

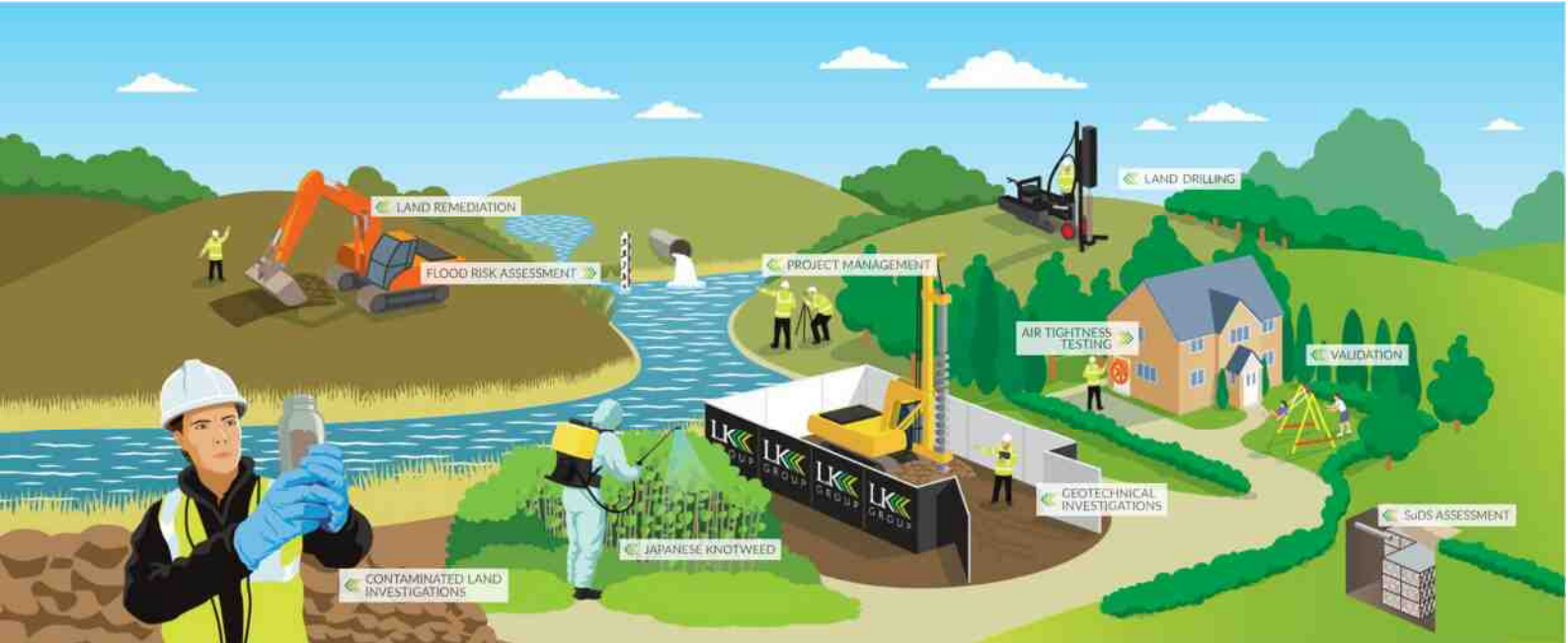
Tetrosyl Ltd,
Bury

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

Job Number: LKC 23 1650
Date: January 2024
Client: Tetrosyl Group Ltd



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EXECUTIVE SUMMARY

Site Details

Location	Tetrosyl Group, Bridge Hall Lane, Bury, BL9 7NZ Centred at National Grid Reference 382870E 410870N.
Area	4,300m ² .
Topography	86-90 metres above ordnance datum (AOD). Site has a moderate slope down to the southwest.
Current Site Use	Vacant land north of Tetrosyl warehouses, east of Bridge Hall Lane.
Proposed Development	Construction of Pump Room, 2no. Sprinkler Tanks and a GRP Kiosk.

Site Setting

Main Historical Features	Onsite: Mill Buildings, Electrical Substation, Road. Surrounding Area: Bridge Hall Paper Mill, Tetrosyl Works, Reservoir, Filter Beds, Electrical Substation
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial Alluvium (Clay, Silt, Sand and Gravel) Secondary undifferentiated aquifer. Diamicton Till, Secondary A Aquifer. Bedrock: Lower Coal Measures. Secondary A Aquifer.
Landfills / Infilled Ground	Landfills recorded in the vicinity. Potentially infilled ground identified.
Other Relevant Environmental Settings etc.	The site is within a development high risk area. A coal mining risk assessment has been carried out under separate cover. Further assessment is required.
Site Reconnaissance	Manholes and service entries identified in proximity to road.
Recommendations	Site Investigation was recommended to further assess geo-environmental risk.

Ground Investigation Work Undertaken

Date of Investigation:	12 th December 2023 to 8 th February 2024
Intrusive Investigation Work Undertaken:	5no. mechanically excavated trial pits. 4no. cable percussion boreholes. 3no. rotary open hole boreholes. Contamination and geotechnical testing. Gas monitoring. Groundwater monitoring.

Ground Conditions

Made Ground	Made ground was recorded from 0.00mbgl to 7.200mbgl, except from anthropogenic material encountered, no further contamination identified.
Superficial	Superficial comprised light brown gravelly clay was located in 2no. boreholes ref: (RH102A & RH103A) between 4.50mbgl to 6.20mbgl.
Bedrock	Bedrock was encountered at depths of 5.20mbgl to 7.20mbgl comprising light grey mudstone. Rotary boreholes were drilled to 40.00mbgl.
Groundwater	No groundwater encountered within ref: (CP101-CP104, TP101-TP105 & RH101-RH103).
Obstructions	Obstructions located in TP101-TP104 consisting of boulder sized concrete. Concrete slab was observed within CP102 to CP104, chiselled for 2.5-3.5 hours to advance borehole.

Geotechnical Assessment

Allowable Pressure	Bearing	No reliance can be placed on the made ground deposits. Based on guidance contained in BS8004:1986, Mudstone should return a safe bearing capacity of 600kN/m ² .
Anticipated Type	Foundation	It is considered that a piled, or ground improvement solution will provide the most reliable foundation option.
Shallow Groundwater		None encountered during siteworks. Subsequent monitoring recorded shallow groundwater withing CP104 at depths between 3.55m and 3.73mbgl.
Concrete Requirements		Based on BRE Digest 20051 – DS-1 AC-1 recommended.
Services		Services – consideration to the presence of services running through the site. Services may need to be re-routed.
Coal Mining		Rotary boreholes were advanced to a depth of 40mbgl and did not record any voids or coal seams which may be indicative of potential shallow mine workings. All boreholes maintained 100% flush returns with the exception of RH103A which returned 50% flush between 10m and 20mbgl, this is considered likely due to encountering a fissure in which the flush made its way into the nearby monitoring borehole installed previously during the Dunelm investigation.
Temporary excavation	support of	May be required; however, trial pits were generally recorded as stable.

Contamination Risk Assessment

PL	Contaminant	Risk	Recommendations
	Asbestos, heavy metals, sulphates, PAHs, petroleum hydrocarbons, other organic / inorganic contaminants (made ground, paper mill)	–	
2	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks, surrounding industrial use)	Moderate / Low	No remediation required.
3	Hazardous / ground gas: methane, carbon dioxide (landfills/offsite potentially infilled features within 250m, deep made ground, Pennine Lower Coal Measures)	Moderate / Low	No remediation required.
4	Chlorinated organic solvents, PAHs, metals, petroleum hydrocarbons (made ground, paper mill, works, tanks, surrounding industrial use)	Moderate / Low	No remediation required.
5	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks)	–	

Waste Assessment

The results show that all the samples tested are classified as non-hazardous for disposal.

Recommendations and Outline Remedial Strategy

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

Other Considerations
Unexpected Contamination
Grubbing Out of Inground Structures
Re-use of site generated material
Stockpile Management
Disposal
Control of Water
Health and Safety Considerations
Asbestos Survey
Piling in Contaminated Land
Asbestos Management Plan
Soil Validation
Site Completion Report

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Figure 3 – Site Investigation Location Plan

APPENDICES

Appendix A – Risk Matrix

Appendix B – Profile Logs

Appendix C – Certificates of Analysis (Soil)

Appendix D – Certificates of Analysis (Geotechnical)

Appendix F – Gas Monitoring Results

Appendix H – Generic Assessment Criteria Values

Appendix I – Comparison Output Sheets

Appendix J – Hazard Index Sheets

Appendix K – References

1. Introduction

1.1. Background

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

The following work has previously been undertaken:

- Factual Report for Site Investigation, undertaken by Dunelm Geotechnical and Environmental (Ref: M1203, dated 24th May 2023).
- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: LKC 23 1650, dated 09-01-24).
- Coal Mining Risk Assessment (CMRA) report, undertaken by LKC (Ref: LKC 23 1650, dated 12-01-24)

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

The investigation will aim to confirm the risks of the potential pollutant linkages identified in the PRA and recommend further assessment / remediation, as required. This investigation also comprised rotary boreholes to assess the potential for unrecorded shallow coal workings to be present below the site.

The aims of this report are also to establish the feasibility of developing this site, to demonstrate to the Local Planning Authority that in accordance with the National Planning Policy Framework (NPPF)² the site may be developed for the intended end use and that appropriate site investigation and risk assessment works are in place to allow conditional approval of any future planning application.

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

Location	Tetrosyl Group, Bridge Hall Lane, Bury, BL9 7NZ Centred at National Grid Reference 382870E 410870N.
Area	4,300m ² .
Topography	86-90 metres above ordnance datum (AOD). Site has a moderate slope down to the southwest.
Current Site Use	Vacant land north of Tetrosyl warehouses, east of Bridge Hall Lane.
Proposed Development	Construction of Pump Room, 2no. Sprinkler Tanks and a GRP Kiosk.

Table 1-1: Summary of site details.

2. Summary of Previous Work and 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: Mill Buildings, Electrical Substation, Road. Surrounding Area: Bridge Hall Paper Mill, Tetrosyl Works, Reservoir, Filter Beds, Electrical Substation
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial Alluvium (Clay, Silt, Sand and Gravel) Secondary undifferentiated aquifer. Diamicton Till, Secondary A Aquifer. Bedrock: Lower Coal Measures. Secondary A Aquifer.
Landfills / Infilled Ground	3no. Landfills • Prettywood Sand Quarry (79m E) • Prettywood West Extension Landfill Site (79m E) • Bury New Road (135m E) 2no. Infilled land (non-water and water) • 40m NW • 41m NW.
Other Relevant Environmental Settings etc.	The site is within a development high risk area. A coal mining risk assessment has been carried out under separate cover. Further assessment is required.
Site Reconnaissance	Manholes and service entries identified in proximity to road.

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

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

Coal Mining	A coal mining risk assessment has been carried out under separate cover. Intrusive Shallow Mining Investigation required to confirm the instability risk.
Slope Stability	Further assessment is required to confirm the instability risk.
Made Ground	Deep made ground present on site, consisting of demolition waste.
Superficial	Unknown strength of soils for foundation design.
Bedrock	Mudstone bedrock reported at 5.50mbgl by previous ground investigation.
Groundwater	Unknown depth and variability of groundwater.
Plasticity	Plasticity of clay deposits should be confirmed.
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. Previous Site Investigations

Dunelm Geotechnical and Environmental undertook a site investigation on the 17th and 18th of April 2023. Work consisted of one cable percussive borehole with rotary follow on, in order to determine the nature, thickness and engineering parameters of the made ground and natural deposits, and to recover samples of the strata for geotechnical laboratory testing.

2.3. Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM³ 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 C552⁴. The risk matrix is provided in Appendix A.

PL	Contaminants of Concern (source)	Pathway	Receptor	Probability	Consequence	Risk
1	Asbestos, heavy metals, sulphates, PAHs, petroleum hydrocarbons, other organic / inorganic contaminants (made ground, paper mill)	No viable pathways (dermal contact, inhalation, ingestion).	-			
2	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks, surrounding industrial use)	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users	Low Likelihood	Medium	Moderate / Low
3	Hazardous / ground gas: methane, carbon dioxide (landfills/offsite potentially infilled features within 250m, deep made ground, Pennine Lower Coal Measures)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings.	Low Likelihood	Severe	Moderate
4	Chlorinated organic solvents, PAHs, metals, petroleum hydrocarbons (made ground, paper mill, works, tanks, surrounding industrial use)	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Likely	Medium	Moderate
5	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks)	No viable pathways (potable pipework not expected)	-			

Table 2-3: Preliminary Contamination Conceptual Model.

3. Ground Investigation

3.1. Site Investigation Scope

The scope of the contaminated land investigation was agreed in conjunction with Francis Bradshaw consulting Ltd and LKC.

This investigation was in line with the agreed scope.

3.2. Site Investigation Design and Methodology

The investigation carried out on 11th to 15th December 2023 and 31st January to 2nd February 2024 comprised the following:

- 5no. trial pits (using JCB 3CX excavated to 2.80-3.30mbgl (ref. TP101 to TP105).
- 4no. cable percussion boreholes drilled to 5.80-6.70mbgl (ref. CP101 to CP104) through the area of the trial pits.
- 3no. rotary boreholes drilled to 40mbgl in areas not covered by prior investigation.

All site investigation locations are shown in Figure 3.

