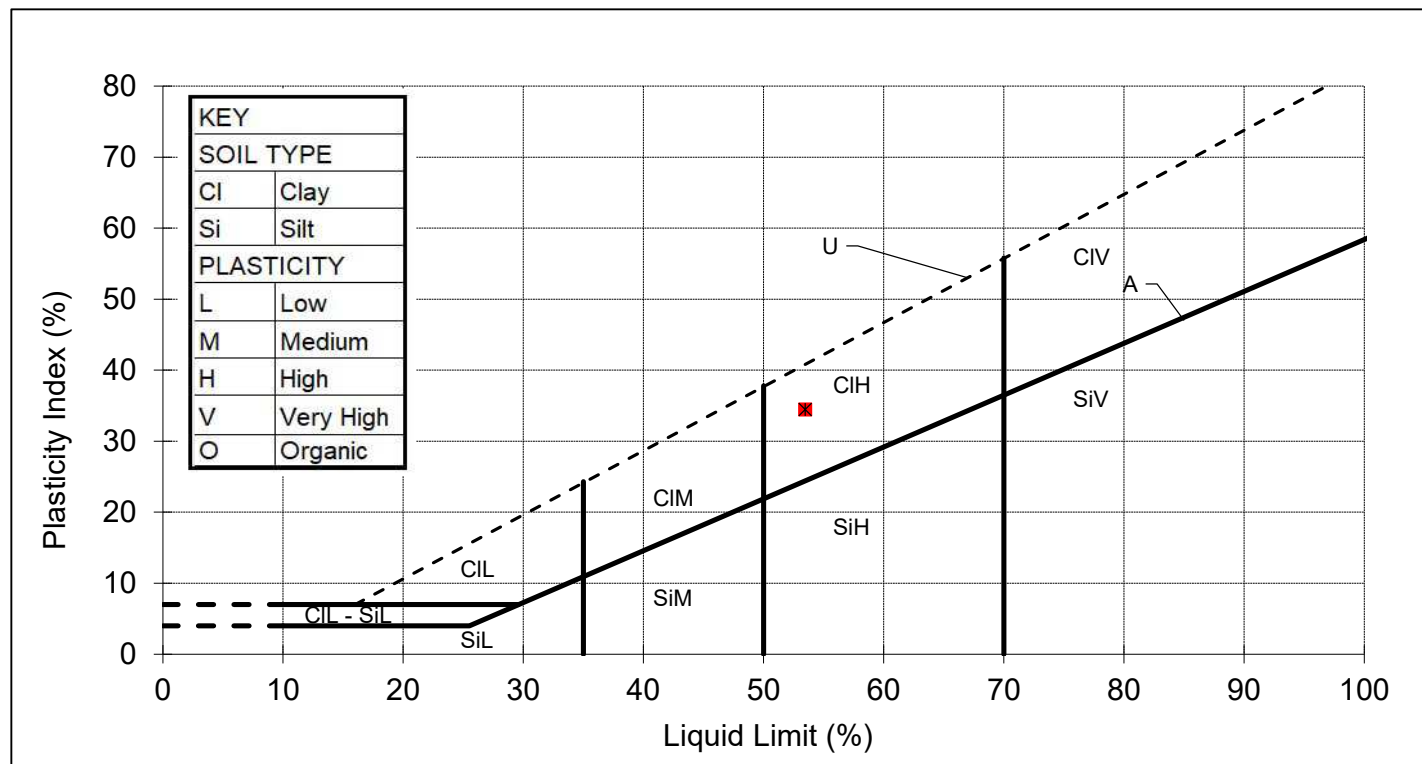
CLIENT	LK Consult Ltd
SITE	LKC 25 1054, Riverside Drive, Rochdale
JOB NUMBER	MRN 26004/24

SAMPLE LABEL	WS03 0.5-1.0m	DATE SAMPLED	06-Mar-26
SAMPLE No.	6048403	DATE RECEIVED	10-Mar-26
DATE TESTED	16-Mar-26	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Hand picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.8	54.2	0.987	
Determination 2 (avg)	20.8	54.1		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
30.6	53	19	34	94



