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PHASE 2

GEO-ENVIRONMENTAL REPORT

| | | | |
|--------------|--|------------|--------------|
| job number | C4503/24/E/6885 | date | 21.03.2025 |
| site address | Royd Moor House Farm, Thurlstone, Sheffield, South Yorkshire, S36 7RD | | |
| written by | S. Hale | checked by | S. Alexander |
| issued by | S. Hale | | |

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Report on a Phase 2 Geo-environmental Investigation

| | | |
|------------|---|-------------------------|
| Location: | Royd Moor House Farm, Thurlstone, Sheffield, S36 7RD | |
| For: | Kingsman Homes | |
| Report No. | C4503/24/E/6885 | Report date: March 2025 |

For and on behalf of **Rogers Geotechnical Services Ltd**

| | |
|---|--|
|  |  |
| Steven Hale BSc FGS Geo-environmental Technician | Scott Alexander BSc FGS Senior Geo-environmental Engineer |

Report Summary¹

| Item | Comments | Section |
|---------------------|--|---------|
| Development | Construction of a new residential development. | 1. |
| Geology | Superficial geology – None. Solid geology – Grenoside Sandstone. | 5. |
| Strata Conditions | Made ground overlaying the weathered fraction of the underlying Grenoside Sandstone. | 6. |
| Groundwater | None encountered during investigation. | 6.2 |
| Foundation Design | Shallow foundation solution. | 10. |
| Effect of Sulphates | DS-1, AC-1, DC-1 concrete. | 10.4 |
| Contamination | Asbestos contamination revealed within TP05. | 11. |

¹ This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

It is understood that the land at Royd Moor House Farm, Thurlstone is to be developed by the construction of a series of residential houses. Consequently, a site investigation has been undertaken in accordance with the instruction from the client. This work was required in order to determine the nature of the underlying soils, to assess their engineering properties and to assist in the design of safe and economical foundations for the proposed development. This investigation also takes into consideration the risk of any contamination present. This report describes the work undertaken, presents the data obtained and discusses the ground conditions in relation to the proposed works.

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of the laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between borehole positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Desk Study

A Phase 1 Desk Study has been undertaken by Rogers Geotechnical Services (RGS) and the results were presented as report number C4503/24/E/6882 in January 2025. This report has been used extensively during the current intrusive investigation.

4. Fieldworks

The fieldworks were undertaken on the 10th February 2025 and included six machine excavated trial pits. The investigatory locations are shown on the site plan which is presented in Appendix 1 to this report.

4.1 Trial Pits (Mechanical Plant)

A total of six trial pits were excavated in order to reveal the nature of the near surface soils using a tracked mini-excavator. The soils were logged on site in general accordance with BS5930: 2015+A1: 2020, and full descriptions are given on the trial pit records which are presented in Appendix 2. At regular intervals throughout the excavation of the pits, samples were taken for chemical and geotechnical testing. The test specimens were retained in the appropriate air tight containers within cool boxes for onward transition to the laboratory.

Once excavations were completed, the trial pits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the back-acting arm of the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of any pits undertaken in this investigation should be conveyed to the current site user, as the mounds or depressions associated with the pits may present a risk to current site operations e.g. livestock or agricultural plant equipment. Furthermore, it must be realised that the infilled pits represent an area of disturbance within the site soils, thus the soils at the pit locations may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

At the locations TP04, and TP06 the surface was broken out to reveal the strata beneath the concrete hardstanding.

5. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

| Strata Type | Strata Name ² | Previous Name ³ | Description ³ |
|---------------------|--------------------------|----------------------------|--|
| Artificial Ground | Made Ground | N/A | Not indicated on site although previous construction may have resulted in the presence of made ground. |
| Superficial Geology | N/A | N/A | Not indicated to underlie the site. |
| Solid Geology | Grenoside Sandstone | - | The Grenoside Sandstone is a fine-grained, thinly bedded, cross-laminated, micaceous and carbonaceous sandstone. |

6. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile

| Depth m below ground level to underside of layer | Strata Type | Positions Encountered | Groundwater Strikes m below ground level |
|--|--|--------------------------|---|
| 0.10 – 0.30 | TOPSOIL (Dark brownish grey SAND and CLAY) | TP01 – TP03 | None |
| 0.05 | MADE GROUND (CONCRETE) | TP04 | None |
| 0.05 | MADE GROUND (Asphalt) | TP06 | None |

² Sources: British Geological Survey (NERC) Map Sheet 86; Glossop; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

³ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

| | | | |
|----------------|---|-----------------------|-------|
| 0.25 – 0.40 | MADE GROUND (gravelly SAND) [SUBBASE] | TP04 & TP06 | None |
| +0.45 to +1.30 | Yellowish brown gravelly cobbly SAND. [GRENOSIDE SANDSTONE MEMBER] | TP01 – TP04 & TP06 | None |
| +1.10 | MADE GROUND (Grey gravelly cobbly SAND). | TP05 | 1.10m |

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated

6.1 General Strata

In TP01 to TP03 the ground conditions comprised a thin capping of topsoil was underlain by sand, gravel and cobbles of highly weathered sandstone to depths between 0.45m below existing ground level (begl) and 1.30m begl thought to represent the Grenoside Sandstone Member.

Beneath the concrete hardstanding at TP04, a gravelly sand subbase was revealed overlying completely weathered sandstone recorded as gravelly cobbly sand to 1.40m begl. Beneath the hardstanding in TP06, subbase of gravelly sand was revealed to 0.40m begl underlain by weathered sandstone recovered as gravelly cobbly sand.

In TP05, no natural deposits were encountered and the trial pit comprised entirely of made ground of gravelly cobbly bouldery sand with common concrete blocks. The trial pit was abandoned at 1.10m where no further excavation could be made, as an inferred concrete slab was encountered. The client should be aware that this ground was extremely unstable and the pit was also abandoned due to the pit walls starting to undermine the excavator.