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

Site Investigation Locations	Rationale
TP101-104	Clearing larger cobbles/boulders ahead of cable percussive drilling. Identifying made ground composition.
CP101-104	Identifying depth of made ground and bedrock present beneath site.
TP105	Additional trial pit across road for potential future LPG tank locations.
RB101-103	Identifying potential instability risk.

Table 3-1: Summary of Sampling Locations.

The number of site investigation points corresponds to approximately one location per 18m square centres. This is considered to be a conservative sampling density and is in line with BS10175⁵ for a 'detailed investigation'.

All profile logs are provided in Appendix B and are in line with BS14688-1⁶ and BS5930⁷.

3.3. Well Installations

3no. (CP102-CP104) of the boreholes were installed with monitoring wells for gas monitoring. Monitoring wells were installed in accordance with BS10175 and CIRIA C665⁸ 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.

3.4. Sampling Protocol

3.4.1. Soil Sampling (Contamination)

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation⁹.

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, sulphate, cyanide suite, TPHCWG, BTEX, MTBE, speciated PAHs, phenol, and hardness.	4	A more detailed suite due to location of former paper mill and subsequent demolition waste.
Waste Acceptance Criteria (WAC)	2	Samples of representative material which may be earmarked for disposal.

Table 3-2: Summary of Soil Testing.

Notes:

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

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

Soil samples taken during the investigation were collected in tubs and bulks and sent to DETS for geotechnical testing for sulphate analysis. Due to the strata encountered on site being entirely made ground and non-cohesive, no geotechnical classification tests were undertaken by LK Consult.

Tests undertaken by DETS are UKAS accredited and further details are given in the laboratory report presented in Appendix D. Table 3-3 shows the geotechnical testing undertaken.

Testing	No. Samples
BRE SD1 short suite for pH and water-soluble sulphate	5

Table 3-3: Summary of Geotechnical Testing Undertaken.

3.4.2. Water Sampling / Leaching Testing

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

A low risk was identified in the preliminary contamination conceptual model for controlled waters (Pollutant Linkage 4) and further action was only recommended if significant soil contamination was identified on site. Based on the ground conditions encountered, LKC did not consider testing to be required. This is discussed further in Section 5.4.

3.5. In-situ Testing

3.5.1. 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 cable percussion boreholes at approximately 1m intervals.
- Shear vane tests (giving undrained shear strength) were performed in trial pit TP105 within cohesive strata.

Shear vanes tests were not always possible due to the friable or gravel rich nature of some of the cohesive deposits.

The results are provided within Appendix B.

3.6. Gas Monitoring

Four gas monitoring visits have been undertaken over a 1-month period (19th January 2024 to 8th February 2024) in all installed boreholes, and is now complete.

Monitoring was undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665¹⁰ (flow rate measured first). The monitoring was 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 (including PID results), are reproduced in full in Appendix F.

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 exploratory hole locations to depths of between 0.00-7.20mbgl. The made ground comprised silty sand and gravel, with frequent concrete cobbles and boulders, metal waste, ash, clinker and brick fragments. Decayed wood was found in RH101.

4.1.2. Natural Strata

Superficial strata comprised light brown gravelly clay located within 2no. boreholes re: (RH102A & RH103A) between 4.50mbgl to 7.20mbgl. Bedrock comprised dark grey mudstone. This was present in all cable percussive holes at depths starting at 5.20mbgl to 5.80mbgl. Bedrock was proven by chiselling, with exploratory holes completed at depths of between 5.80mbgl and 6.70mbgl. The depth of the made ground was slightly deeper at the location of RH101 (7.20mbgl) in the north-east of the site. Rotary boreholes continued in mudstone down to 40.00mbgl, identifying darker shale banding at lower depths.

4.1.3. Contamination

RB101: Rotted timbers at 5.00-5.40mbgl. Black and red brick between 5.40-7.20mbgl.

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations, other than the identified made ground noted.

4.1.4. Obstructions

The following obstructions were encountered:

- TP101-104: Boulder sized concrete was observed within trial pits, obstructions were removed with standard JCB 3CX plant.
- CP102-104: concrete at 3.30-3.40mbgl, chiselled through over 2.5-3.5 hours.

4.2. Groundwater

4.2.1. Groundwater Levels

No groundwater strikes were recorded in CP101-CP104 / TP101-TP105 / RH101-103.

Groundwater monitoring within the borehole wells has been undertaken on four occasions. This data is provided in Appendix F. Water was found in CP104, where levels were recorded between 3.73 and 3.55mbgl. No groundwater was encountered in CP102-103.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise 2no. water sprinkler tanks, associated pump room and a GRP kiosk.

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

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

It is anticipated that some enabling works may be required to create a level developable platform.

Given the nature of the proposed development the structure meets the criteria of Geotechnical Category 2 of Eurocode 7¹¹.

5.2. Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1, and typically comprises 5.20-5.80m of made ground containing boulder obstructions over bedrock comprising dark grey MUDSTONE to the completion depths investigated. Plate 5-1 shows the scale of obstructions encountered during the trial pitting on site.



Plate 5-1: Large boulders encountered during the trial pitting.

5.3. Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works¹². 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.
- Any redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Concrete obstructions and boulders have been encountered on site. 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.

5.4. Foundation Conditions and Bearing Capacity

5.4.1. General

The made ground is not considered a suitable founding stratum due to the inherent variability of the material, the thickness of the material and the presence of large obstructions. Foundation options are therefore:

- Conventional shallow footings on vibro granular columns.
- Mini-pile foundations.

These options are discussed in the following Sections.

5.4.2. Ground Improvement

The use of ground improvement techniques such as vibro granular columns will allow shallow foundations to be utilised with the made ground. The vibro granular columns should provide an Allowable Bearing Capacity of around 150kN/m² but will also remove variability within the made ground. Obstructions comprising concrete and brick boulders and were encountered throughout the made ground deposits.

The presence of the large obstructions within the made ground may preclude this method and 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.

It should be noted that the stone columns provide a pathway for gas and vapour migration, and additional mitigation measures may be required to help prevent the ingress into structures.

5.4.3. Piled Foundations

Piled foundations transferring loadings through the deep made ground / poor ground, end bearing upon the shallow mudstone bedrock at depths encountered from 5.20m and 5.80mbgl, are considered suitable for the development.

Use of piles will reduce the amount of spoil generated from foundation trenches requiring offsite disposal, along with the amount of concrete required for the development. Given the nature of the obstructions encountered during the intrusive investigation, it is recommended that rotary bored piling is employed using temporary casing to provide support for the bored pile.

Up to 5.80m 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 may require further information on ground conditions to a minimum of 5m below the base of the pile.

5.4.4. Ground Floor Slabs

Following suitable preparation of the sub-grade, by a combination of excavation and re-compaction, a ground bearing floor slab should be suitable for the proposed structure. Floor slabs should be designed by a suitably experienced structural engineer.

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

5.4.5. 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.

5.4.6. Concrete Durability

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

5.4.7. Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant, however obstructions were identified in the near surface including large boulders.

Groundwater seepage was not recorded in any of the trial holes during the site works. Ponded water was recorded at the base of WS104 during subsequent monitoring.

The made ground included granular strata and the short- and long-term stability of near vertically sided excavations can therefore not be guaranteed and random and sudden instability within these soils should be anticipated.

Due to the variability of the made ground all excavations should be supported or battered back in accordance with guidance contained in CIRIA R97¹³.

5.4.8. 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 R97¹⁴ 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).

5.4.9. Enabling Works

It is considered that the ground will require preparation to facilitate a developable platform for the first stage of construction works.

As referenced in Section 5.3, obstacles such as concrete floor slabs and large boulders etc. can be anticipated on site from historical land uses and it is recommended that these are grubbed out as part of a general site turnover to remove obstacles.

The enabling works should also cover activities such as undertaking site preparation works including pre commencement surveys of the site and surrounding areas, preparation of access routes and providing suitable piling mats if required, surveying

the site and producing topographical plans on completion of the earthworks, as well as installation of safety signs and security fencing.

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 (LCRM¹⁵). 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) ^{16, 17}.
- LQM Suitable 4 Use Levels (S4ULs) ^{18, 19, 20, 21}.
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs)²²

The proposed development is for a commercial end use including the construction of a pump room, 2no. sprinkler tank and associated kiosk.

All criteria have been generated using the CLEA V1.06 model²³ based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

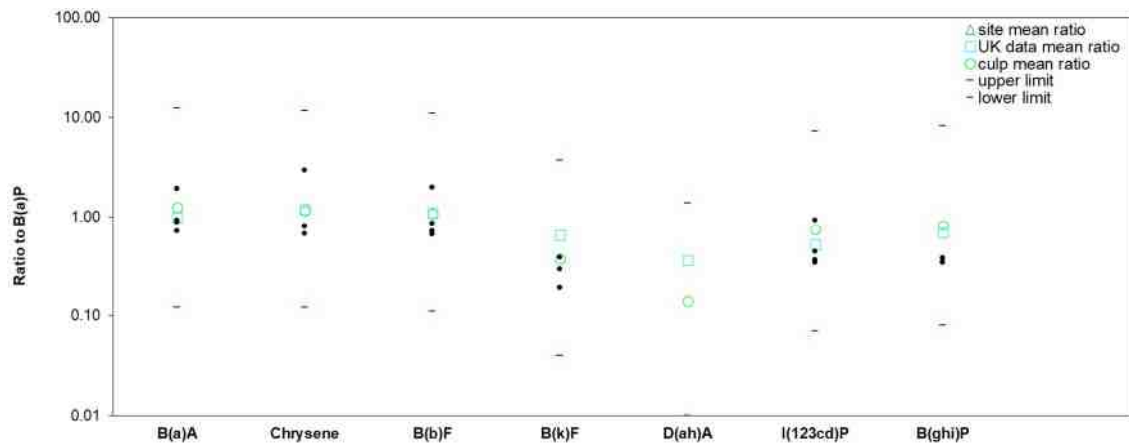
A summary of the generic assessment criteria used in this assessment is provided in Appendix H.

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^{24,25} and naphthalene the most volatile and soluble²⁶. 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 negligible²⁷. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)²⁸ 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.*²⁹, which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two-year carcinogenicity study.

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



Graph 6-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 4 samples (where values were >LOD to allow the calculation of a ratio).

Notes:

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

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

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

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.

Asbestos was identified, as detailed in Table 6-1.

Sample Location	ID	Type	Total Asbestos (%)
TP102 – 1.00-2.00	TP104 – 1.00-2.00	Chrysotile as clumps	0.01
TP104 – 1.00-2.00	TP104 – 1.00-2.00	Chrysotileclumps	0.03
CP103 – 1.70-2.00	TP104 – 1.00-2.00	Chrysotile clumps	0.004

Table 6-1: Details of Asbestos Identified.

6.2.3. Hazard Quotient

To examine the potential additivity of toxicological effects between the petroleum hydrocarbon fractions, a Hazard Index (HI) as described by the Environment Agency³⁰ technical report should be calculated for the samples. As no significant concentrations of petroleum hydrocarbons were identified in any of the soil samples this has not been undertaken.

6.2.4. Direct Contact Risk – Pollutant Linkage 1

No significantly elevated hydrocarbons, pesticides, PAH's, metals were identified, therefore the probability of these contaminants posing a risk to site users is considered unlikely. With a medium consequence, the risk is considered to be moderate, and no remediation is recommended.

Asbestos

Asbestos (Chrysotile) was identified in TP102, TP104 and CP103. The asbestos was identified as 'clumps'. Asbestos was located in the central northern area of the site, possibly from demolition of the historical mill, which was previously located in this area of site.

LKC have utilised the Joint Industry Working Group (JIWG) Decision Support Tool for receptor risk ranking of ACM onsite. This model incorporates guidance from CL:AIRE CAR-SOIL³¹ and CIRIA C733³². The following assumptions have been incorporated into the model:

- Asbestos type, nature and concentrations as encountered during the site investigation and reported in laboratory data.
- In this model, an adult of >24 and <60 working in the hardstood area for <10 hours was assumed in close proximity to the source.
- Low respirable index was assumed based on the ACM identified onsite as per RIVM³³.
- The assessment was carried out assuming 'Medium disturbance' based on ACM at a shallow depth.

For added conservatism, the model does not consider moisture content, which can significantly reduce the potential for airborne fibre release from soil in a typical UK climate. Swartjes and Tromp (2008)³⁴ based on work by Addison *et al.*³⁵ note that the addition of 10% water to soil decreases the risk of potential fibre release by a factor of between 2 and 10. The moisture content of the soil from this area was 14.30-18.70% making fibre release unlikely.

Data from Addison *et al.* shows that a sandy soil with Chrysotile fibre concentrations of 0.01%w/w (1 order of magnitude lower recorded) when agitated in a moderately aggressive way, produced between 0.01fibres/ml and no recordable fibres at moisture contents of 5% and above.

The JIWG model output sheet is presented in Appendix I. A low/medium risk was identified to key receptors based on general worst-case scenario, such as some ground disturbance and track back into other areas of the site (24-hour exposure).