REMARKS

SIGNED

NAME

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

DATE

25-Mar-26

MURRAY RIX

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



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 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

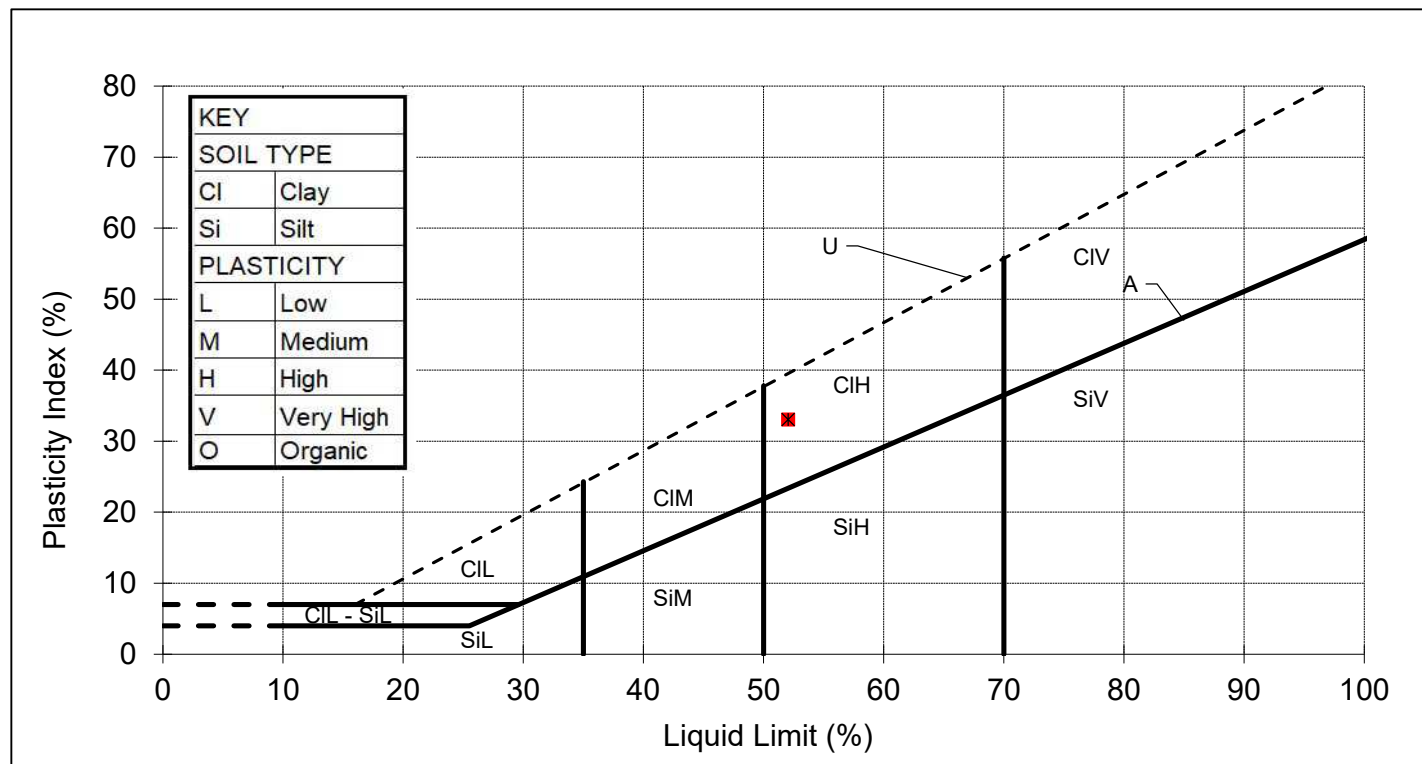
CLIENT	LK Consult Ltd
SITE	LKC 25 1054, Riverside Drive, Rochdale
JOB NUMBER	MRN 26004/24