6.2 Groundwater

Perched groundwater was recorded on top of the buried obstruction in TP05 at a depth of 1.10m begl. No other water strikes were recorded. However, it should be appreciated that the normal rate of boring does not permit the recording of an equilibrium water level for any one strike, moreover, groundwater levels are subject to seasonal variation or changes on local drainage conditions.

7. Laboratory Testing - Geotechnical

The following programme of laboratory testing has been undertaken on samples obtained during this investigation:

- Determination of water content BS EN ISO 17892-1:2014
- Determination of particle size distribution (Dry) BS EN ISO 17892-4:2016: 5.2
- Determination of total sulphur BS 1377-3:2018+A1:2021: Pt3: 7.10
- Soluble sulphate content BS 1377-3:2018+A1:2021: Pt3: 7.3
- pH value BS 1377-3:2018+A1:2021: Pt3: 12

The test results are presented in Appendix 3 and are summarised below:

Table 6: Summary of Geotechnical Test Results

| Test type | Number of tests | Range of results | | Comments |
|--|-----------------|---|--|--|
| Water content determinations | 2 | 11% & 13% | | GRAVEL. |
| Particle size distribution (Dry sieve) | 2 | Very Coarse Gravel Sand Silt/Clay | 48% & 00% 42% & 80% 26% & 18% 4% & 2% | SANDSTONE recovered as very cobbly very sandy to sandy GRAVEL. |
| Soluble sulphate & pH | 4 | SO ₄ pH | 4.67 to 203 mg/l 7.2 to 8.4 | Natural ground. Brownfield conditions. |

7.1 Geotechnical Properties

The idealised geotechnical properties employed in design are summarised below.

Table 7: Summary of Geotechnical Properties

| Property | Range of values | Comments |
|--------------------------------|-----------------|---|
| Volume change potential (NHBC) | N/A | Non-Plastic |
| Concrete classification | DC1 | Natural ground locations (Static water) |

8. Laboratory Testing - Environmental

A suite of testing was conducted on samples from across the site and the following regime was undertaken.

- Metals – Cd, Cr^{VI}, Cu, Hg, Ni, Pb, V and Zn.
- Semi and Non-Metals - As, Se, Free CN⁻ and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).
- Others – pH, organic content and total/soluble SO₄²⁻.
- Asbestos.

This testing was undertaken by i2 Analytical Ltd and the results of all of the chemical testing are presented in Appendix 3 of this report.

9. Discussion of Ground Conditions - Geotechnical

It is understood that the site is to be developed by the construction of a series of residential houses. At the time of writing this report the precise layout and method of construction is not known, thus the discussion below is of a generalised nature.

The investigation has revealed that in TP01 to TP03 beneath a thin capping of topsoil, soils representing weathered bedrock are likely to be encountered as a sandy to very sandy cobbly gravel at depths up to 1.30m begl. Indeed, it became difficult to excavate below 0.60m begl with the mini excavator in TP01 and TP02.

In TP04 and TP06, beneath a capping of made ground and subbase weathered bedrock was recovered as very sandy cobbly gravel. In TP05 no natural deposits were encountered and the trial pit was abandoned at 1.10m begl where an obstruction was encountered.

It is considered that excavations for foundations should be placed at a minimum depth of 0.70m below existing or finish ground levels whichever is lower to protect against frost and excavations should be extended until hard dig or rip conditions are encountered by plant, where increasing competency of sandstone bedrock is anticipated.

Following demolition of the existing buildings, further investigation works should be undertaken at the location of TP05 to determine the nature and extent of the buried obstruction encountered. It is anticipated in this location that foundations are likely to require to penetrate to depths exceeding 1.50m begl and this should be allowed for in any structural designs.

9.1 General Comments for Excavations

The stability of excavation faces cannot be guaranteed thus temporary support to the excavation faces may become necessary unless the foundations are constructed using trench-fill techniques. In this method the foundation trenches should be excavated, inspected and backfilled with concrete as a continuous operation. Under no circumstances should operatives be allowed to enter unsupported excavations.

Should the excavations be required to stand open, it is considered that a blinding layer of lean-mixed concrete be placed over the sub-grade. This expedient will reduce loosening or softening of the underling soil due to both physical disturbance and the ingress of surface water.

Should seepage of groundwater be encountered it is considered that it could be dealt with using a simple form of de-watering. Such a system could include the excavation of sumps from which the water could be pumped.

9.2 Ground-floors

In light of the made ground and weak near surface soils, which were revealed to depths of up to 1.10m, it is not recommended that ground bearing ground floor slabs be employed. In this instance it would be necessary to suspend floors between foundation positions, such that the floor loads are transmitted via the foundations to competent soils at depth.

9.3 Hard-standing Areas

It is considered that any hard-standing at the site could be constructed employing traditional pavement design. A design California Bearing Ratio (CBR) of 3% could be employed in the pavement design⁴. However, it is recommended that proof rolling of the sub-grade be undertaken to establish the suitability of the soils, to expose any soft or weak ground and to ensure the sub-grade is well compacted prior to construction. Any areas of soft or weak ground should be remediated by increasing the sub-base thickness. Alternatively, weak material could be locally removed and replaced with a compacted granular capping layer. If construction were to be undertaken during the winter or after periods of prolonged rainfall, it may be prudent to employ a geotextile and/or a geogrid between the sub-base and sub-grade.

⁴ Table 11.1, *Reproduction of TRRL Report LR1132 (1984)*, Smith (2006), Smith's Elements of Soil Mechanics, 8th ed.