6.2.5. Risk from Inhalation of Vapours – Pollutant Linkage 2

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

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

6.3. Gas Risk Assessment

4 gas monitoring visits have been undertaken on the study site. Gas monitoring results in full are presented in Appendix F and summarised in Table 6-2. Following guidance set out in CIRIA C665³⁶ and BS8485³⁷ 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)	Flow (l/h)	Groundwater Level (mbgl)	Pressure (mb)	Prev 24hr Pressure Trend
CP102	1	<0.1	0.1	21.3	<0.1	Dry	1006	Rising
	2	<0.1	1.2	20.4	<0.1	Dry	1016	Rising
	3	0.1	1.4	19.7	<0.1	Dry	1015	Variable
	4	<0.1	0.8	20.6	<0.1	Dry	976	Falling
CP103	1	<0.1	0.4	21	<0.1	Dry	1007	Rising
	2	<0.1	0.5	20.9	<0.1	Dry	1017	Rising
	3	0.1	0.4	21.1	<0.1	Dry	1016	Variable
	4	<0.1	0.4	20.9	<0.1	Dry	976	Falling
CP104	1	<0.1	0.1	21.5	<0.1	Dry	1007	Rising
	2	<0.1	0.1	21.7	<0.1	3.73	1016	Rising
	3	0.1	0.2	21.6	<0.1	3.55	1016	Variable
	4	<0.1	0.1	21.4	<0.1	3.55	976	Falling

Table 6-2: Gas Monitoring Assessment.

No significantly elevated gas concentrations or flow rates were identified during the 4 visits across 1 month. Falling and low atmospheric pressure was recorded on visit 4 with no elevated readings noted.

Gas Screening Value

In accordance with CIRIA C665³⁸, a Gas Screening Value (GSV) may be calculated. Assuming worst-case scenario maximum gas concentrations and flow for each borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS).

Table 6-3 shows the maximum GSV for each borehole and the appropriate characteristic situation (based on GSV only). An overall site assessment (CP102-CP104) has also been included (worst case values across the site).

Boreholes	Max GSV (l/hr)	CS
CP102	0.0014	CS1
CP103	0.0005	CS1
CP104	0.0002	CS1
CP102-CP104	0.0001 (CH ₄) 0.0014 (CO ₂)	CS1

Table 6-3: Summary of Worst-Case Gas Screening Values (GSV).

Notes:

CS = Characteristic Situation.

In accordance with CIRIA C665³⁹, 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.

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.

6.4. Controlled Water Assessment

The PRA identified a moderate risk with respect to controlled waters as there was an anticipated source of contamination. A Secondary A Aquifer is present below the site, Groundwater and surface water abstractions were identified in the PRA at 64m to the east for use in a chemical works as process water, the site is not located in a Source Protection Zone.

However, no evidence of significant mobile contamination was identified on the site, no groundwater was observed during the investigation with very limited water observed during monitoring (CP104).

The site investigation did not identify any significant sources of likely mobile contamination within the soils. This confirms an unlikely probability of onsite contamination affecting controlled waters. With a medium consequence the risk is anticipated to be low, and no remediation is required.

6.5. Potable Water Supply (Pollutant Linkage 5)

Although no potable pipework is expected, the probability of organic contaminants affecting potable water pipes should they be installed is a low likelihood. Given the consequence is considered to be medium, the risk (Pollutant Linkage 5) is anticipated to be low / moderate risk, should potable pipe work be installed, and no remediation is likely to be required.

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 6-4.

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 (source)	Pathway	Receptor	Probability	Consequence	Risk	Recommendations
1	Asbestos, heavy metals, sulphates, PAHs, petroleum hydrocarbons, other organic / inorganic contaminants (made ground, paper mill)	No viable pathways (dermal contact, inhalation, ingestion).		-			-
2	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks, surrounding industrial use)	Inhalation of vapours. Migration via permeable strata and preferential pathways.	Future site users	Low Likelihood	Medium	Moderate / Low	No remediation required.
3	Hazardous / ground gas: methane, carbon dioxide (landfills/offsite potentially infilled features within 250m, deep made ground, Pennine Lower Coal Measures)	Migration via permeable strata and preferential pathways. Inhalation of gas. Explosion in confined spaces.	Future site users. Buildings.	Unlikely	Severe	Moderate / Low	No remediation required.
4	Chlorinated organic solvents, PAHs, metals, petroleum hydrocarbons (made ground, paper mill, works, tanks, surrounding industrial use)	Surface run-off. Migration via permeable strata and preferential pathways. Perched waters migration.	Groundwater	Unlikely	Medium	Moderate / Low	No remediation required.
5	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks)	No viable pathways (potable pipework not expected)		-			-

Table 6-4: Revised Contamination Conceptual Model.

7. Waste Disposal Assessment

7.1. HazWaste Assessment

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

As an initial screen the soil results were inputted into Hazwaste Online™. This is a web-based facility that allows an assessment waste as either hazardous or non-hazardous waste based on relevant guidance and legislation 404142434445.

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

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

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

The output sheets are provided in Appendix D.

Where LKC investigated, the soil matrix is considered non-hazardous waste.

7.2. Waste Acceptance Criteria (WAC) Testing

Waste Acceptance Criteria (WAC) testing was also undertaken on two samples representative of material likely to be earmarked for off-site disposal. WAC test results are included in Appendix B.

The WAC limits cannot be used to make an assessment of whether a waste is hazardous. Landfills are classified according to whether they can accept hazardous or non-hazardous wastes. Wastes can only be accepted at a landfill if they meet the WAC for that class of landfill.

The results of the soil and WAC testing should be provided to the landfill operator for confirmation prior to movement of any soil offsite.

8. Conclusions

8.1. Ground Conditions

Ground conditions are summarised in Table 8-1 below.

Made Ground	Made ground was recorded from 0.00mbgl to 7.200mbgl, except from anthropogenic material encountered, no further contamination identified.
Superficial	Superficial comprised light brown gravelly clay was located in 2no. boreholes ref: (RH102A & RH103A) between 4.50mbgl to 6.20mbgl.
Bedrock	Bedrock was encountered at depths of 5.20mbgl to 7.20mbgl comprising light grey mudstone. Rotary boreholes were drilled to 40.00mbgl.
Groundwater	No groundwater encountered within ref: (CP101-CP104, TP101-TP105 & RH101-RH103).
Obstructions	Obstructions located in TP101-TP104 consisting of boulder sized concrete. Concrete slab was observed within CP102 to CP104, chiselled for 2.5-3.5 hours to advance borehole.

Table 8-1: Summary of Ground Conditions.

8.2. Geotechnical

Geotechnical observations and conclusions are contained in Table 8-2 below, more detailed discussions are contained within Section 5.

Allowable Bearing Pressure	No reliance can be placed on the made ground deposits. Based on guidance contained in BS8004:1986, Mudstone should return a safe bearing capacity of 600kN/m ² .
Anticipated Foundation Type	It is considered that a piled, or ground improvement solution will provide the most reliable foundation option.
Shallow Groundwater	None encountered during siteworks. Subsequent monitoring recorded shallow groundwater withing CP104 at depths between 3.55m and 3.73mbgl.
Concrete Requirements	Based on BRE Digest 2005 ⁴⁶ – DS-1 AC-1 recommended.
Services	Services – consideration to the presence of services running through the site. Services may need to be re-routed.
Coal Mining	Rotary boreholes were advanced to a depth of 40mbgl and did not record any voids or coal seams which may be indicative of potential shallow mine workings. All boreholes maintained 100% flush returns with the exception of RH103A which returned 50% flush between 10m and 20mbgl, this is considered likely due to encountering a fissure in which the flush made its way into the nearby monitoring borehole installed previously during the Dunelm investigation.
Temporary support of excavation	May be required; however, trial pits were generally recorded as stable.

Table 8-2: Geotechnical Conclusions Table.

8.3. Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 8-3 below (more detailed model provided in Section 6).

PL	Contaminant	Risk	Recommendations
	Asbestos, heavy metals, sulphates, PAHs, petroleum hydrocarbons, other organic / inorganic contaminants (made ground, paper mill)	–	
2	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks, surrounding industrial use)	Moderate / Low	No remediation required.
3	Hazardous / ground gas: methane, carbon dioxide (landfills/offsite potentially infilled features within 250m, deep made ground, Pennine Lower Coal Measures)	Moderate / Low	No remediation required.
4	Chlorinated organic solvents, PAHs, metals, petroleum hydrocarbons (made ground, paper mill, works, tanks, surrounding industrial use)	Moderate / Low	No remediation required.
5	Petroleum hydrocarbons, naphthalene (made ground, paper mill, works, tanks)	–	

Table 8-3: Summary Risk Table.

PL=Pollutant Linkage, see Table 6-10 for details.

8.4. Waste Assessment

The results show that all the samples tested are classified as non-hazardous for disposal.

WAC

Waste Acceptance Criteria (WAC) testing was also undertaken on 2no. samples. The WAC limits cannot be used to assess whether a waste is non-hazardous or hazardous. It is recommended that waste assessment and WAC data is forwarded to a licensed waste disposal operator.

9. Recommendations and Outline Remediation Strategy

Based on the findings of the site investigation and risk assessment, no remediation is recommended. A watching brief for any unexpected contamination should be maintained during groundworks (refer to Section 9.1.1), and any imported soils brought to site for use in gardens / soft landscaping should be validated to ensure they are suitable for use (refer to Section 9.2).

9.1. Other Considerations

9.1.1. *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.

9.1.2. *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 are to be undertaken in accordance with current EA guidelines⁴⁷.

9.1.3. *Grubbing Out of In-ground Structures*

Surface hard standing and relict features including former foundations may be encountered across the site. It is recommended that in-ground structures are grubbed out as part of the groundworks.

Hard materials can be used to generate suitable aggregates for re-use on site as part of engineered made ground and/ or construction platforms (subject to geo-environmental testing and client design specifications). Suitable materials derived from grubbing-up should be stored in a location on site, to be agreed with the Engineer, prior to crushing. Any unsuitable materials should be removed to a suitably licensed landfill site.

9.1.4. 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 used⁴⁸):

- 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 Practice⁴⁹ may be required if volumes exceed exemption limits. This must be registered before material movement starts onsite.

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

For all the above material will need to be tested at the rate and analytical suites presented in Table 9-2.

Testing must include asbestos screening and quantification.

9.1.5. 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.

9.1.6. 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.

9.1.7. Control of Water

If significant organic contamination is present or to chase out deeper obstructions some localised excavation below the groundwater table may be required. Contingency arrangements to remove groundwater (including contaminated groundwater if encountered) from excavations / relict structures should be allowed.

Small volumes of pumped fluids / groundwater may be stored in appropriate, sealed tanks / containers and analysed for a range of determinants prior to disposal to suitable facility. Alternatively, a temporary discharge licence, including their requirements for

treatment/ testing should be agreed with local utility providers (United Utilities) prior to start on site.

Where relict structures are found to retain fluid contaminants, they should be drained prior to removal.

9.1.8. 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 guidance⁵⁰) should be adopted by all workers involved with site enabling and construction works, Including management of fibre/dust release.

9.1.9. 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 Agency⁵¹.

9.1.10. Asbestos in Soils Management Plan

Due to the presence of asbestos containing material, it is recommended that additional precautions are taken during site clearance, earthworks, and construction in the areas of concern, such as dampening down. The presence of asbestos in the made ground at the site presents a potential risk of generation of airborne fibres if this material is disturbed, such as for excavations to construct new foundations.

LKC recommend that an appropriate 'Asbestos Management Strategy' is developed in line with CIRIA C733⁵².

9.2. Validation of Imported / Site Won Soils

A summary of the required imported material sampling requirements is presented in Table 9-2 and is based on the YALPAG guidance (2021)⁵³. 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 to ensure suitability for use.

Material Type	Source	Suite of Analysis	Sampling Rate
Topsoil / Subsoil	Greenfield / manufactured / site-won natural	Suite A*	1 sample per 50m ³
	Brownfield / unknown	Suite B**	
Subsoil	Quarried sand	No testing required. Certification of material provenance is required.	
Gravel break layer	Quarried stone	No testing required. Certification of material provenance is required.	
	Recycled stone (6F2 / screened)	Suite B*	1 sample per 500m ³

Table 9-1: 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.

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

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882⁵⁴). LKC advise this information is provided by the supplier before material is imported onto site.