SAMPLE LABEL	WS04 1.2-1.65m	DATE SAMPLED	06-Mar-26
SAMPLE No.	6048404	DATE RECEIVED	10-Mar-26
DATE TESTED	16-Mar-26	SAMPLED BY	Client

MATERIAL	Dark brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
PRE TREATMENT	As received	% RET. 425um BY	Hand picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.0	52.0	1.000	
Determination 2 (avg)	20.0	52.1		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
33.9	52	19	33	94



REMARKS

SIGNED

NAME

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

DATE

25-Mar-26

Appendix E – Gas Monitoring Results

 LK CONSULT	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 1 of 4
		Site Name	Riverside Drive	Recent Weather	Sunny	
		Job Number	LKC251054	Ground Conditions	Dry	
		Engineer	AP	Approx. Air temperature (°C)	16°C	
		Date	19/03/2026	Atmospheric Pressure (Prev. 24 hrs)	Rising	

Site Monitoring	BH Ref.	WS101	WS102	WS104												
	Time	09:03:36	09:31:35	09:45:57												
	Barometric Pressure (mb)	1014	1014	1034												
	Relative Pressure (mb)	0.69	-10.64	-0.04												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	-0.1	-2.1	-0.1												
	Peak Flow (l/hr)	0	-2.2	0												
	Steady CH ₄ (%v/v)	0	0	0												
	Peak CH ₄ (%v/v)	0	0	0												
	% LEL ²	0	0	0												
	Steady CO ₂ (%v/v)	0.1	4.3	0.8												
	Peak CO ₂ (%v/v)	0.1	4.3	0.8												
	Steady O ₂ (%v/v)	20.6	5.5	20.5												
	Min O ₂ (%v/v)	20.4	5.5	20.3												
	Balance (%)	79.3	90.2	78.7												
	Steady CO (ppm)	0	0	0												
	Peak CO (ppm)	0	0	0												
	Steady H ₂ S (ppm)	0	0	0												
	Peak H ₂ S (ppm)	0	0	0												
	Steady PID (ppm)	0	0.6	0												
	Max PID (ppm)	0	0.8	0												
	Standing Water Level (mbgl)	4.3	Dry	4.35												
	Installation Base Depth (mbgl)	4.37	3.97	4.5												
	Response Zone/Strata	1-5m	2-4m	1-4m												
	Comments															

Equipment			ABBREVIATIONS			NOTES	
Gas Machine	Gas Analyser GA5000		ND	Not detected	ppm	Parts per million	All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665. ¹ Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates. ² CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4. ³ Flow readings are based on steady 1 minute value where flow is detected (equipment range of +/- 12 ltr/hr).
	G502417		NR	Not recorded	mb	Millibars	
Dipmeter	Geotech Oil-in-Water Interface Meter		UR	Unable to record	l/hr	Litres per hour	
	HT-01		OS	Off recordable scale	mbgl	Metres below ground level	
PID	Mini Rae Lite+ PGM7300		N/A	Not applicable	LEL	Lower explosive limit in air	
	590-913892						

	LK CONSULT LTD	Site Details		Monitoring Visit Conditions		Visit No.
	GAS MONITORING RECORD	Site Name	Riverside Drive	Recent Weather	Sunny	2
		Job Number	LKC251054	Ground Conditions	Damp	of
		Engineer	AP	Approx. Air temperature (°C)	11°C	4
		Date	31/03/2026	Atmospheric Pressure (Prev. 24 hrs)	Rising	