9.4 Effect of Sulphates

In view of the nature of the underlying soils it is considered that the design sulphate class be assessed with reference to Table C2⁵, which is provided in BRE Special Digest 1, *Concrete in aggressive ground*: Part C. On the basis of this table and considering the soluble sulphate contents recorded, it can be shown that well compacted buried concrete should be designed in accordance with Class DS-2 requirements. Assuming mobile groundwater, the table also indicates that the aggressive chemical environment for concrete (ACEC) classification is AC-1.

In order to evaluate the design chemical (DC) class for the buried concrete at this site reference should be made to Table D1⁶, which can be found in Part D, *Specifying concrete for general cast-in-situ use*, of BRE Special Digest 1. From this table it may be shown that for an intended working life of at least 50 years the concrete design class DC-1 is required.

10. Discussion of Ground Conditions - Environmental

10.1 Discussion of Test Results

It is understood that the site is to be developed by the construction of a series of residential houses. Consequently, the site may be classified as residential with plant uptake.

The samples were targeted at proposed soft landscaped areas where the predominant pathways to end users would be present. Two samples, TP04 and TP06, were taken below the existing hardstanding in yards where plant and vehicles were stored to investigate potential contamination. TP05, was undertaken in an area of land which was surrounded by a concrete buffer to separate it from the rest of the site. TP03, was moved slightly to be undertaken adjacent to a stockpile of tyres and disused car batteries to identify any potential contamination to the underlying natural deposits.

10.1.1 Soil Samples

The results of the chemical testing undertaken on soil samples obtained during this investigation have been compared to the ATRISK soil screening values (SSVs) as compiled by WS Atkins plc. With respect to the results it should be appreciated that the soil organic matter (SOM) content for the samples tested was found to range between 0.7% and 3.9%. On this basis, it is considered that the screening values associated with 1% SOM should be adopted. These values have been derived in such a way as to adhere to the principles within the revised CLEA model and include the most current release of the SGVs. A list of subscribers is provided within the website⁷ and these include many local authorities.

A comparison of the results of the testing, together with the data given above, can be found within Appendix 4. These results indicate the following:

⁵ Table C2, *Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations*

⁶ Table D1, *Selection of the DC Class and the number of APMs for concrete elements where the hydraulic gradient due to groundwater is 5 or less: for general in-situ use of concrete.*

⁷ <http://www.atrisksoil.co.uk/pages/general/subscribers.asp>

Table 8: Summary of Contaminated Areas

| Location | Depth (m) | Contaminants found to be exceeding SSVs (Residential with plant uptake) |
|----------|-------------|--|
| TP01 | 0.20 – 0.30 | PAHs: Benzo(g,h,i)perylene. |
| TP02 | 0.10 – 0.20 | PAHs: Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-c,d)Pyrene, Dibenz(a,h)Anthracene & Benzo(g,h,i)perylene. |
| TP03 | 0.10 – 0.20 | None. |
| TP04 | 0.10 – 0.20 | PAHs: Chrysene, Indeno(1,2,3-c,d)Pyrene, Dibenz(a,h)Anthracene & Benzo(g,h,i)perylene. |
| TP05 | 0.60 | Asbestos. Chrysotile 0.008% PAHs: Chrysene, Indeno(1,2,3-c,d)Pyrene, Dibenz(a,h)Anthracene & Benzo(g,h,i)perylene. |
| TP06 | 0.10 – 0.20 | None. |

Concentrations of cadmium, chromium^{VI}, mercury, free cyanide, phenols (total) and total petroleum hydrocarbons (aliphatic C5 to C12; aromatic C5 to C12) were below the detection limits for the tests. Detectable levels of all other contaminants were recorded, but these fell below the associated Atrisk Soil Screening Values. In addition, asbestos was detected within the soil sample tested within TP05, this was recorded as asbestos cement. Consequently, a quantification of the asbestos was carried out that found it made up 0.008% of the sample tested.

It should be appreciated that the soil screening values for PAHs and TPHs (where appropriate) represents vapour saturation limits. The inhalation of vapour pathway contributes less than 10% of total exposure, which is unlikely to significantly affect the combined assessment criterion⁸. In view of this, the ATRISK soil SSVs notes that the users may wish to consider using a combined assessment criterion if free product is not observed, the values for which are also provided on the summary of contamination analysis. It is therefore considered that the criteria for no free product should be adopted for the PAHs and TPHs at this site. The results of the contaminants found to exceed these screening values are tabulated below:

Table 9: Summary of Areas Contaminated by PAHs & TPHs

| Location | Depth (m) | Contaminants found to be exceeding SSVs (Residential with Plant Uptake) |
|----------|-------------|---|
| TP01 | 0.20 – 0.30 | None. |
| TP02 | 0.10 – 0.20 | None. |
| TP03 | 0.10 – 0.20 | None. |
| TP04 | 0.10 – 0.20 | None. |
| TP05 | 0.60 | None. |
| TP06 | 0.10 – 0.20 | None. |

On the basis of the above information, the results of the investigation have concluded that the site is contaminated with asbestos in regards to the intended end use.

⁸ Ref: ATRISK soil, SSVs derived using CLEA v1.071 for 1% SOM, Residential with home grown produce land use, 23.06.17.

10.2 Site Specific Risk Assessment

10.2.1 Approach

The presence of contamination hazards and the risks associated with them should be assessed in accordance with industry practice and the 'suitable for use' approach. This has been conducted with reference to The Department for Environment, Food and Rural Affairs (DEFRA) and The Environment Agency⁹ advice on the assessment of risks arising from the presence of contamination in soils and using the source-pathway-receptor approach.¹⁰ This method dictates that there must be a risk of contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed, DEFRA and The Environment Agency state that 'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'¹¹

10.2.2 Conceptual Ground Model and Risk Assessment

In view of the results of the chemical testing undertaken the conceptual site model is presented accordingly as Table 10. Sources of contamination include the following:

On-site – Made Ground (Asbestos).