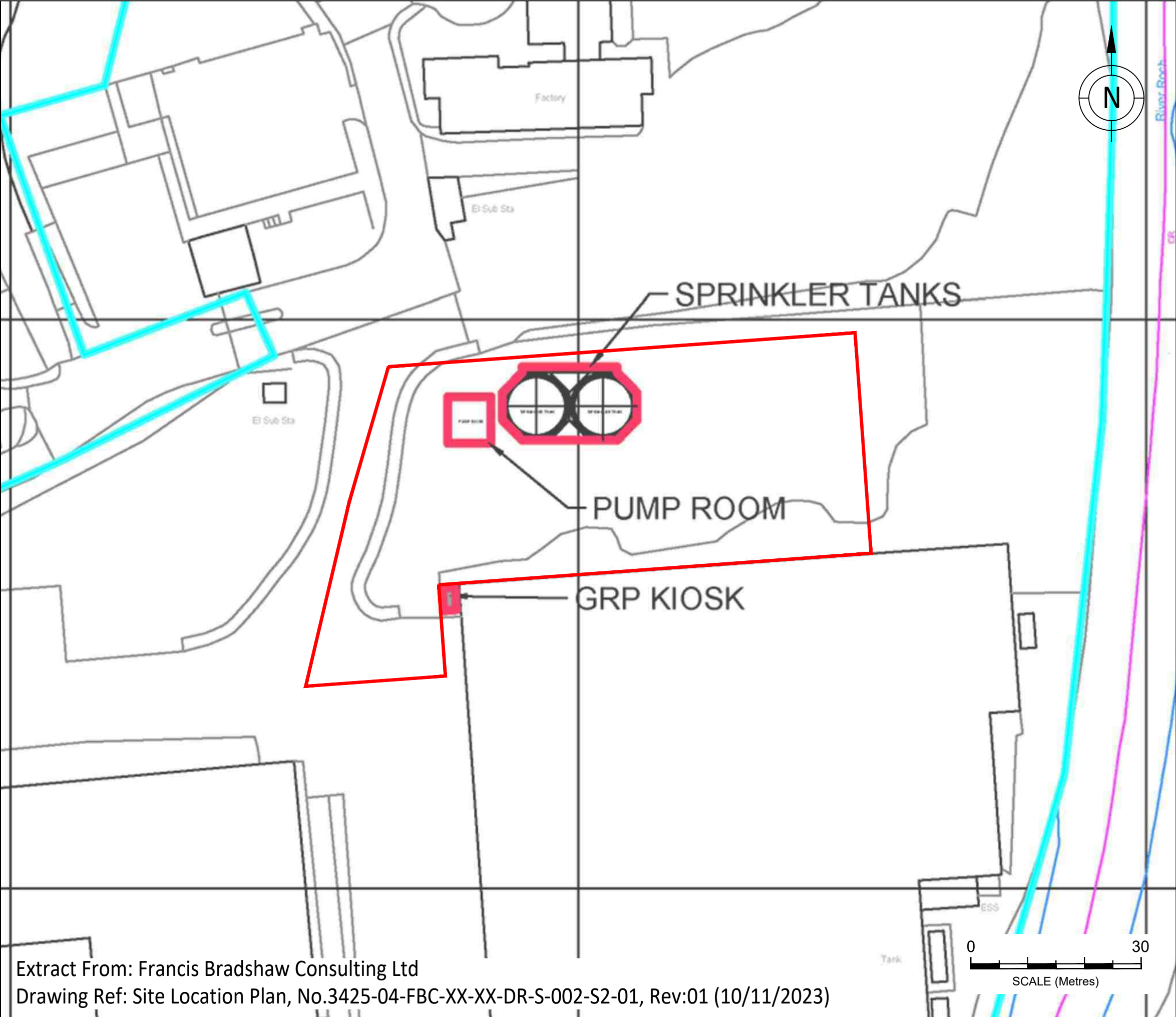
9.3. Site Completion Report

Any remediation and validation work should be documented in a Site Completion Report. The Site Completion Report will allow discharge of relevant planning conditions.

Figures



Client: Tetrosyl Group Ltd				Title: Site Location & Boundary Plan		
Site: Tetrosyl Group Ltd. Bury				Scale (see scale bar): 1:25,000 & 1:1000 @ A4		
Job No.: LKC 23 1650	Drawn By: CD	Checked By: CW	Drawn: Dec 2023	Figure: 1	Revision:	



KEY

- Site Boundary
- Ownership Boundary

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

Client:

Tetrosyl Ltd

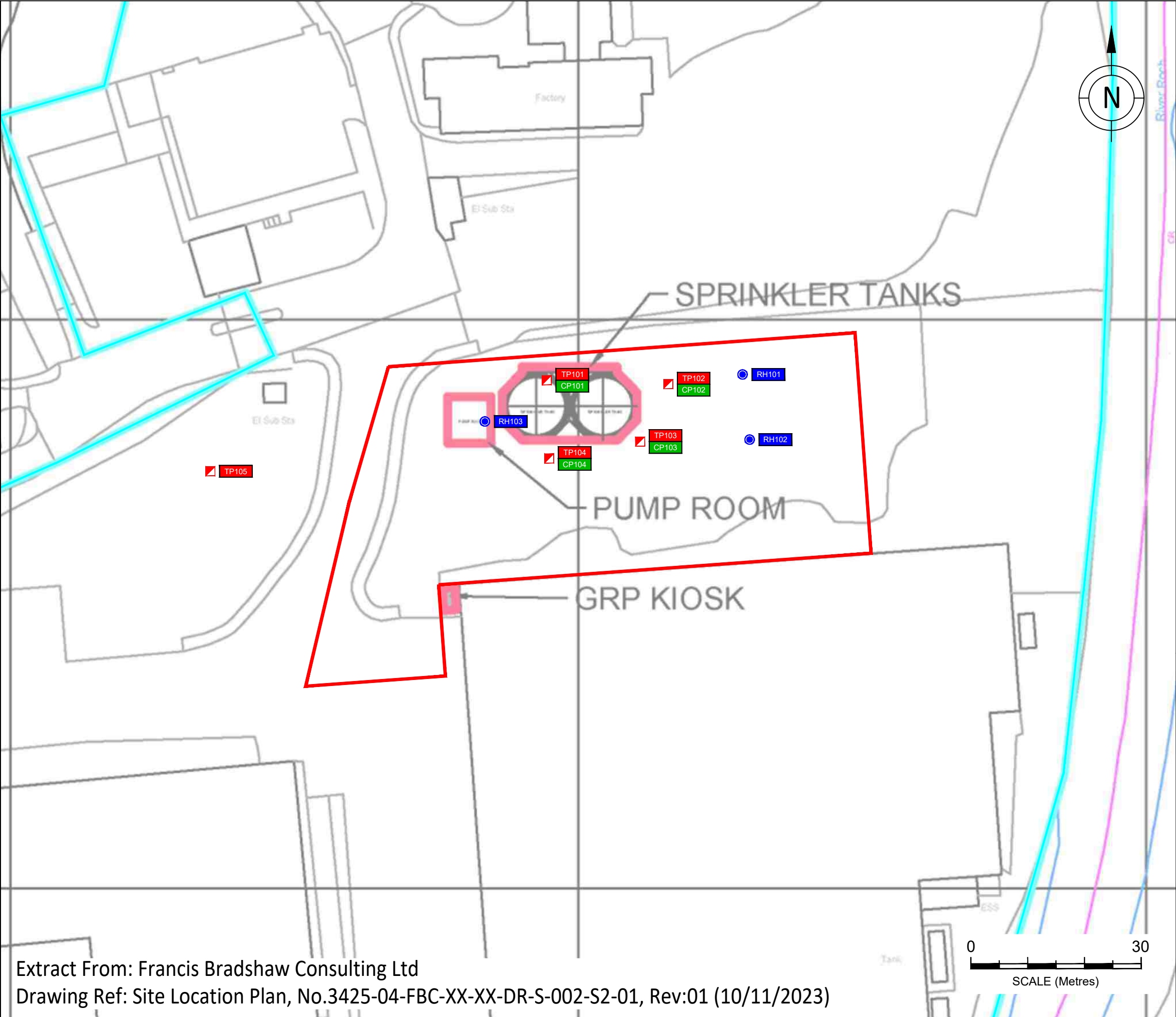
Site:

Tetrosyl, Bury

Title:

Proposed Development Plan

Job No.:	LKC 23 1650	Scale (See Scale Bar):	See Scale Bar	Figure:	2	Revision:	
Drawn By:	AC	Checked By:	CD	Drawn:	Dec 2023		



KEY

- Site Boundary
- Ownership Boundary
- Trial Pit (TP)
- Cable Percussive Borehole (CP)
- Rotary Borehole (RH)

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

Client: Tetrosyl Group Ltd

Site: Tetrosyl Group Ltd, Bury

Title: Site Investigation Location Plan

Job No.: LKC 23 1650	Scale (See Scale Bar): See Scale Bar	Figure: 3	Revision: A
Drawn By: AC	Checked By: CD	Drawn: Feb 2024	

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 552⁵⁵. 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



Cable Percussion Drilling Log

Location Number:
CP101

Project Name: Tetrosyl, Bury

Client: Tetrosyl Ltd.

Date: 15/12/2023

Project ID:LKC 23 1650

Contractor: D&I Drilling

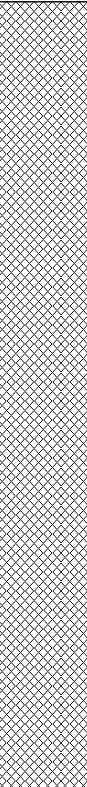
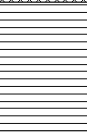
Co-ords: E382894.51 N410889.30

Level
86.59m AoD

Logged By
CD

Scale
1:50

Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
1.20 - 1.65 1.20	SPT N=5 (1,2/2,1,1,1)			MADE GROUND: Dark brown silty sandy GRAVEL with many cobbles, abundant brick and concrete fragments, frequent ash, clinker, plastic, and occasional fibreglass, textiles and wood. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular, comprising sandstone and mudstone. Cobbles are rounded to subangular, comprising concrete.	1	
2.20	N=3 (1,1/0,1,1,1)	2				
2.70 - 3.00	B	3				
3.30 - 3.75 3.30	SPT N=21 (2,4/4,5,7,5)	4				
4.30 - 4.75 4.30	SPT N=22 (2,4/5,5,6,6)	5				
5.40 - 5.60 5.40	SPT 50 (10,14/50 for 245mm)	5.20		Dark grey MUDSTONE.	5	81.39
6.00	50 (25 for 95mm/50 for 264mm)	6.05		End of Borehole at 6.05m	6	80.54
					7	
					8	
					9	
					10	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)
						5.30	6.00	00:30

Remarks:

Chiseling from 5.30 to 6.00mbgl over 30 mins. Complete at 6.05mbgl after mudstone confirmed for 0.70m.



Cable Percussion Drilling Log

Location Number:
CP102

Project Name: Tetrosyl, Bury

Client: Tetrosyl Ltd.

Date: 14/12/2023 - 15/12/2023

Project ID:LKC 23 1650

Contractor: D&I Drilling

Co-ords: E382915.90 N410888.61

Level
86.81m AoD

Logged By
CD

Scale
1:50

Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well
1.20 - 1.65 1.20	SPT N=7 (1,2/2,3,1,1)			MADE GROUND: Dark brown silty sandy GRAVEL with many cobbles, frequent brick and concrete fragments, occasional ash, clinker, fibreglass and rootlets. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded, comprising sandstone and mudstone.	1	83.51	
2.40 - 2.85 2.40	SPT N=10 (5,3/1,1,4,4)				2		
2.90 - 3.20	B				3		
3.30	50 (25 for 105mm/50 for 245mm)	3.30		MADE GROUND: Concrete and brick.	4		
4.20 4.40 - 4.80	50 (25 for 125mm/50 for 265mm) SPT				5		
5.30 5.50 - 5.65 5.50	50 (25 for 105mm/50 for 245mm) SPT	5.40		Dark grey MUDSTONE.	6		
6.00	50 (25 for 105mm/50 for 265mm) 50 (25 for 105mm/50 for 255mm)	6.05		End of Borehole at 6.05m	80.76		
					7		
					8		
					9		
					10		

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)
						3.30	6.00	03:00

Remarks:

Chiseling from 3.30 to 6.00mbgl over 3 hours. Complete at 6.05mbgl after mudstone confirmed for 0.60m.



Cable Percussion Drilling Log

Location Number:
CP103

Project Name: Tetrosyl, Bury

Client: Tetrosyl Ltd.

Date: 14/12/2023

Project ID:LKC 23 1650

Contractor: D&I Drilling

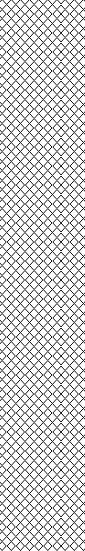
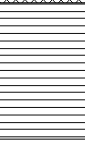
Co-ords: E382910.94 N410878.51

Level
87.24m AoD

Logged By
CD

Scale
1:50

Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well
1.20 - 1.65 1.20	SPT N=7 (1,2/2,1,2,2)			MADE GROUND: Dark brown silty sandy GRAVEL with frequent brick and concrete fragments, metal waste, occasional wood, ash and clinker. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded, comprising sandstone and mudstone.	1		
1.70 - 2.00	B				2		
2.20	N=3 (1,0/1,0,1,1)				3		
3.30 - 3.70 3.30	SPT N=50 (1,2/50 for 255mm)	3.70		MADE GROUND: Concrete boulders and cobbles.	4		83.54
4.40	50 (2,3/50 for 245mm)				5		
5.40 - 5.50 5.40	SPT 50 (25 for 145mm/50 for 255mm)	5.80		Dark grey MUDSTONE.	6		81.44
5.90 - 6.20 5.90	SPT 50 (10,14/50 for 245mm)						
6.70 - 6.80 6.70	SPT 50 (25 for 125mm/50 for 275mm)	6.70		End of Borehole at 6.70m	7		80.54
					8		
					9		
					10		

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)
						3.30	5.90	02:30

Remarks:

Chiseling from 3.30 to 5.90mbgl over 2.5 hours. Tool jammed at 5.40m for 1.5hrs. Complete at 6.70mbgl after mudstone confirmed for 1.00m.



Cable Percussion Drilling Log

Location Number:
CP104

Project Name: Tetrosyl, Bury

Client: Tetrosyl Ltd.