Site Monitoring	BH Ref.	WS101	WS102	WS104												
	Time	08:39:39	09:02:51	09:10:47												
	Barometric Pressure (mb)	1014	1014	1014												
	Relative Pressure (mb)	-9.42	-10.76	-9.31												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	-1.5	-1.6	-1.7												
	Peak Flow (l/hr)	-1.5	-1.6	-1.7												
	Steady CH ₄ (%v/v)	0	0	0												
	Peak CH ₄ (%v/v)	0.1	0	0												
	% LEL ²	0	0	0												
	Steady CO ₂ (%v/v)	0.8	5.1	2.4												
	Peak CO ₂ (%v/v)	0.8	5.1	2.5												
	Steady O2 (%v/v)	20.1	6.3	19.6												
	Min O ₂ (%v/v)	20.1	6.3	19.1												
	Balance (%)	79.1	88.6	78												
	Steady CO (ppm)	1	1	0												
	Peak CO (ppm)	1	1	0												
	Steady H ₂ S (ppm)	0	0	0												
	Peak H ₂ S (ppm)	0	0	0												
	Steady PID (ppm)	NR	NR	NR												
	Max PID (ppm)	NR	NR	NR												
	Standing Water Level (mbgl)	4.25	3.94	4.5												
	Installation Base Depth (mbgl)	4.37	3.94	4.58												
	Response Zone/Strata	1-5m	2-4m	1-4m												
	Comments															
Equipment							ABBREVIATIONS						NOTES			
Gas Machine	Gas Analyser GA5000						ND	Not detected		ppm	Parts per million		All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.			
	G502417						NR	Not recorded		mb	Millibars					
Dipmeter	HydroTechnik						UR	Unable to record		l/hr	Litres per hour		¹ Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.			
	HT-01						OS	Off recordable scale		mbgl	Metres below ground level					
PID	-						N/A	Not applicable		LEL	Lower explosive limit in air		² CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4. ³ Flow readings are based on steady 1 minute value where flow is detected (equipment range of +/- 12 ltr/hr).			
	0															

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

 LK CONSULT	LK CONSULT LTD	Site Details		Monitoring Visit Conditions		Visit No.
	GAS MONITORING RECORD	Site Name	Riverside Drive	Recent Weather	Overcast	3
		Job Number	LKC251054	Ground Conditions	Damp	of
		Engineer	AP	Approx. Air temperature (°C)	10°C	4
		Date	16/04/2026	Atmospheric Pressure (Prev. 24 hrs)	Falling then rising	

Site Monitoring	BH Ref.	WS101	WS102	WS104													
	Time	09:03:47	09:12:22	09:26:20													
	Barometric Pressure (mb)	999	999	999													
	Relative Pressure (mb)	-1.68	-0.02	-8.39													
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	-1.4	-1.5	-1.7													
	Peak Flow (l/hr)	-1.4	-1.5	-1.7													
	Steady CH ₄ (%v/v)	0	0	0													
	Peak CH ₄ (%v/v)	0.1	0	0													
	% LEL ²	0	0	0													
	Steady CO ₂ (%v/v)	3	5.9	0.1													
	Peak CO ₂ (%v/v)	3	5.9	0.6													
	Steady O2 (%v/v)	16.7	5.5	20.4													
	Min O ₂ (%v/v)	16.7	5.5	19.6													
	Balance (%)	80.3	88.6	79.5													
	Steady CO (ppm)	1	1	1													
	Peak CO (ppm)	1	1	1													
	Steady H ₂ S (ppm)	0	0	0													
	Peak H ₂ S (ppm)	0	0	0													
	Steady PID (ppm)	N/A	N/A	N/A													
	Max PID (ppm)	N/A	N/A	N/A													
	Standing Water Level (mbgl)	4.26	3.94	4.36													
	Installation Base Depth (mbgl)	4.39	3.95	4.6													
	Response Zone/Strata	1-5m	2-4m	1-4m													
	Comments																
Equipment							ABBREVIATIONS						NOTES				
Gas Machine	Gas Analyser GA5000						ND	Not detected			ppm	Parts per million		All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.			
	G502417						NR	Not recorded			mb	Millibars					
Dipmeter	HydroTechnik						UR	Unable to record			l/hr	Litres per hour		¹ Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.			
	HT-01						OS	Off recordable scale			mbgl	Metres below ground level					
PID	-						N/A	Not applicable			LEL	Lower explosive limit in air		² CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4. ³ Flow readings are based on steady 1 minute value where flow is detected (equipment range of +/- 12 ltr/hr).			
	0																