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

| | |
|-------------------|---|
| N/A - | A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required. |
| Low - | A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence. |
| Moderate - | The linkage exists but the likelihood of harm occurring is not considered to be significant although remedial action may be necessary |
| High - | The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary. |

The results of the risk assessment are presented in Table 10.

⁹ R&D Publication CLR 8, 'Assessment of Risks to Human Health from Land Contamination: An overview of the Development of Soil Guideline Values and Related Research'.

¹⁰ The pollution linkage approach was developed by 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990' which provides meanings for the terms contained in The Environmental Protection Act 1990 Part IIA, the primary legislation for addressing the issues of contaminated land.

¹¹ See 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990', appendix A.



Table 10: Conceptual Site Model and Site-Specific Risk Assessment [Contamination: Asbestos]

| Conceptual Site Model | | | Site Specific Risk Assessment | |
|--|------------|---|-------------------------------|--|
| Pathways | Receptor | Linkage Present? | Risk Rating | Notes |
| Direct contact/dermal absorption/soil ingestion | Operative | Yes – Local asbestos found to be present at the site and contact with soil likely during works. | High | Some contamination is present in the soils underlying the site. Precautionary measures will be required during the construction phase. Some Remedial works will be required to either remove the contamination or break pathways. However, as the site is anticipated to be secured during the development phase, contamination is not anticipated to affect neighbours. |
| | End User | Yes – Local asbestos found to be present at the site and site to be developed into residential dwellings with landscaped areas. | High | |
| | Neighbours | Yes – asbestos found to be present at the site and a residential dwelling is present adjacent to the site. | Low | |
| Inhalation of Dust/Vapours | Operative | Yes – dust may be derived from asbestos contaminated soils. | High | Some contamination is present underlying the site. Precautionary measures will be required during the construction phase. Some Remedial works will be required to either remove the contamination or break pathways. |
| | End User | Yes – dust may be derived from asbestos contaminated soils. | High | |
| | Neighbours | Yes – asbestos found to be present at the site and residential property is located adjacent to the site and possible inhalation of dust during the works. | High | |
| Ingestion of fruit/vegetables and/or waters | Operative | No – no edible plants or contained water sources in the area of the proposed new works. | N/A | Some contamination is present underlying the site. Precautionary measures will be required during the construction phase. Remediation will be required to either remove the contamination or break pathways. However, the contamination at the site is considered to be of limited mobility, therefore the likelihood of contamination affecting neighbouring gardens is considered low risk. |
| | End User | Yes – Local asbestos found to be present at the site and a residential development with landscaped areas is proposed. | Moderate | |
| | Neighbours | Yes – asbestos found to be present at the site and a residential dwelling is present adjacent to the site. | Low | |
| Migration of hazardous gases via permeable strata or shallow mining activity | Operative | No – it is not considered that the made ground encountered on site is capable of producing ground gases hazardous to health. | N/A | No further action required. |
| | End User | | N/A | |

| | | | | |
|---|--------------------|---|-----------------------------|---|
| | Neighbours | | N/A | |
| Spillage/loss/run off direct to receiving water | Controlled Waters | Yes – known controlled waters within 250m. However, contamination by asbestos is not anticipated to be significantly mobile. | Low | Some contamination is present underlying the site. Remediation will be required to either remove the contamination or break pathways. Old services to be removed or capped. |
| Migration via permeable unsaturated strata | Controlled Waters | Yes – a secondary A aquifers is present beneath the site. However, contamination by asbestos is not anticipated to be significantly mobile. Potentially permeable stratum at or very close to the surface. Care taken to ensure leaks/spills do not enter into bedrock. | Low | |
| Run off via drainage/sewers etc | Controlled Waters | Yes – old services may be present on site. However, contamination by asbestos is not anticipated to be significantly mobile. | Low | |
| Direct contact with contaminated soils | Plants | Yes – asbestos contamination is present to the site, however, it is not expected that it will cause harm to plants. | Low | No further action required. |
| Uptake via root system | | | Low | |
| Direct contact with contaminated soils | Building Materials | Yes – elevated presence of PAHs revealed at the site may represent a risk to building materials or plastic water pipes. pH >8 precludes copper pipes. Moreover, testing indicates that the aggressive chemical environment for concrete classification is AC-1. | Moderate (plastic services) | Please see section 11.3.3 for information on good building practice. |
| Direct contact with contaminated groundwater | | | Low (buried concrete) | |
| Exposure to Radon | Operative | No – Not in a radon affected area. | N/A | Less than 1% of properties are above the action level. No radon protection measures required. |
| | End User | | | |
| UXO Risk | Operative | No – it is considered that the activities of the end users are unlikely to affect any UXO devices that may be present below the site. | Low | No further action required. |
| | End User | | | |

10.3 Indicative Remediation Strategy

In view of the site-specific risk assessment it is considered that some remediation will be required at this site. The asbestos encountered was recovered from the deep made ground local to TP05 where concrete and a buried obstruction have been observed which may represent a former structure it is considered that this represents a hotspot of contamination directly related to this deeper made ground material. Such a strategy should include the following main elements.

10.3.1 Remediation Objectives

Based on the site-specific risk assessment the object of the remediation is likely to be as follows.

- To protect the site operatives during the construction process from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust and asbestos fibres.
- To protect the end user from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust or asbestos fibres.
- To protect neighbours from the inhalation and ingestion dust and asbestos fibres during the construction process.
- To protect plants from direct contact with contamination and prevent uptake via root system.
- To ensure that contamination cannot reach controlled waters via surface run-off or permeable strata.
- To ensure that contamination cannot enter the former services occupying the site which may return to controlled waters.
- To protect plastic services from being penetrated by, or degrading due to the presence of, contamination in the soil or groundwaters.

10.3.2 Development Requirements

Whilst the precise nature of this development has not been finalised it is understood that it is to be developed by the construction of a series of residential houses. In view of the above a site-specific remediation strategy should be undertaken after the proposed development has been finalised. However, for preliminary design and costing the following remediation proposals are offered.