Date: 13/12/2023

Project ID:LKC 23 1650

Contractor: D&I Drilling

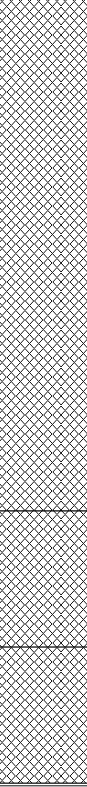
Co-ords: E382894.95 N410875.53

Level
87.14m AoD

Logged By
CD

Scale
1:50

Page Number
Sheet 1 of 1

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)	Well	
0.50 - 0.80	B			MADE GROUND: Dark brown silty sandy GRAVEL with some cobbles, frequent brick and concrete fragments, steel cable and wiring, occasional textile, wood, ash, clinker, and paper.				
1.20	N=3 (1,1/1,0,1,1)					1		
2.40 - 2.85 2.40	SPT N=9 (1,1/1,1,3,4)					2		
3.40 - 3.50 3.40	SPT 50 (25 for 145mm/50 for 275mm)	3.40			MADE GROUND: Concrete cobbles and boulders.			83.74
4.20 - 4.50 4.20 - 4.60 4.20 4.50 - 5.00	B SPT N=50 (25 for 145mm/50 for 255mm) D	4.30			MADE GROUND: Orangish grey clayey silty SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded, comprising sandstone and concrete.			82.84
5.20 - 5.60 5.20	SPT 50 (6,13/50 for 245mm)	5.20			Dark grey MUDSTONE.			81.94
5.70 - 5.85 5.70	SPT 50 (25 for 145mm/50 for 295mm)	5.80			End of Borehole at 5.80m			81.34
					6			
					7			
					8			
					9			
					10			

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)
						3.40	5.70	03:00

Remarks:

Chiseling from 3.40 to 5.70mbgl over 3 hours. Complete at 5.80mbgl after mudstone confirmed for 0.60m.

		Rotary Core Log					Location Number: RH101				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 30/01/2024 - 31/01/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382928.99 N410890.32				
				Level 86.52m AoD		Logged By CD		Scale 1:50		Page Number Sheet 1 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								MADE GROUND: Cobbles comprising concrete and sandstone with frequent steel and brick fragments.			
										1	
										2	
										3	
						4.00		MADE GROUND: Concrete		4	82.52
						5.00		MADE GROUND: Timber sleepers.		5	81.52
						5.40		MADE GROUND: Black and red brick and concrete cobbles.		6	81.12
										7	
						7.20		Light grey MUDSTONE.		7	79.32
										8	
										9	
										10	
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)	
40.00	125										
Remarks: Borehole rotary open holed utilizing water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH101			
Project Name: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 30/01/2024 - 31/01/2024				
Project No. : LKC 23 1650			Contractor: Taylor Drilling Services Ltd			Co-ords: E382928.99 N410890.32				
			Level 86.52m AoD		Logged By CD		Scale 1:50		Page Number Sheet 2 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description		Level (m)
	TCR	SCR	RQD							
								Light grey MUDSTONE.		
										11
										12
										13
										14
										15
										16
										17
										18
										19
							19.80		Dark grey MUDSTONE with bands of black shale.	
										20
Hole Diameter		Casing Diameter		Water Strike Details			Chiselling			
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)		
40.00	125									
Remarks: Borehole rotary open holed utilizing water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.										

Borehole rotary open holed utilizing water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.

Remarks.
Borehole rotary open holed utilizing water flush. 100% flush returns, no loss of flush or voids encountered.
Borehole complete at 40.00mbgl.

		Rotary Core Log					Location Number: RH102				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 01/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382930.23 N410878.86				
				Level 86.66m AoD		Logged By CD		Scale 1:50		Page Number Sheet 1 of 1	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								MADE GROUND: Concrete and Sandstone cobbles with frequent steel and brick fragments.			
											1
											2
											3
						4.00		MADE GROUND: Concrete			4
						5.00		End of Borehole at 5.00m			5
											6
											7
											8
											9
											10
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)		Depth Top (m)	Depth Base (m)	Duration (hh:mm)
5.00	125										
Remarks: Steel encountered at 5.00mbgl, unable to advance. Relocated a short distance away as RH102A.											

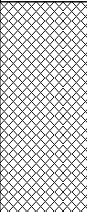
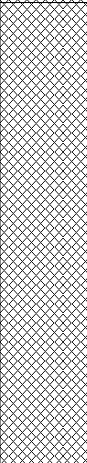
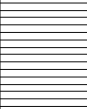
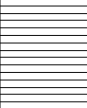
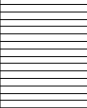
		Rotary Core Log					Location Number: RH102A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 01/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382930.23 N410878.86				
				Level 86.66m AoD		Logged By CD		Scale 1:50		Page Number Sheet 1 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								MADE GROUND: Cobbles comprising concrete and sandstone, with frequent steel and brick fragments,			
										1	
										2	
										3	
						4.00		MADE GROUND: Concrete		4	82.66
						5.00		MADE GROUND: Gravelly cobbles comprising brick and concrete.		5	81.66
						6.20		Light brown gravelly CLAY.		6	80.46
						6.80		Light grey MUDSTONE.		7	79.86
										8	
										9	
										10	
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)		Depth Top (m)	Depth Base (m)	Duration (hh:mm)
40.00	125										
Remarks: Borehole rotary open holed using water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH102A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 01/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382930.23 N410878.86				
				Level 86.66m AoD		Logged By CD		Scale 1:50		Page Number Sheet 2 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								Light grey MUDSTONE.			
										11	
										12	
										13	
										14	
										15	
										16	
										17	
										18	
										19	
						20.00				20	66.66
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)	
40.00	125										
Remarks: Borehole rotary open holed using water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH102A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 01/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382930.23 N410878.86				
				Level 86.66m AoD		Logged By CD		Scale 1:50		Page Number Sheet 3 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								Dark grey MUDSTONE with black hard shale bands.			
											21
											22
											23
											24
											25
											26
											27
											28
											29
											30
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)		Depth Top (m)	Depth Base (m)	Duration (hh:mm)
40.00	125										
Remarks: Borehole rotary open holed using water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH102A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 01/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382930.23 N410878.86				
				Level 86.66m AoD		Logged By CD		Scale 1:50		Page Number Sheet 4 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								Dark grey MUDSTONE with black hard shale bands.			
											31
											32
											33
											34
											35
											36
											37
											38
											39
						40.00		End of Borehole at 40.00m		40	46.66
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)	
40.00	125										
Remarks: Borehole rotary open holed using water flush. 100% flush returns, no loss of flush or voids encountered. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH103				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 02/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services Ltd			Co-ords: E382883.59 N410882.04				
				Level 87.01m AoD		Logged By CD		Scale 1:50		Page Number Sheet 1 of 1	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD					MADE GROUND: Concrete and sandstone cobbles.			
						3.00		End of Borehole at 3.00m			84.01
										1	
										2	
										3	
										4	
										5	
										6	
										7	
										8	
										9	
										10	
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)		Depth Top (m)	Depth Base (m)	Duration (hh:mm)
3.00	125										
Remarks: Steel encountered at 3.00mbgl, unable to advance. Relocated short distance away as RH103A.											

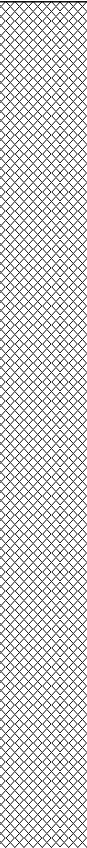
		Rotary Core Log					Location Number: RH103A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 02/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services			Co-ords: E382883.59 N410882.04				
				Level 87.01m AoD		Logged By CD		Scale 1:50		Page Number Sheet 1 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
						1.40		MADE GROUND: Cobbles comprising concrete and sandstone, with frequent steel and brick fragments,		1	85.61
								Gravels, possible made ground,		2	
										3	
										4	
						4.50		Light brown gravelly CLAY.			82.51
						5.00		Light grey MUDSTONE.		5	82.01
											
										6	
										7	
										8	
										9	
										10	
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)		Depth Top (m)	Depth Base (m)	Duration (hh:mm)
40.00	125										
Remarks: Borehole rotary open holed utilizing water flush. 50% of flush lost between 10.00 and 20.00mbgl, returned at end of hole. No voids encountered. Increased water levels found in nearby preexisting monitoring well. Borehole complete at 40.00mbgl.											

		Rotary Core Log					Location Number: RH103A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 02/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services			Co-ords: E382883.59 N410882.04				
				Level 87.01m AoD		Logged By CD		Scale 1:50		Page Number Sheet 2 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								Light grey MUDSTONE.			
										11	
										12	
										13	
										14	
										15	
										16	
										17	
										18	
										19	
										20	
Hole Diameter			Casing Diameter			Water Strike Details			Chiselling		
Depth Base (m)	Diameter (mm)		Depth Base (m)	Diameter (mm)		Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)	
40.00	125										
Remarks: Borehole rotary open holed utilizing water flush. 50% of flush lost between 10.00 and 20.00mbgl, returned at end of hole. No voids encountered. Increased water levels found in nearby preexisting monitoring well. Borehole complete at 40.00mbgl.											

Remarks:
Borehole rotary open holed utilizing water flush. 50% of flush lost between 10.00 and 20.00mbgl, returned at end of hole. No voids encountered. Increased water levels found in nearby preexisting monitoring well.
Borehole complete at 40.00mbgl.

		Rotary Core Log					Location Number: RH103A				
Project Name: Tetrosyl, Bury				Client: Tetrosyl Ltd.			Date: 02/02/2024				
Project No. : LKC 23 1650				Contractor: Taylor Drilling Services			Co-ords: E382883.59 N410882.04				
				Level 87.01m AoD		Logged By CD		Scale 1:50		Page Number Sheet 4 of 4	
Depth (m)	Coring			FI	Field Records	Depth (m)	Legend	Stratum Description			Level (m)
	TCR	SCR	RQD								
								Dark grey MUDSTONE with black hard shale bands.			
											31
											32
											33
											34
											35
											36
											37
											38
											39
						40.00		End of Borehole at 40.00m			40
Hole Diameter		Casing Diameter		Water Strike Details		Chiselling					
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)			
40.00	125										
Remarks: Borehole rotary open holed utilizing water flush. 50% of flush lost between 10.00 and 20.00mbgl, returned at end of hole. No voids encountered. Increased water levels found in nearby preexisting monitoring well. Borehole complete at 40.00mbgl.											

		Trial Pit Log				Location Number: TP101	
Project: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 11/12/2023	
Project No. : LKC 23 1650			Contractor:				
Equipment: JCB Excavator			Level	Logged By CD	Scale 1:25	Page Number Sheet 1 of 1	

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	Level (m)
0.00 - 1.00	ES	2.80		MADE GROUND: Dark brown silty sandy GRAVEL with many cobbles and large boulders, abundant brick and concrete fragments, frequent rebar, ash, clinker, plastic, fibreglass, textiles and occasional barbed wire and wood. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular, comprising sandstone and mudstone. Cobbles are rounded to subangular, comprising concrete. Boulders are rounded to subangular, comprising concrete.	0.5
1.00 - 2.00	B				1.0
				End of Trial Pit at 2.80m	1.5
					2.0
					2.5
					3.0
					3.5
					4.0
					4.5
					5.0

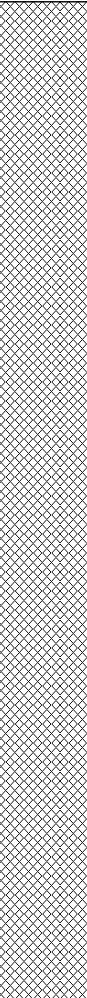
	Pit Dimensions			Pit Stability
	Length (m)	Width (m)	Depth (m)	STABLE, DRY
	5.00	2.00	2.80	
	Remarks: Pit dry. Terminated on further concrete at 2.80mbgl.			

		Trial Pit Log					Location Number: TP102	
Project: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 11/12/2023		
Project No. : LKC 23 1650			Contractor: H&C Plant Hire					
Equipment: JCB Excavator			Level	Logged By CD	Scale 1:25	Page Number Sheet 1 of 1		

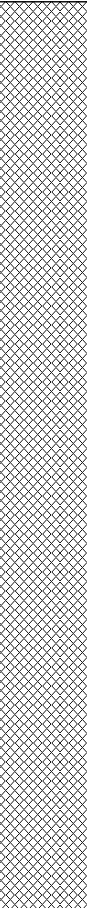
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	Level (m)
1.00 - 2.00	ES			MADE GROUND: Dark brown silty sandy GRAVEL with many cobbles and large boulders, frequent brick and concrete fragments, occasional ash, clinker, fibreglass, rebar and rootlets. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded, comprising sandstone and mudstone.	0.5
					1.0
					1.5
					2.0
					2.5
		2.80		End of Trial Pit at 2.80m	3.0
					3.5
					4.0
					4.5
					5.0

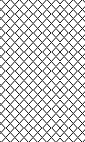
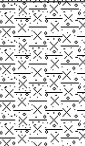
	Pit Dimensions			Pit Stability
	Length (m)	Width (m)	Depth (m)	STABLE
	4.00	2.00	2.80	
	Remarks: Pit dry. Complete at 2.80mbgl.			