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

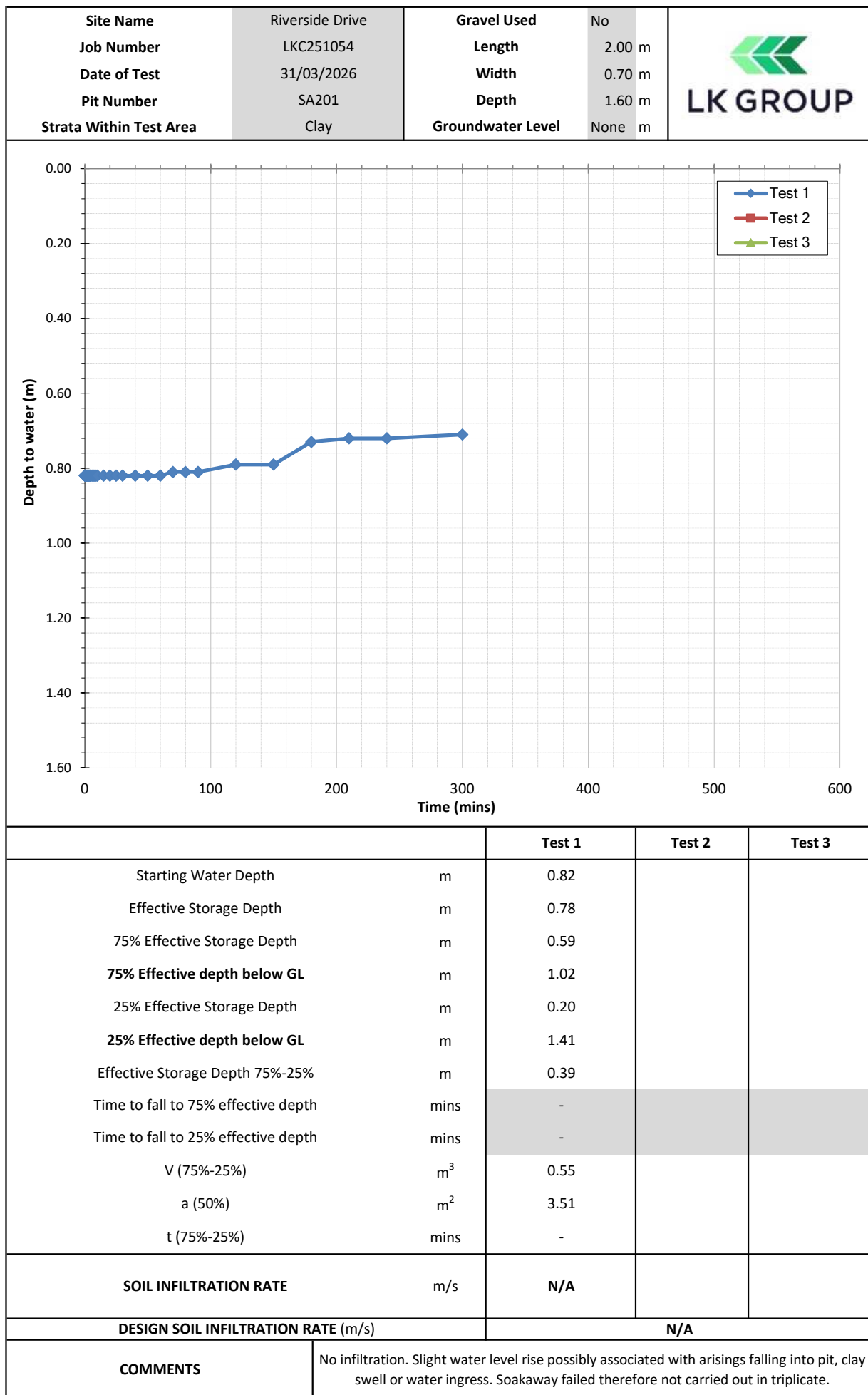
	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 4 of 4
		Site Name	Riverside Drive	Recent Weather	Sunny, no wind	
		Job Number	LKC251054	Ground Conditions	Dry	
		Engineer	AP	Approx. Air temperature (°C)	20°C	
		Date	01/05/2026	Atmospheric Pressure (Prev. 24 hrs)	Falling	