10.3.3 Outline Strategy

In order to fulfil the objectives defined above it is likely that the following remedial strategy could be utilised. Given that made ground across the majority of the site is thin, and generally inert it is recommended that a localised pragmatic approach be undertaken with respect to the contamination hotspots, with observational techniques being employed at each stage of the work.

Ground-works

During the ground-works phase of the development, protection to the site operatives is required. The risk to site operatives is considered under the Health and Safety at Work Act 1974, together with regulations made under the act, which includes the Control of Substances Hazardous to Health (COSHH) regulations. Therefore, the risks to site personnel must be considered under the Construction Design and Management (CDM) regulations at the planning stage and be included in the contractor's Health and Safety Plan and site-specific Method Statements. These documents should include the following main elements.

- Site operatives at all levels should be made aware of the hazards of working with contaminated soils and the potential hazards associated with materials containing asbestos.
- Personal hygiene facilities, including washing and messing, must be provided and site operatives be encouraged to use them.
- Where work is undertaken in dry weather the site should be dampened down to avoid dust. In addition, dust masks must be provided to all site operatives for use in dry weather.
- In order for contaminated soils to be disposed of to an appropriate landfill, it may be necessary to carry out Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457.
- Any stockpiles of contaminated soil on site should be sheeted over to prevent excessive amounts of airborne dust and cross contamination of imported fill.
- Where vehicles are transferring soil to the landfill site they should be covered to prevent contamination of the surrounding area by dust.
- Where work is undertaken in wet weather, vehicle and wheel washing facilities are required to ensure that the vehicles leaving the site do not transfer contamination to surrounding areas.

On completion of the ground-works a careful site inspection of the sub-grade would be required. Should visual or olfactory evidence of contamination be revealed then further testing may become necessary.

Construction

During the construction phase of the contract the following items are required to protect the end user from the potential contaminants revealed at this site.

- Beneath buildings, pavements and hard-standings clean inert granular sub-base should be employed.
- Any redundant services revealed at this site should be de-commissioned and piped services sealed. Any existing services that are to be employed in the new development should be carefully inspected to ensure that they are serviceable.
- New plastic services should be constructed in a surround of clean inert material and selected in accordance with the recommendation given in the United Kingdom Water Industry Research (UKWIR) website under Report Ref. No. 10/WM/03/21 - 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites'. The statutory water authority for the area in which site is located may have a risk assessment form to complete which allows these recommendations to be met. However, further determinand specification contamination testing may be necessary.
- For buried concrete the results of the sulphate and pH testing indicate that the design sulphate class for the site should be DS-1.

Hotspot Removal

It is recommended that during the initial enabling works and demolition of the existing structures an investigation into the vertical and lateral extent of deep made ground and asbestos containing material local to TP05 be undertaken alongside an investigation into the extent of the buried obstruction and determine what is underneath. This work should be undertaken under the supervision of a suitably qualified and competent person who can inspect the excavations to ensure that the asbestos containing made ground has been completely removed and no other olfactory or visual evidence of unexpected contamination is revealed.

The area should then be reinstated by suitably clean and tested material. Site won materials which have been suitably screened such as the thin made ground and topsoil from external areas, or subbase from TP04, and TP06 may be utilised subject to approval from the Local Authority. Should unexpected potential contamination be revealed then further testing should be undertaken to fully quantify the risks. It is considered that this material is most likely to be classified as non-hazardous waste given the quantities of asbestos and the levels of contamination encountered.

Landscaped Areas

Subject to the removal of the hotspot, and no unexpected contamination is revealed then it is considered that a suitable growing medium should be employed in soft landscaped areas. This should comprise a minimum thickness of 150mm of suitable clean and screened topsoil, and 300mm of clean and screened subsoil. This soil should be free of any deleterious material

10.4 Fill Materials

It should also be appreciated that any fill material, either site-won or imported, to be employed at the site should be subjected to the following assessment to determine its suitability.

Fill materials should be initially screened, by a suitably qualified engineer to establish that:

- It is a suitable growing media if it is to be employed as such, including compliance with BS3882 (2015)
- It is free from obvious contamination i.e. visual or olfactory evidence
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to be growing
- It is not a statutory nuisance, such as being odorous
- It is free from unsuitable material i.e. whole bricks, brick ties, timber or glass.

It should also be appreciated that any fill should be subjected to validation testing to assess its suitability. The following table has been taken from YALPAG¹² documentation and may be used as a guide. Depending on the origin and nature of the material, not all fill will require the sampling frequency and testing indicated, although this should be in agreement with any regulatory bodies (such as the Local Authority).

¹² YALPAG *Technical Guidance for Developers, Landowners and Consultants – Verification Requirements for Cover Systems V4 .1* Appendix 1a, June 2021

Table 12: Validation Sampling and Testing

| Fill Type | Frequency | Minimum Determinands |
|-----------------------------------|---|--|
| Virgin Quarried Material | 1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material. | Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn) |
| Crushed Hardcore, Stone, Brick | Minimum 1 per 500m ³ | Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE). |
| Greenfield/ Manufactured Soils | Minimum 3 Dependent on source and receptor, between 1 per 50m ³ and 1 per 250m ³ | Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)). |
| Brownfield/ Screened Soils | Minimum 6 Dependent on source and receptor, between 1 per 50m ³ and 1 per 100m ³ | Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).. |

The screening values for the above regime should also be agreed with any regulatory bodies; however, the following is recommended in the first instance.