		Trial Pit Log					Location Number: TP103	
Project: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 11/12/2023		
Project No. : LKC 23 1650			Contractor: H&C Plant Hire					
Equipment: JCB Excavator			Level	Logged By CD	Scale 1:25	Page Number Sheet 1 of 1		

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description	Level (m)
2.00 - 3.00	ES	3.30		MADE GROUND: Dark brown silty sandy GRAVEL with some cobbles and boulders, frequent brick and concrete fragments, rebar, cables and other waste metal, occasional wood, ash and clinker. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded, comprising sandstone and mudstone.	0.5
					1.0
					1.5
					2.0
					2.5
					3.0
				End of Trial Pit at 3.30m	3.5
					4.0
					4.5
					5.0

	Pit Dimensions			Pit Stability
	Length (m)	Width (m)	Depth (m)	Stable
	3.60	1.50	3.30	
	Remarks: Pit dry. Complete at 3.30mbgl.			

		Trial Pit Log					Location Number: TP104			
Project: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 11/12/2023				
Project No. : LKC 23 1650			Contractor: H&C Plant Hire							
Equipment: JCB Excavator			Level		Logged By CD		Scale 1:25		Page Number Sheet 1 of 1	
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description					Level (m)	
1.00 - 2.00	ES	3.00		MADE GROUND: Dark brown silty sandy GRAVEL with some cobbles and boulders, frequent whole brick, brick and concrete fragments, steel cable and rebar, occasional textile, wood, ash, clinker, and paper.				0.5		
								1.0		
								1.5		
								2.0		
								2.5		
								3.0		
								3.5		
								4.0		
								4.5		
								5.0		
				End of Trial Pit at 3.00m						
			Pit Dimensions			Pit Stability				
			Length (m)	Width (m)	Depth (m)	STABLE				
			3.50	1.80	3.00					
			Remarks: Pit dry. Complete at 3.00mbgl.							

		Trial Pit Log					Location Number: TP105		
Project: Tetrosyl, Bury			Client: Tetrosyl Ltd.			Date: 11/12/2023			
Project No. : LKC 23 1650			Contractor: H&C Plant Hire						
Equipment: JCB Excavator			Level	Logged By CD	Scale 1:25	Page Number Sheet 1 of 1			
Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description			Level (m)	Water Strikes	
0.00 - 0.50	ES			MADE GROUND: Dark brown silty sandy gravel with frequent brick and concrete fragments. Sand is fine to coarse.					
		0.50		MADE GROUND: MOT			0.5		
0.80 - 1.30	D	0.80			Black clayey slightly sandy slightly gravelly SILT.			1.0	
1.30 - 1.80	B	1.30			Grey firm to stiff silty slightly sandy slightly gravelly CLAY.			1.5	
1.50 1.50 1.50	SV=44.00kPa SV=48.00kPa SV=52.00kPa	1.80			Orangish grey clayey sandy GRAVEL.			2.0	
		2.50	End of Trial Pit at 2.50m			2.5			
							3.0		
							3.5		
							4.0		
							4.5		
							5.0		
			Pit Dimensions			Pit Stability			
			Length (m)	Width (m)	Depth (m)	STABLE			
			3.50	1.50	3.00				
			Remarks: Seepage occurred from strata at 0.90mbgl. Complete at 2.50mbgl.						

Appendix C – Certificates of Analysis (Soil)



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M26 2ZS

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

DETS Report No: 23-15502

Site Reference: Tetrosyl, Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Sample Receipt Date: 20/12/2023

Sample Scheduled Date: 20/12/2023

Report Issue Number: 1

Reporting Date: 02/01/2024

Authorised by:

Steve Knight
Customer Support Manager

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

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

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

DETS Report No: 23-15502		Date Sampled	15/12/23			Landfill Waste Acceptance Criteria Limits			
LK Consult Limited		Time Sampled	None Supplied			Inert Waste Landfill Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill Hazardous Waste Landfill	3% -- 6 1 500 100 -- --	5% -- -- -- -- -- -- -- To be evaluated	6% 10% -- -- -- -- -- -- To be evaluated
Site Reference: Tetrosyl, Bury		TP / BH No	CP101						
Project / Job Ref: LKC 23 1650		Additional Refs	None Supplied						
Order No: LKC231650CW		Depth (m)	2.70 - 3.00						
Reporting Date: 02/01/2024		DETS Sample No	691607						
Determinand	Unit	MDL							
TOC ^{MU}	%	< 0.1	3.1						
Loss on Ignition ^{MU}	%	< 0.01	7						
BTEX ^{MU}	mg/kg	< 0.05	< 0.05						
Sum of PCBs	mg/kg	< 0.1	< 0.1						
Mineral Oil ^{MU}	mg/kg	< 10	< 10						
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7						
pH ^{MU}	pH Units	N/a	7.3						
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1						
Eluate Analysis				2:1 mg/l	8:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		0.0004	0.0005		0.009	0.5	2	25	
Barium ^U		0.0319	0.0197		0.363	20	100	300	
Cadmium ^U		< 0.0002	< 0.0002		< 0.002	0.04	1	5	
Chromium ^U		0.0003	0.0003		0.006	0.5	10	70	
Copper ^U		0.0036	0.0025		0.045	2	50	100	
Mercury ^U		< 0.00004	< 0.00004		< 0.0004	0.01	0.2	2	
Molybdenum ^U		0.0008	0.0027		0.048	0.5	10	30	
Nickel ^U		0.0007	0.0004		0.0070	0.4	10	40	
Lead ^U		< 0.0002	0.0004		0.007	0.5	10	50	
Antimony ^U		< 0.0002	< 0.0002		< 0.002	0.06	0.7	5	
Selenium ^U		0.0010	0.0006		0.0108	0.1	0.5	7	
Zinc ^U		< 0.001	0.003		0.05	4	50	200	
Chloride ^U		3	2		41	800	15000	25000	
Fluoride ^U		3.4	1.5		27.8	10	150	500	
Sulphate ^U		111	15		313	1000	20000	50000	
TDS		204	73		1383	4000	60000	100000	
Phenol Index ^U		< 0.01	< 0.01		< 0.5	1	-	-	
DOC ^U		18.5	16.1		293	500	800	1000	
Leach Test Information									
Sample Mass (kg)				0.10					
Dry Matter (%)				83.7					
Moisture (%)				19.4					
Stage 1									
Volume Eluate L2 (litres)				0.16					
Filtered Eluate VE1 (litres)				0.04					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-15502	
LK Consult Limited	
Site Reference: Tetrosyl, Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 02/01/2024	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
691607	CP101	None Supplied	2.70 - 3.00	15.8	Brown sandy clay with stones
691608	CP103	None Supplied	1.70 - 2.00	17.5	Brown sandy clay with stones

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

Insufficient Sample ^{1/s}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15502

LK Consult Limited

Site Reference: Tetrosyl, Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 02/01/2024

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

D Dried
AR As Received



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Tel : 01622 850410



Water Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No: 23-15502	
LK Consult Limited	
Site Reference: Tetrosyl, Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 02/01/2024	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered



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List of HWOL Acronyms and Operators	
DETS Report No: 23-15502	
LK Consult Limited	
Site Reference: Tetrosyl, Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 02/01/2024	

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

Det - Acronym
Mineral Oil (C10 - C40) (BS EN 12457-3) - EH_CU_1D_AL
Total BTEX (BS EN 12457-3) - HS_1D_MS_Total

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%



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DETS Report No: 23-15637

Site Reference: Tetosyl Burv
Project / Job Ref: LKC 23 1650
Order No: LKC231650CW
Sample Receipt Date: 22/12/2023
Sample Scheduled Date: 22/12/2023
Report Issue Number: 1
Reporting Date: 04/01/2024

Authorised by:

Steve Knight
Customer Support Manager

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

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



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Soil Analysis Certificate						
DETS Report No: 23-15637	Date Sampled	11/12/23	11/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetosyl Bury	TP / BH No	TP102	TP104			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	1.00 - 2.00	1.00 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692267	692268			

Determinand	Unit	RL	Accreditation	(n)		
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Detected	Detected	
Sample Matrix ^(S)	Material Type	N/a	NONE	Bundles of Chrysotile fibres	Bundles of Chrysotile fibres	
Asbestos Type ^(S)	PLM Result	N/a	ISO17025	Chrysotile	Chrysotile	
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	0.009	0.026	
pH	pH Units	N/a	MCERTS	7.9	8.1	
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	
Free Cyanide	mg/kg	< 1	NONE	< 1	< 1	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	189	51	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.19	0.05	
Organic Matter (SOM)	%	< 0.1	MCERTS	5.4	3.7	
Arsenic (As)	mg/kg	< 2	MCERTS	15	12	
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.6	0.6	
Chromium (Cr)	mg/kg	< 2	MCERTS	23	18	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	96	100	
Lead (Pb)	mg/kg	< 3	MCERTS	329	187	
Mercury (Hg)	mg/kg	< 1	MCERTS	3.1	3.2	
Nickel (Ni)	mg/kg	< 3	MCERTS	23	16	
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	
Vanadium (V)	mg/kg	< 1	MCERTS	28	22	
Zinc (Zn)	mg/kg	< 3	MCERTS	217	203	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	

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

Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-15637	Date Sampled	11/12/23	11/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetosyl Bury	TP / BH No	TP102	TP104			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	1.00 - 2.00	1.00 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692267	692268			

Determinand	Unit	RL	Accreditation	(n)		
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	0.68	1.03	
Anthracene	mg/kg	< 0.1	MCERTS	0.14	0.25	
Fluoranthene	mg/kg	< 0.1	MCERTS	0.99	1.82	
Pyrene	mg/kg	< 0.1	MCERTS	0.94	1.88	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.48	0.96	
Chrysene	mg/kg	< 0.1	MCERTS	0.45	0.83	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.48	0.89	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.13	0.30	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.38	0.75	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.23	0.37	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.23	0.39	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	5.1	9.5	

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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 23-15637	Date Sampled	11/12/23	11/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetosyl Bury	TP / BH No	TP102	TP104			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	1.00 - 2.00	1.00 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692267	692268			

Determinand	Unit	RL	Accreditation	(n)		
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	
Aliphatic >C34 - C44 : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10	
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	2	
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2	< 2	
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2	2	
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	5	9	
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	< 10	
Aromatic >C35 - C44 : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10	
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21	
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42	< 42	

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



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-15637	Date Sampled	11/12/23	11/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetosyl Bury	TP / BH No	TP102	TP104			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	1.00 - 2.00	1.00 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692267	692268			

Determinand	Unit	RL	Accreditation	(n)		
Benzene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2	
Toluene : HS 1D MS	ug/kg	< 5	MCERTS	< 5	< 5	
Ethylbenzene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2	
p & m-xylene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2	
o-xylene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2	
MTBE : HS 1D MS	ug/kg	< 5	MCERTS	< 5	< 5	

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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-15637	
LK Consult Limited	
Site Reference: Tetosyl Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 04/01/2024	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
\$ 692267	TP102	None Supplied	1.00 - 2.00	16.1	Brown sandy clay with stones and concrete
\$ 692268	TP104	None Supplied	1.00 - 2.00	14.3	Brown sandy gravel with stones and concrete

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

Insufficient Sample ^{I/S}

Unsuitable Sample ^{U/S}

\$ samples exceeded recommended holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15637

LK Consult Limited

Site Reference: Tetosyl Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 04/01/2024

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

D Dried
AR As Received



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List of HWOL Acronyms and Operators

DETS Report No: 23-15637

LK Consult Limited

Site Reference: Tetosyl Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 04/01/2024

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

Det - Acronym

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



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DETS Report No: 23-15639

Site Reference: Tetrosvl, Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Sample Receipt Date: 22/12/2023

Sample Scheduled Date: 22/12/2023

Report Issue Number: 1

Reporting Date: 04/01/2024

Authorised by:

Steve Knight
Customer Support Manager

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

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Soil Analysis Certificate

DETS Report No: 23-15639	Date Sampled	15/12/23	15/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetrosyl, Bury	TP / BH No	CP101	CP103			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	2.70 - 3.00	1.70 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692277	692278			

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Detected			
Sample Matrix ^(S)	Material Type	N/a	NONE		Bundles of Chrysotile fibres			
Asbestos Type ^(S)	PLM Result	N/a	ISO17025		Chrysotile			
Asbestos Quantification ^(S)	%	< 0.001	ISO17025		0.004			
pH	pH Units	N/a	MCERTS	8.0	7.9			
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1			
Free Cyanide	mg/kg	< 1	NONE	< 1	< 1			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	248	251			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.25	0.25			
Organic Matter (SOM)	%	< 0.1	MCERTS	3.8	6.6			
Arsenic (As)	mg/kg	< 2	MCERTS	12	13			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	1.1			
Chromium (Cr)	mg/kg	< 2	MCERTS	14	20			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	38	84			
Lead (Pb)	mg/kg	< 3	MCERTS	52	123			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	4.7			
Nickel (Ni)	mg/kg	< 3	MCERTS	12	20			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2			
Vanadium (V)	mg/kg	< 1	MCERTS	30	29			
Zinc (Zn)	mg/kg	< 3	MCERTS	53	233			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

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



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-15639	Date Sampled	15/12/23	15/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetrosyl, Bury	TP / BH No	CP101	CP103			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	2.70 - 3.00	1.70 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692277	692278			

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	0.15	0.52		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.12		
Fluoranthene	mg/kg	< 0.1	MCERTS	0.21	0.82		
Pyrene	mg/kg	< 0.1	MCERTS	0.46	0.81		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.29	0.46		
Chrysene	mg/kg	< 0.1	MCERTS	0.44	0.41		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.30	0.34		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.20		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.19	0.36		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.14	0.23		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.18		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2.2	4.5		