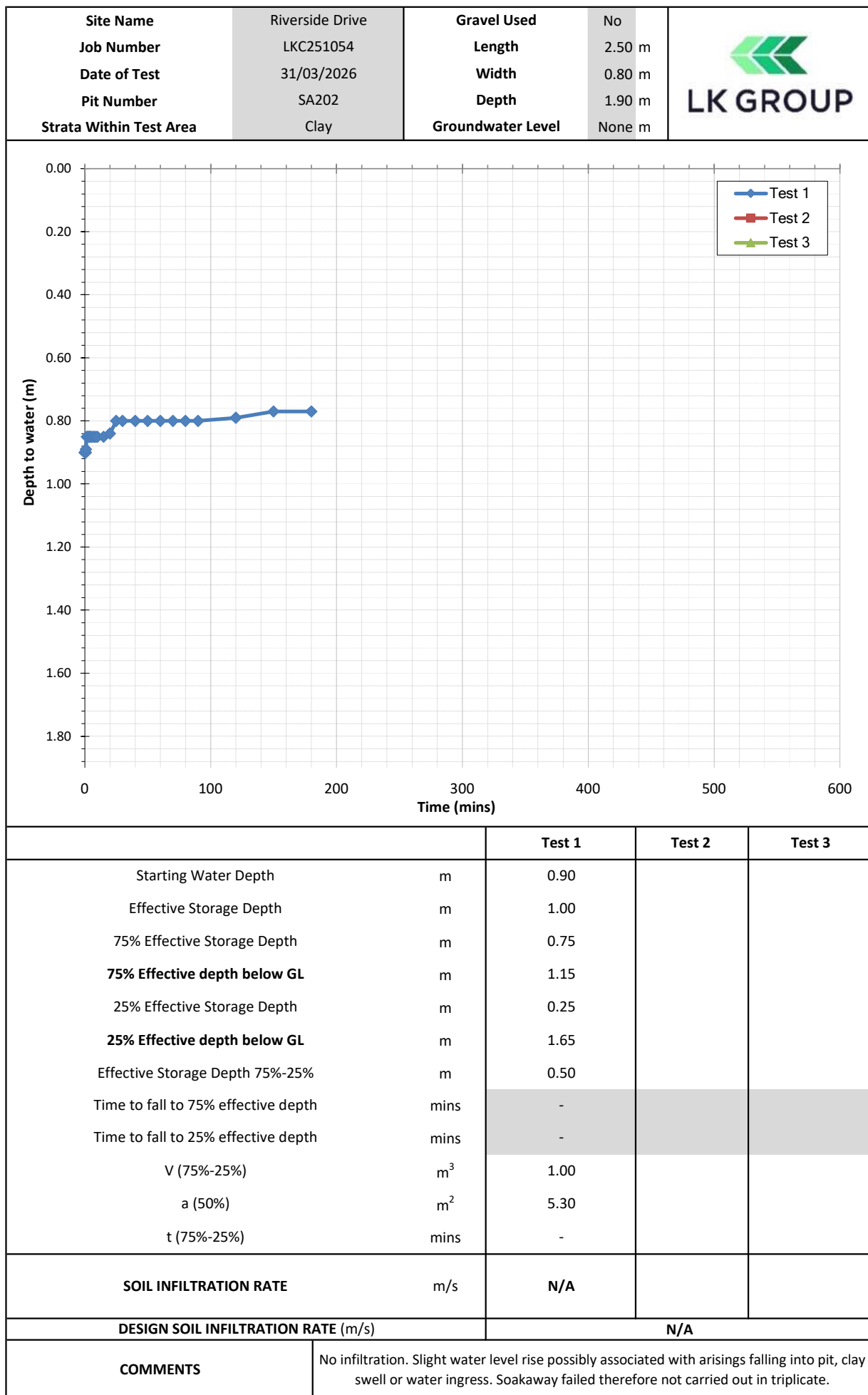
Site Monitoring	BH Ref.	WS101	WS102	WS104												
	Time	NR	NR	NR												
	Barometric Pressure (mb)	1001	1001	1001												
	Relative Pressure (mb)	0	0	0												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	-1.4	-1.5	-1.7												
	Peak Flow (l/hr)	-1.4	-1.5	-1.7												
	Steady CH ₄ (%v/v)	0	0	0												
	Peak CH ₄ (%v/v)	0	0	0												
	% LEL ²	0	0	0												
	Steady CO ₂ (%v/v)	0	0	0												
	Peak CO ₂ (%v/v)	2.8	6.6	4.2												
	Steady O ₂ (%v/v)	18.9	12.6	16.8												
	Min O ₂ (%v/v)	18.9	12.6	16.8												
	Balance (%)	78.3	80.8	79												
	Steady CO (ppm)	0	0	0												
	Peak CO (ppm)	0	0	0												
	Steady H ₂ S (ppm)	0	0	0												
	Peak H ₂ S (ppm)	0	0	0												
	Steady PID (ppm)	NR	NR	NR												
	Max PID (ppm)	NR	NR	NR												
	Standing Water Level (mbgl)	Dry	Dry	Dry												
	Installation Base Depth (mbgl)	4.54	4.04	4.58												
	Response Zone/Strata	1-5m	2-4m	1-4m												
	Comments															