Table 13: Fill Screening Values

| Contaminant | Screening Value (Residential with Plant Uptake) (mg/kg) | | Reference |
|-------------|---|--------|-----------------------------|
| | 1% SOM | 6% SOM | |
| As | 37 | 37 | Atrisk ^{SOIL} SSVs |
| Cd | 22.1 | 22.1 | Atrisk ^{SOIL} SSVs |
| Cr(VI) | 3.62 | 3.63 | Atrisk ^{SOIL} SSVs |
| Cu | 4730 | 4790 | Atrisk ^{SOIL} SSVs |
| Hg | 8.81 | 15.8 | Atrisk ^{SOIL} SSVs |
| Ni | 136 | 136 | Atrisk ^{SOIL} SSVs |
| Pb | 200 | 200 | Atrisk ^{SOIL} SSVs |
| V | 136 | 138 | Atrisk ^{SOIL} SSVs |
| Zn | 20000 | 20300 | Atrisk ^{SOIL} SSVs |

Please see summary sheet within Appendix 5 for full screening values including PAHs & TPHs.

The above screening values should be considered with respect to the Soil Organic Matter (SOM) of the subject material i.e. 1% SOM would be typical for granular fill and 6% SOM for topsoil. Testing should comply with UKAS and MCERTS, where applicable, and undertaken by an accredited laboratory.

Where the material has been derived from a commercial company, certificates or other industry quality protocol compliance i.e. WRAP should be obtained. However, it will be necessary to ensure that this documentation specifically related to the material being imported, it is no more than two months old and complies with the screening and frequency requirements given above.

Suitable fill materials should be either placed immediately or sufficiently quarantined to prevent cross-contamination. If it is necessary, the quarantined material should be placed on appropriate

sheeting and covered to prevent it becoming mixed with contaminated soils or dust, or penetrated by mobile contaminants.

10.5 Verification Report

In order to demonstrate that the remedial works have been sufficiently carried out, it will be necessary to produce a verification report for submission to any statutory authorities.

It will be necessary for this report to include the following:

- The assessment of the extents of any contamination 'hot-spots' identified including the details of sampling points, such as location and descriptive logs, and the results of any chemical testing.
- The extents of any areas where made ground has been wholly removed.
- Characterisation of the suitability of the clean material including the derivation of the material, comments from a visual screen, the tests results of chemical screening, delivery tickets where appropriate and the conditions by which the clean material has been stored and handled on site.
- Photographic and logged evidence the clean material has been handled on site and placed in a sufficient thickness over areas where made ground remains. This may be either at the time of placement or after placement by means of hand excavated trialpits. Photographs should include visual site references or reference boards to prove the location and date taken. A measurement reference should be visible in the photographs to substantiate the thickness of material placed. Please note that it may also be necessary to undertake a topographical survey and the requirement for which should be checked with any statutory authorities.

The report detailed above should be produced by a suitably qualified engineer. The number of verification areas for the development should be confirmed with any statutory authorities for the site.

11. Recommendations for Further Work

- This report should be forwarded to the relevant authorities as soon as practicable to ensure they have sufficient time to review and discuss any issues.
- Completion of investigation, remediation, and reinstatement of hotspot contamination.
- Discussions with ground work contractors in relation to the requirement for testing of materials to be disposed off-site (Waste Acceptance Criteria) and the suitability of imported materials.
- Discussions with service providers regarding suitable materials for pipe work given the nature of chemical determinands found within the soils on site.
- Produce a validation report to demonstrate that the geo-environmental risks discussed in this report have been mitigated.
- Detailed design of the sub-structure.

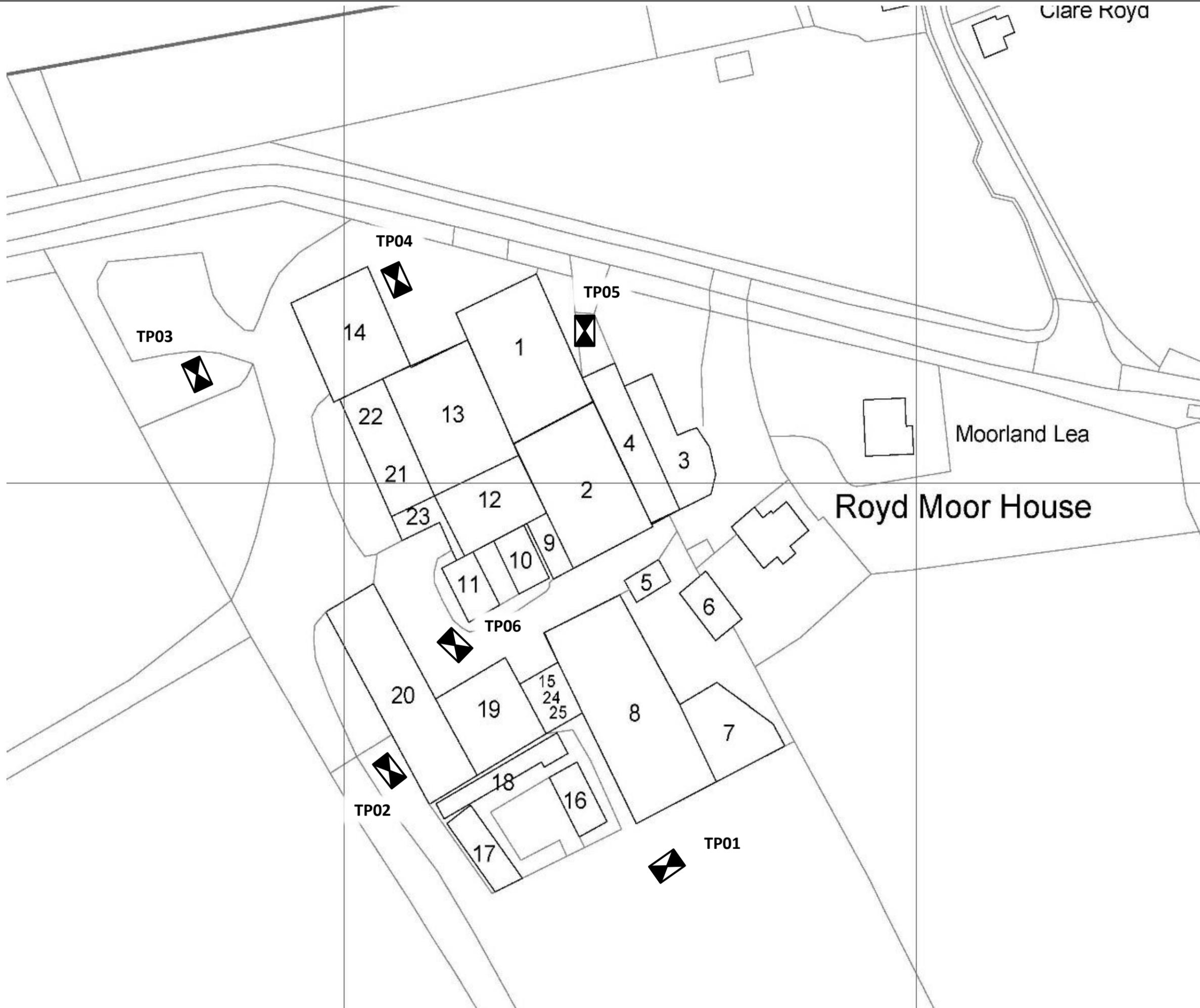
Clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