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Soil Analysis Certificate - TPH CWG Banded					
DETS Report No: 23-15639	Date Sampled	15/12/23	15/12/23		
LK Consult Limited	Time Sampled	None Supplied	None Supplied		
Site Reference: Tetrosyl, Bury	TP / BH No	CP101	CP103		
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied		
Order No: LKC231650CW	Depth (m)	2.70 - 3.00	1.70 - 2.00		
Reporting Date: 04/01/2024	DETS Sample No	692277	692278		

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01		
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05		
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2		
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2		
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3		
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3		
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10		
Aliphatic >C34 - C44 : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10		
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21		
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01		
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05		
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2	< 2		
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2	3		
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	4		
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	5	5		
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	14	< 10		
Aromatic >C35 - C44 : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10		
Aromatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	23	< 21		
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42	< 42		



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-15639	Date Sampled	15/12/23	15/12/23			
LK Consult Limited	Time Sampled	None Supplied	None Supplied			
Site Reference: Tetrosyl, Bury	TP / BH No	CP101	CP103			
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied			
Order No: LKC231650CW	Depth (m)	2.70 - 3.00	1.70 - 2.00			
Reporting Date: 04/01/2024	DETS Sample No	692277	692278			

Determinand	Unit	RL	Accreditation				
Benzene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2		
Toluene : HS 1D MS	ug/kg	< 5	MCERTS	< 5	< 5		
Ethylbenzene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2		
p & m-xylene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2		
o-xylene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2		
MTBE : HS 1D MS	ug/kg	< 5	MCERTS	< 5	< 5		



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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-15639	
LK Consult Limited	
Site Reference: Tetrosyl, Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 04/01/2024	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
692277	CP101	None Supplied	2.70 - 3.00	15.9	Grey clay
692278	CP103	None Supplied	1.70 - 2.00	18.7	Brown sandy clay with stones

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

Insufficient Sample ^{I/S}

Unsuitable Sample ^{U/S}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15639

LK Consult Limited

Site Reference: Tetrosyl, Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 04/01/2024

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

D Dried
AR As Received



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List of HWOL Acronyms and Operators

DETS Report No: 23-15639

LK Consult Limited

Site Reference: Tetrosyl, Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 04/01/2024

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

Det - Acronym

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

Appendix D – Certificates of Analysis (Geotechnical)



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DETS Report No: 23-15421

Site Reference: Tetrosyl Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Sample Receipt Date: 18/12/2023

Sample Scheduled Date: 18/12/2023

Report Issue Number: 1

Reporting Date: 22/12/2023

Authorised by:

Steve Knight
Customer Support Manager

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

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Soil Analysis Certificate						
DETS Report No: 23-15421	Date Sampled	11/12/23	11/12/23	11/12/23	11/12/23	11/12/23
LK Consult Limited	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Tetrosyl Bury	TP / BH No	TP101	TP102	TP103	TP104	TP105
Project / Job Ref: LKC 23 1650	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: LKC231650CW	Depth (m)	0.00 - 1.00	1.00 - 2.00	2.00 - 3.00	1.00 - 2.00	0.00 - 0.50
Reporting Date: 22/12/2023	DETS Sample No	691134	691135	691136	691137	691138

Determinand	Unit	RL	Accreditation	(n)				
pH	pH Units	N/a	MCERTS	8.8	7.8	8.1	8.2	8.0
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	1480	1383	1845	1942	1496
Total Sulphate as SO ₄	%	< 0.02	MCERTS	0.15	0.14	0.18	0.19	0.15
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	165	71	52	76	18
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.17	0.07	0.05	0.08	0.02
Total Sulphur	%	< 0.02	NONE	0.07	0.07	0.08	0.09	0.07
Ammonium as NH ₄	mg/kg	< 0.5	MCERTS	11	5.6	5.1	5.3	5.3
Ammonium as NH ₄	mg/l	< 0.05	MCERTS	1.10	0.56	0.51	0.53	0.53
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	11	7	8	42	8
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	5.7	3.4	4	21.1	4.1
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	9	4	6	6	< 3
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	4.5	2.1	3.2	3.1	< 1.5
W/S Magnesium	mg/l	< 0.1	NONE	1.3	1.8	1.6	1.1	1

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

Subcontracted analysis (S)

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



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-15421	
LK Consult Limited	
Site Reference: Tetrosyl Bury	
Project / Job Ref: LKC 23 1650	
Order No: LKC231650CW	
Reporting Date: 22/12/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
691134	TP101	None Supplied	0.00 - 1.00	7.4	Brown sandy clay with stones
691135	TP102	None Supplied	1.00 - 2.00	8	Brown sandy clay with stones and brick
691136	TP103	None Supplied	2.00 - 3.00	8.9	Brown sandy gravel with stones and concrete
691137	TP104	None Supplied	1.00 - 2.00	8.6	Brown gravelly sand with stones and concrete
691138	TP105	None Supplied	0.00 - 0.50	7.2	Brown sandy gravel with stones and concrete

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

Insufficient Sample ^{u/s}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15421

LK Consult Limited

Site Reference: Tetrosyl Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 22/12/2023

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

D Dried
AR As Received



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List of HWOL Acronyms and Operators

DETS Report No: 23-15421

LK Consult Limited

Site Reference: Tetrosyl Bury

Project / Job Ref: LKC 23 1650

Order No: LKC231650CW

Reporting Date: 22/12/2023

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

Det - Acronym

Appendix E – Gas Monitoring Results

	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 1 of 4
		Site Name	Tetrosyl Ltd. Bury	Recent Weather	Clear, Dry, No wind	
		Job Number	LKC 23 1650	Ground Conditions	Snow	
		Engineer	CD	Approx. Air temperature (°C)	3°C	
		Date	19/01/2024	Atmospheric Pressure (Prev. 24 hrs)	Rising	

Site Monitoring Visit Details	BH Ref.	CP102	CP103	CP104												
	Time	12:34:23	12:51:36	13:04:53												
	Barometric Pressure (mb)	1006	1007	1007												
	Relative Pressure (mb)	3.48	0.02	0.05												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	0	0	0												
	Peak Flow (l/hr)	0	0	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	0.4	0.1												
	Peak CO ₂ (%v/v)	0.1	0.4	0.1												
	Steady O ₂ (%v/v)	21.4	21.1	21.5												
	Min O ₂ (%v/v)	21.3	21	21.5												
	Balance (%)	78.5	78.5	78.4												
	Steady CO (ppm)	0	0	0												
	Peak CO (ppm)	0	0	6												
	Steady H ₂ S (ppm)	0	0	0												
	Peak H ₂ S (ppm)	0	0	0												
	Steady PID (ppm)	0	0	0												
	Max PID (ppm)	0	0	0												
	Standing Water Level (mbgl)	Dry	Dry	Dry												
	Installation Base Depth (mbgl)	4.81	4.87	3.89												
	Response Zone/Strata	0	0	0												
	Comments	ed premature	0	0												

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 CH ₄ is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH ₄ . 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	HydroTechnik	UR	Unable to record	l/hr	Litres per hour		
	HT-04	OS	Off recordable scale	mbgl	Metres below ground level		
PID	Mini Rae Lite+ PGM7300	N/A	Not applicable	LEL	Lower explosive limit in air		
	590-913907						

	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 2 of 4
		Site Name	Tetrosyl Ltd. Bury	Recent Weather	Clear, Dry, Slight Breeze	
		Job Number	LKC 23 1650	Ground Conditions	Damp	
		Engineer	CD	Approx. Air temperature (°C)	8°C	
		Date	26/01/2024	Atmospheric Pressure (Prev. 24 hrs)	Rising	

Site Monitoring Visit Details	BH Ref.	CP102	CP103	CP104												
	Time	14:31:16	14:41:06	14:50:03												
	Barometric Pressure (mb)	1016	1017	1016												
	Relative Pressure (mb)	-0.35	0.12	0.05												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	0	0	0												
	Peak Flow (l/hr)	0	0	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)	1.2	0.5	0.1												
	Peak CO ₂ (%v/v)	1.2	0.5	0.1												
	Steady O ₂ (%v/v)	20.4	20.9	21.7												
	Min O ₂ (%v/v)	20.4	20.9	21.7												
	Balance (%)	78.4	78.6	78.2												
	Steady CO (ppm)	0	0	0												
	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)	0	0	0												
	Max PID (ppm)	0	0	0												
	Standing Water Level (mbgl)	Dry	Dry	3.73												
	Installation Base Depth (mbgl)	4.8	4.84	3.87												
	Response Zone/Strata	0	0	0												
	Comments	0	0	0												

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	HydroTechnik	UR	Unable to record	l/hr	Litres per hour		
	HT-02	OS	Off recordable scale	mbgl	Metres below ground level		
PID	-	N/A	Not applicable	LEL	Lower explosive limit in air		
	-						

	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 3 of 4
		Site Name	Tetrosyl Ltd. Bury	Recent Weather	Cloudy, Dry, Slight Breeze	
		Job Number	LKC 23 1650	Ground Conditions	Damp	
		Engineer	CD	Approx. Air temperature (°C)	8°C	
		Date	02/02/2024	Atmospheric Pressure (Prev. 24 hrs)	Variable	

Site Monitoring Visit Details	BH Ref.	CP102	CP103	CP104												
	Time	07:38:30	07:47:04	07:55:24												
	Barometric Pressure (mb)	1015	1016	1016												
	Relative Pressure (mb)	-0.05	0.07	0.05												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	0	0	0												
	Peak Flow (l/hr)	0	0	0												
	Steady CH ₄ (%v/v)	0	0	0.1												
	Peak CH ₄ (%v/v)	0.1	0.1	0.1												
	% LEL ²	0	0	2												
	Steady CO ₂ (%v/v)	1.4	0.4	0.1												
	Peak CO ₂ (%v/v)	1.4	0.4	0.2												
	Steady O ₂ (%v/v)	19.8	21.1	21.7												
	Min O ₂ (%v/v)	19.7	21.1	21.6												
	Balance (%)	78.8	78.5	78.1												
	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	0												
	Max PID (ppm)	0	0	0												
	Standing Water Level (mbgl)	Dry	Dry	3.55												
	Installation Base Depth (mbgl)	4.81	4.85	3.88												
	Response Zone/Strata	0	0	0												
	Comments	0	0	0												

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).	
	G507783	NR	Not recorded	mb	Millibars		
Dipmeter	HydroTechnik	UR	Unable to record	l/hr	Litres per hour		
	HT-03	OS	Off recordable scale	mbgl	Metres below ground level		
PID	-	N/A	Not applicable	LEL	Lower explosive limit in air		
	-						

	LK CONSULT LTD GAS MONITORING RECORD	Site Details		Monitoring Visit Conditions		Visit No. 4 of 4
		Site Name	Tetrosyl Ltd. Bury	Recent Weather	Snowing, Breezy	
		Job Number	LKC 23 1650	Ground Conditions	Damp	
		Engineer	CD	Approx. Air temperature (°C)	3°C	
		Date	08/02/2024	Atmospheric Pressure (Prev. 24 hrs)	Falling	

Site Monitoring Visit Details	BH Ref.	CP102	CP103	CP104												
	Time	15:04:30	15:12:54	15:18:35												
	Barometric Pressure (mb)	976	976	976												
	Relative Pressure (mb)	0	0.14	0.11												
Gas and Groundwater Monitoring Data	Internal Flow ³ (l/hr)	0	0	0												
	Peak Flow (l/hr)	0	0	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)	0.8	0.4	0.1												
	Peak CO ₂ (%v/v)	0.8	0.4	0.1												
	Steady O ₂ (%v/v)	20.6	20.9	21.5												
	Min O ₂ (%v/v)	20.6	20.9	21.4												
	Balance (%)	78.6	78.7	78.4												
	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	0												
	Max PID (ppm)	0	0	0												
	Standing Water Level (mbgl)	Dry	Dry	3.55												
	Installation Base Depth (mbgl)	4.8	4.85	3.88												
	Response Zone/Strata	0	0	0												
	Comments	0	0	0												

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	HydroTechnik	UR	Unable to record	l/hr	Litres per hour		
	HT-02	OS	Off recordable scale	mbgl	Metres below ground level		
PID	-	N/A	Not applicable	LEL	Lower explosive limit in air		
	-						