Equipment		ABBREVIATIONS			NOTES
Gas Machine	GFM 436 Gas Analyser	ND	Not detected	ppm	Parts per million
		NR	Not recorded	mb	Millibars
Dipmeter	Geotech Oil-in-Water Interface Meter 1-800-833-7958	UR	Unable to record	l/hr	Litres per hour
		OS	Off recordable scale	mbgl	Metres below ground level
PID	-	N/A	Not applicable	LEL	Lower explosive limit in air

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.
¹Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.
²CH₄ is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH₄.
³Flow readings are based on steady 1 minute value where flow is detected (equipment range of +/- 12 ltr/hr).

Appendix F – Soakaway Tests





Appendix G – Generic Assessment Criteria Values

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}	Source
Metals	Inorganic Arsenic	N/A	37	40	49	640	79	168	DEFRA C4SL
	Beryllium	N/A	1.7	1.7	35	12	2.2	63	LQM S4UL
	Boron	N/A	290	11,000	45	240,000	21,000	46,000	LQM S4UL
	Cadmium	N/A	26	149	4.9	410	220	880	DEFRA C4SL
	Chromium (III)	N/A	910	910	18,000	8,600	1,500	33,000	LQM S4UL
	Chromium (VI)	N/A	21.0	21.0	170.0	49	23.0	250	DEFRA C4SL
	Copper	N/A	2,400	7,100	520	68,000	12,000	44,000	LQM S4UL
	Lead	N/A	200	310	80	2,330	630	1,300	DEFRA C4SL
	Elemental Mercury	N/A	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}	LQM S4UL
	Inorganic Mercury	N/A	40	56	19	1,100	120	240	LQM S4UL
	Methylmercury	N/A	11	15	6.0	320	40	68	LQM S4UL
	Nickel	N/A	130	180	53	980	230	800	LQM S4UL
	Selenium	N/A	250	430	88	12,000	1,100	1,800	LQM S4UL
Polycyclic Aromatic Hydrocarbons (PAHs)	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
	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	1600 f	11000 f	800 f	C4SL
		2.5%	36	36	130	3700 f	15000 f	1200 f	C4SL
		6%	85	85	200	8400 f	17000 f	1900 f	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%	0.087	0.38	0.017	27	72	90	LQM S4UL
		2.5%	0.17	0.70	0.034	47	72	100	LQM S4UL
		6%	0.37	1.4	0.075	90	73	110	LQM S4UL
		6%	0.87	3.3	0.180	98	140	230	C4SL
	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) ^{vap}	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
Petroleum Hydrocarbons	Aliphatic								
	EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304) ^{sol}	95,000 (304) ^{sol}	LQM S4UL
	EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}	LQM S4UL
	EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}	LQM S4UL
	EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}	LQM S4UL
	EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}	LQM S4UL
	EC>16-35	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL
	EC>35-44	1%	65,000 (8.48)	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f	LQM S4UL
	Aliphatic								
	EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}	LQM S4UL
	EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}	LQM S4UL
	EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}	LQM S4UL
	EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}	LQM S4UL
	EC>12-16	2.5%	2,400 (59) ^{sol}	2,400 (59) ^{sol}	13,000	82,000 (59) ^{sol}	13,000	25,000 (59) ^{sol}	LQM S4UL
	EC>16-35	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL
	EC>35-44	2.5%	92,000 (21)	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f	LQM S4UL
	Aliphatic								
	EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150) ^{sol}	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) ^{vap}	LQM S4UL
	EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}	LQM S4UL
	EC>10-12	6%	380	1,200	4	34,000 (2,150) ^{sol}	5,000	10,000	LQM S4UL