12. References

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 - Part D: *Specifying concrete for general cast-in-situ use*.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – Final SC050021/SR2, *Human Health toxicological assessment of contaminants in soil*. Environment Agency, Bristol.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – SC050021/SR3, *Updated technical background to the CLEA model*. Environment Agency, Bristol.
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- Wilson S, Oliver S, Mallet H, Hutchings H, Card G, *Assessing risks posed by ground gasses to buildings*, CIRIA Report C665.

Appendix 1

Site Plan



Notes:
Investigation positions approximated from site operative's notes.



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Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:
Kingsman Homes

Job Number:
C4503/24/E/6885

Project Details:
Royd Moor House Farm, Thurlstone

Scale: Not to scale - reference only

A row of service icons including ground investigation, drilling & excavation, insitu testing, laboratory testing & gas monitoring, engineering consultancy, surveying & flood risk assessments, and training, CPD & expert witness. Below these is the text: "... delivered using our own drilling rigs / crews / soils lab / engineers". At the bottom are several accreditation logos including Constructionline, OMS, and others.

Appendix 2

Trial Pit Records



Trial Pit Log

Trialpit No
TP02
Sheet 1 of 1

Project Name: Royd Moor Farm, Thurlstone Project No. C4503/24/E/6885 Co-ords: - Date 10/02/2025
Level: Level:

Location: Royd Moor Farm, Thurlstone Dimensions (m): Scale 1:50
Client: Kingsman Homes Depth 0.45 Logged SA

| Water Strike | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|--------------|-----------------------------|------|---------|--------------|-----------|--|---|
| | Depth | Type | Results | | | | |
| | 0.10 - 0.20 | ES | | 0.30 0.45 | |  | TOPSOIL. (Dark brownish grey slightly clayey slightly gravelly fine to coarse SAND with common plant rootlets). Weak (engineers description) yellowish brown SANDSTONE recovered as sub angular gravel and cobbles. Unable to excavate further. [GRENOSIDE SANDSTONE MEMBER] End of pit at 0.45 m |
| | 0.30 - 0.40 | D | | | | | |



Remarks: 1. CAT and Genny Survey. 2. No groundwater encountered

Stability:





Trial Pit Log

Trialpit No
TP03
Sheet 1 of 1

| | | | |
|--|-------------------------------|----------------------|-------------------------------|
| Project Name: Royd Moor Farm, Thurlstone | Project No. C4503/24/E/6885 | Co-ords: - Level: | Date 10/02/2025 |
| Location: Royd Moor Farm, Thurlstone | Dimensions (m): Depth 1.30 | | Scale 1:50 Logged SA |
| Client: Kingsman Homes | | | |

| Water Strike | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|--------------|-----------------------------|------|---------|-----------|-----------|--------|---|
| | Depth | Type | Results | | | | |
| | 0.10 - 0.20 | ES | | 0.10 | | | TOPSOIL. (Grey sandy CLAY with occasional plant roots). |
| | 0.80 - 1.00 | B | | 1.30 | | | Loose (Engineers Description) yellowish brown slightly silty gravelly fine to coarse SAND with moderate cobble content. Gravel is angular to sub rounded fine to coarse of sandstone. Cobbles are sub angular to sub rounded of sandstone. [GRENSIDE SANDSTONE MEMBER] |
| | | | | | | | End of pit at 1.30 m |



Remarks: 1. CAT and Genny Survey. 2. No groundwater encountered

Stability:





Trial Pit Log

Trialpit No
TP04
Sheet 1 of 1

| | | | |
|--|-------------------------------|----------------------|-------------------------------|
| Project Name: Royd Moor Farm, Thurlstone | Project No. C4503/24/E/6885 | Co-ords: - Level: | Date 10/02/2025 |
| Location: Royd Moor Farm, Thurlstone | Dimensions (m): Depth 1.40 | | Scale 1:50 Logged SA |
| Client: Kingsman Homes | | | |

| Water Strike | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|--------------|-----------------------------|------|---------|--------------|-----------|--------|--|
| | Depth | Type | Results | | | | |
| | 0.10 - 0.20 | ES | | 0.05 0.25 | | | MADE GROUND. (CONCRETE. No reinforcement observed). |
| | 0.80 - 1.00 | B | | 1.40 | | | MADE GROUND. (Grey clayey slightly gravelly fine to coarse SAND with occasional plant roots. Gravel is angular fine to medium of brick and sandstone). Loose (Engineers Description) yellowish brown slightly silty gravelly fine to coarse SAND with moderate cobble content. Gravel is angular to sub rounded fine to coarse of sandstone. Cobbles are sub angular to sub rounded of sandstone. [GRENOSIDE SANDSTONE MEMBER] |
| | | | | | | | End of pit at 1.40 m |