Appendix F – Generic Assessment Criteria Values

Generic Assessment Criteria Values

Contaminant	SOM	Res +	Res -	Allot.	Comm.	pos resi	pos park	Source	
Metals	Inorganic Arsenic	N/A	37	40	49	640	79	168	DEFRA C4SL
	Beryllium	N/A	1.7	1.7	35	12	2.2	63	LQM S4UL
	Boron	N/A	290	11,000	45	240,000	21,000	46,000	LQM S4UL
	Cadmium	N/A	26	149	4.9	410	220	880	DEFRA C4SL
	Chromium (III)	N/A	910	910	18,000	8,600	1,500	33,000	LQM S4UL
	Chromium (VI)	N/A	21.0	21.0	170.0	49	23.0	250	DEFRA C4SL
	Copper	N/A	2,400	7,100	520	68,000	12,000	44,000	LQM S4UL
	Lead	N/A	200	310	80	2,330	630	1,300	DEFRA C4SL
	Elemental Mercury	N/A	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}	LQM S4UL
	Inorganic Mercury	N/A	40	56	19	1,100	120	240	LQM S4UL
	Methylmercury	N/A	11	15	6.0	320	40	68	LQM S4UL
	Nickel	N/A	180	180	230	980	230	3,400	LQM S4UL
	Selenium	N/A	250	430	88	12,000	1,100	1,800	LQM S4UL
	Vanadium	N/A	410	1,200	91	9,000	2,000	5,000	LQM S4UL
	Zinc	N/A	3,700	40,000	620	730,000	81,000	170,000	LQM S4UL
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000	LQM S4UL
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000	LQM S4UL
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000	LQM S4UL
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000	LQM S4UL
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000	LQM S4UL
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000	LQM S4UL
		2.5%	5,400	35,000	950	540,000	74,000	150,000	LQM S4UL
		6%	11,000	37,000	2,200	540,000	74,000	150,000	LQM S4UL
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49	LQM S4UL
		2.5%	11	14	6.5	170	29	56	LQM S4UL
		6%	13	15	13	180	29	62	LQM S4UL
	Benzo(a)pyrene (only)	1%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		2.5%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
		6%	5.0	5.3	5.70	77	10.0	21	DEFRA C4SL
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13	LQM S4UL
		2.5%	3.3	4.0	2.1	44	7.2	15	LQM S4UL
		6%	3.7	4.0	3.9	45	7.2	16	LQM S4UL
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400	LQM S4UL
		2.5%	340	360	470	4,000	640	1,500	LQM S4UL
		6%	350	360	640	4,000	640	1,600	LQM S4UL
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370	LQM S4UL
		2.5%	93	110	75	1,200	190	410	LQM S4UL
		6%	100	110	130	1,200	190	440	LQM S4UL
	Chrysene	1%	15	30	4.1	350	57	93	LQM S4UL
		2.5%	22	31	9.4	350	57	110	LQM S4UL
		6%	27	32	19	350	57	120	LQM S4UL
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1	LQM S4UL
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3	LQM S4UL
		6%	0.3	0.32	0.43	3.6	0.58	1.4	LQM S4UL
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300	LQM S4UL
		2.5%	560	1,600	130	23,000	3,100	6,300	LQM S4UL
		6%	890	1,600	290	23,000	3,100	6,400	LQM S4UL
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000	LQM S4UL
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000	LQM S4UL
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000	LQM S4UL
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150	LQM S4UL
		2.5%	36	46	21	510	82	170	LQM S4UL
		6%	41	46	39	510	82	180	LQM S4UL
	Naphthalene	1%	2.3 ^f	2.3 ^f	4.1 ^f	190 ^f (76.4) ^{sol}	4,900 ^f	1,200 ^f (76.4) ^{sol}	LQM S4UL
		2.5%	5.6 ^f	5.6 ^f	10 ^f	460 ^f (183) ^{sol}	4,900 ^f	1,900 ^f (183) ^{sol}	LQM S4UL
		6%	13 ^f	13 ^f	24 ^f	1,100 ^f (432) ^{sol}	4,900 ^f	3,000	LQM S4UL
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200	LQM S4UL
		2.5%	220	1,500	38	22,000	3,100	6,200	LQM S4UL
		6%	440	1,500	90	22,000	3,100	6,300	LQM S4UL
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000	LQM S4UL
		2.5%	1,200	3,800	270	54,000	7,400	15,000	LQM S4UL
		6%	2,000	3,800	620	54,000	7,400	15,000	LQM S4UL
	Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4	LQM S4UL
		2.5%	0.98	1.2	0.67	15	2.2	4.7	LQM S4UL
		6%	1.1	1.2	1.2	15	2.2	4.8	LQM S4UL

Generic Assessment Criteria Values

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

Generic Assessment Criteria Values

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

Generic Assessment Criteria Values

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

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

f=naphthalene is based on comparison of inhalation exposure with TDI(inhal) for localised effect

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

dir = S4ULs based on threshold protective of direct skin contact with phenol)brackets long term exposure for illustration purposes)

g = derived based on 2,3,4-tetrachlorophenol

Appendix G – Comparison Output Sheets

Summary Results Sheet

Job Name Tetrosyl, Bury
Job Number LKC 23 1650
Assessment Threshold Used Commercial

Determinant	Units	LoD	Total Samples	Range of Values	
				Min	Max
pH	N/a	N/a	9	7.80	8.80
Water Soluble Sulphate as SO4 (Z-1) BRE SD1	mg/l	< 10	9	18.00	251.00
Moisture Content	%	< 0.1	4	14.30	18.70
Organic Matter - By Analyser	%	< 0.1	4	3.70	6.60
Arsenic	mg/kg	< 2	4	12.00	15.00
Beryllium					
Water Soluble Boron	mg/kg	< 1	4	< 1	< 1
Cadmium	mg/kg	< 0.2	4	0.60	1.10
Copper	mg/kg	< 4	4	38.00	100.00
Chromium	mg/kg	< 2	4	14.00	23.00
Hexavalent Chromium	mg/kg	< 2	4	< 2	< 2
Free Cyanide	mg/kg	< 1	4	< 1	< 1
Total Cyanide	mg/kg	< 1	4	< 1	< 1
Lead	mg/kg	< 3	4	52.00	329.00
Mercury, Elemental					
Mercury, Methyl	mg/kg	< 1	4	3.10	4.70
Nickel	mg/kg	< 3	4	12.00	23.00
Selenium	mg/kg	< 2	4	< 2	< 2
Vanadium	mg/kg	< 1	4	22.00	30.00
Zinc	mg/kg	< 3	4	53.00	233.00
Monohydric Phenols	mg/kg	< 2	4	< 2	< 2
Asbestos Screen	N/a	N/a	3	0.00	0.03
Naphthalene	mg/kg	< 0.1	4	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	4	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	4	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	4	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	4	0.15	1.03
Anthracene	mg/kg	< 0.1	4	0.12	0.25
Fluoranthene	mg/kg	< 0.1	4	0.21	1.82
Pyrene	mg/kg	< 0.1	4	0.46	1.88
Benzo(a)anthracene	mg/kg	< 0.1	4	0.29	0.96
Chrysene	mg/kg	< 0.1	4	0.41	0.83
Benzo(b)fluoranthene	mg/kg	< 0.1	4	0.30	0.89
Benzo(k)fluoranthene	mg/kg	< 0.1	4	0.13	0.30
Benzo(a)pyrene	mg/kg	< 0.1	4	0.19	0.75
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	4	0.14	0.37
Di-benzo(a,h)anthracene	mg/kg	< 0.1	4	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	4	0.18	0.39
Total EPA-16 PAHs	mg/kg	< 1.6	4	2.20	9.50
TPH CWG - Aliphatic >C5 - C6	mg/kg	< 0.01	4	< 0.01	< 0.01
TPH CWG - Aliphatic >C6 - C8	mg/kg	< 0.05	4	< 0.05	< 0.05
TPH CWG - Aliphatic >C8 - C10	mg/kg	< 2	4	< 2	< 2
TPH CWG - Aliphatic >C10 - C12	mg/kg	< 2	4	< 2	< 2
TPH CWG - Aliphatic >C12 - C16	mg/kg	< 3	4	< 3	< 3
TPH CWG - Aliphatic >C16 - C21	mg/kg	< 3	4	< 3	< 3
TPH CWG - Aliphatic >C21 - C34	mg/kg	< 10	4	< 10	< 10
TPH CWG - Aliphatic >C34 - C44	mg/kg	< 20	4	< 20	< 20
TPH CWG - Aliphatic >C5 - C44	mg/kg	< 21	4	< 21	< 21
TPH CWG - Aromatic >C5 - C7	mg/kg	< 0.01	4	< 0.01	< 0.01
TPH CWG - Aromatic >C7 - C8	mg/kg	< 0.05	4	< 0.05	< 0.05
TPH CWG - Aromatic >C8 - C10	mg/kg	< 2	4	2.00	2.00
TPH CWG - Aromatic >C10 - C12	mg/kg	< 2	4	2.00	3.00
TPH CWG - Aromatic >C12 - C16	mg/kg	< 2	4	2.00	4.00
TPH CWG - Aromatic >C16 - C21	mg/kg	< 3	4	5.00	9.00
TPH CWG - Aromatic >C21 - C35	mg/kg	< 10	4	14.00	14.00
TPH CWG - Aromatic >C35 - C44	mg/kg	< 21	4	< 21	< 21
TPH CWG - Aromatic >C5 - C44	mg/kg	< 21	4	23.00	23.00
TPH CWG - Total >C5 - C44	mg/kg	< 42	4	< 42	< 42
Benzene	ug/kg	< 2	4	< 2	< 2
Toluene	ug/kg	< 5	4	< 5	< 5
Ethylbenzene	ug/kg	< 2	4	< 2	< 2
m & p-xylene	ug/kg	< 2	4	< 2	< 2
o-xylene	ug/kg	< 2	4	< 2	< 2
MTBE	ug/kg	< 5	4	< 5	< 5
Dichlorodifluoromethane	ug/kg	< 5			
Vinyl Chloride	ug/kg	< 5			
Chloromethane	ug/kg	< 10			
Chloroethane	ug/kg	< 5			
Bromomethane	ug/kg	< 10			
Trichlorofluoromethane	ug/kg	< 5			
1,1-Dichloroethene	ug/kg	< 5			
MTBE	ug/kg	< 5	4	< 5	< 5
trans-1,2-Dichloroethene	ug/kg	< 5			
1,1-Dichloroethane	ug/kg	< 5			
cis-1,2-Dichloroethene	ug/kg	< 5			
2,2-Dichloropropane	ug/kg	< 5			
Chloroform	ug/kg	< 5			
Bromochloromethane	ug/kg	< 5			
1,1,1-Trichloroethane	ug/kg	< 5			
1,1-Dichloropropene	ug/kg	< 10			
Carbon Tetrachloride	ug/kg	< 5			
1,2-Dichloroethane	ug/kg	< 5			
Benzene	ug/kg	< 2	4	< 2	< 2
1,2-Dichloropropane	ug/kg	< 5			
Trichloroethane	ug/kg	< 5			
Bromodichloromethane	ug/kg	< 5			
Dibromomethane	ug/kg	< 5			
TAME	ug/kg	< 5			
cis-1,3-Dichloropropene	ug/kg	< 5			
Toluene	ug/kg	< 5	4	< 5	< 5
trans-1,3-Dichloropropene	ug/kg	< 5			
1,1,2-Trichloroethane	ug/kg	< 10			
1,3-Dichloropropane	ug/kg	< 5			
Tetrachloroethene	ug/kg	< 5			
Dibromochloromethane	ug/kg	< 5			
1,2-Dibromoethane	ug/kg	< 5			
Chlorobenzene	ug/kg	< 5			
1,1,1,2-Tetrachloroethane	ug/kg	< 5			
Ethylbenzene	ug/kg	< 2	4	< 2	< 2
m,p-Xylene	ug/kg	< 2			
o-Xylene	ug/kg	< 2	4	< 2	< 2
Styrene	ug/kg	< 5			
Bromofom	ug/kg	< 10			
Isopropylbenzene	ug/kg	< 5			
1,1,2,2-Tetrachloroethane	ug/kg	< 5			
1,2,3-Trichloropropane	ug/kg	< 5			
n-Propylbenzene	ug/kg	< 5			
Bromobenzene	ug/kg	< 5			
2-Chlorotoluene	ug/kg	< 5			
1,3,5-Trimethylbenzene	ug/kg	< 5			
4-Chlorotoluene	ug/kg	< 5			
tert-Butylbenzene	ug/kg	< 5			
1,2,4-Trimethylbenzene	ug/kg	< 5			
sec-Butylbenzene	ug/kg	< 5			
p-Isopropyltoluene	ug/kg	< 5			
1,3-Dichlorobenzene	ug/kg	< 5			
1,4-Dichlorobenzene	ug/kg	< 5			
n-Butylbenzene	ug/kg	< 5			
1,2-Dichlorobenzene	ug/kg	< 5			
1,2-Dibromo-3-chloropropane	ug/kg	< 10			
Hexachlorobutadiene	ug/kg	< 5			
Name Compound 1	N/a	N/a			
Name Compound 2	N/a	N/a			
Name Compound 3	N/a	N/a			
Name Compound 4	N/a	N/a			
Name Compound 5	N/a	N/a			
% Match Compound 1	%	N/a			
% Match Compound 2	%	N/a			
% Match Compound 3	%	N/a			
% Match Compound 4	%	N/a			
% Match Compound 5	%	N/a			
Concentration Compound 1	ug/kg	< 10			
Concentration Compound 2	ug/kg	< 10			

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- » Geotechnical
- » Contaminated
- » SuDS & Flood Risk
- » Project Management
- » Land Remediation
- » Land Drilling
- » Japanese Knotweed
- » Air Tightness Testing

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 552⁵⁵. 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 is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

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

Appendix B – Profile Logs

Appendix C – Certificates of Analysis (Soil)

Appendix D – Certificates of Analysis (Geotechnical)

Appendix E – Certificates of Analysis (Water / Leaching Tests)

Appendix F – Gas Monitoring Results

Appendix G – Falling Head Tests / Soakaway Tests

Appendix H – Generic Assessment Criteria Values

Appendix I – Comparison Output Sheets

Appendix J – Hazard Index Sheets

Appendix K – References

- ¹ Building Research Establishment (BRE), June 2005, "Concrete in Aggressive Ground", SD1.
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- ²¹ Environment Agency, November 2008, "Compilation of data for priority organic pollutants for derivation of Soil Guideline Values", Science Report SC050021/SR7.
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