	EC>12-16	6%	660	2,500	130	38,000	5,100	10,000	LQM S4UL
	EC>16-21	6%	930 ^f	1,900 ^f	260 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
	EC>21-35	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL
	EC>35-44	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL
	Aliphatic +Aromatic >EC44	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
		2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f	LQM S4UL
		6%	1,900 ^f	1,900 ^f	3,000 ^f	28,000 ^f	3,800 ^f	7,900 ^f	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}	Source
Chloalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	0.11	0.16	0.05	12.0	300	300	DEFRA C4SL
		2.5%	0.18	0.24	0.10	17.0	310	330	DEFRA C4SL
		6%	0.31	0.41	0.19	29.0	310	330	DEFRA C4SL
	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
	Endosulfanns (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300	LQM S4UL
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400	LQM S4UL
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500	LQM S4UL
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15	LQM S4UL
		2.5%	0.2	3.8	3.2E-02	65	8.1	15	LQM S4UL
		6%	0.46	3.8	7.7E-02	65	8.1	16	LQM S4UL
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}	LQM S4UL
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}	LQM S4UL
		6%	2.4	2.4	32	290	14,000	2,900	LQM S4UL
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}	LQM S4UL
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}	LQM S4UL
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}	LQM S4UL
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}	LQM S4UL
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}	LQM S4UL
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}	LQM S4UL
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}	LQM S4UL
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120	LQM S4UL
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130	LQM S4UL
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190	LQM S4UL
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190	LQM S4UL
		6%	22	38	7.0	830	100	190	LQM S4UL
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30	LQM S4UL
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30	LQM S4UL
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30	LQM S4UL

Generic Assessment Criteria Values

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}	Source
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100	LQM S4UL
		2.5%	2.0	150	0.30	4,000	620	1,100	LQM S4UL
		6%	4.5	210	0.70	4,300	620	1,100	LQM S4UL
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110	LQM S4UL
		2.5%	0.52	29	8.0E-02	400	60	120	LQM S4UL
		6%	1.2	31	0.19	400	60	120	LQM S4UL
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300	LQM S4UL
		2.5%	0.29	0.29	10	22	11,000	1,900	LQM S4UL
		6%	0.62	0.62	23	47	11,000	2,700	LQM S4UL
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48	LQM S4UL
		2.5%	0.7	0.78	0.61	66	25	50	LQM S4UL
		6%	1.6	1.8	1.4	120	25	51	LQM S4UL
	Phenol	1%	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)
f=naphthalene is based on comparison of inhalation exposure with TDI(inhal) for localised effect
f = oral, dermal and inhalation exposures compared to oral HCV
dir = S4ULs based on threshold protective of direct skin contact with phenol)brackets long term exposure for illustration purposes)
g = derived based on 2,3,4-tetrachlorophenol

Appendix H – References

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