Remarks: 1. CAT and Genny Survey. 2. Surface concrete broken. 3. No groundwater encountered

Stability:





Trial Pit Log

Trialpit No
TP05
Sheet 1 of 1

Project Name: Royd Moor Farm, Thurlstone Project No. C4503/24/E/6885 Co-ords: - Date 10/02/2025
Level:

Location: Royd Moor Farm, Thurlstone Dimensions (m): Scale 1:50

Client: Kingsman Homes Depth 1.10 Logged SA

| Water Strike | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|--------------|-----------------------------|------|---------|-----------|-----------|-----------------------|--|
| | Depth | Type | Results | | | | |
| ▼ | 0.60 | ES | | 1.10 | | [Cross-hatch pattern] | <p>MADE GROUND. (Grey gravelly fine to coarse SAND with moderate cobble content and moderate boulder content. Gravel is angular to rounded fine to coarse of concrete, and brick. Cobbles are angular to rounded of concrete and brick. Boulders are concrete).</p> <p>Trial pit abandoned on buried obstruction with perched groundwater sitting on top. End of pit at 1.10 m</p> |



Remarks: 1. CAT and Genny Survey. 2. Groundwater encountered perched on buried obstruction at 1.10m

Stability:





Trial Pit Log

Trialpit No
TP06
Sheet 1 of 1

Project Name: Royd Moor Farm, Thurlstone Project No. C4503/24/E/6885 Co-ords: - Date 10/02/2025
Level: Dimensions (m):

Location: Royd Moor Farm, Thurlstone Depth 1.10

Client: Kingsman Homes Logged SA

| Water Strike | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|--------------|-----------------------------|------|---------|-----------|-----------|--------|--|
| | Depth | Type | Results | | | | |
| | 0.20 - 0.30 | ES | | 0.05 | | | MADE GROUND. (Black intact Asphalt) |
| | 0.60 - 0.80 | D | | 0.40 | | | MADE GROUND. (Reddish brown and grey gravelly fine to coarse SAND of crushed brick, burnt red shale and sandstone. Gravel is angular to sub rounded fine to coarse of sandstone, crushed brick and burnt red shale. Layer of yellow sandstone cobbles at bottom of unit). |
| | | | | 1.10 | | | Loose (Engineers Description) yellowish brown slightly silty gravelly fine to coarse SAND with moderate cobble content. Gravel is angular to sub rounded fine to coarse of sandstone. Cobbles are sub angular to sub rounded of sandstone. [GRENOSIDE SANDSTONE MEMBER] End of pit at 1.10 m |

Remarks: 1. CAT and Genny Survey. 2. Surface asphalt broken. 3. No groundwater encountered

Stability:



Appendix 3

Laboratory Testing

Environmental
Geotechnical
Specialists



LABORATORY REPORT

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| | |
|----------------|-------------|
| job number | date |
| site address | |
| date scheduled | date issued |
| issued by | |

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Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

| | | |
|---|--|--|
|  <p>UKAS TESTING 8948</p> <p>Accredited to ISO/IEC 17025:2017</p> | <p>Rogers Geotechnical Services Ltd</p> <p>Issue No: 007 Issue date: 31 May 2024</p> | |
| | <p>Offices 1 & 2 Barncliffe Business Park Near Bank Shelley HD8 8LU United Kingdom</p> | <p>Contact: Emma Pearce Tel: +44 (0)1484 607977 E-Mail: emma.pearce@rogersgeotech.co.uk Website: www.rogersgeotech.co.uk</p> |
| <p>Testing performed at the above address only</p> | | |

DETAIL OF ACCREDITATION

| Materials/Products tested | Type of test/Properties measured/Range of measurement | Standard specifications/ Equipment/Techniques used |
|--|---|---|
| SOILS for civil engineering purposes | Water content | BS 1377-2:2022 |
| | Liquid limit - cone penetrometer (definitive) | BS 1377-2:2022 |
| | Liquid limit - one point cone penetrometer | BS 1377-2:2022 |
| | Plastic limit | BS 1377-2:2022 |
| | Plasticity index and liquidity index | BS 1377-2:2022 |
| | Linear Shrinkage | BS 1377-2:2022 |
| | Density - linear measurement | BS 1377-2:2022 |
| | Particle size distribution - wet sieving | BS 1377-2:2022 |
| | Particle size distribution - dry sieving | BS 1377-2:2022 |
| | Particle size distribution - sedimentation - pipette method | BS 1377-2:2022 |
| | Uniformity coefficient | Specification for Highway Works Series 600 Table 6/1 footnote 5 |
| | Particle density - gas jar | BS 1377-2:2022 |
| Dry density/water content relationship (2.5 kg rammer) | BS 1377-2:2022 | |



Accredited to
ISO/IEC 17025:2017

Schedule of Accreditation
issued by
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Rogers Geotechnical Services Ltd
Issue No: 007 Issue date: 31 May 2024

Testing performed at main address only

| Materials/Products tested | Type of test/Properties measured/Range of measurement | Standard specifications/ Equipment/Techniques used |
|--|---|--|
| SOILS for civil engineering purposes (continued) | Dry density/ water content relationship (4.5 kg rammer) | BS 1377-2:2022 |
| | Dry density/water content relationship (vibrating hammer) | BS 1377-2:2022 |
| | California Bearing Ratio (CBR) | BS 1377-2:2022 |
| | One-dimensional consolidation properties | BS 1377-2:2022 |
| | Unconsolidated undrained triaxial test | BS 1377-2:2022 |
| GEOTECHNICAL INVESTIGATION and TESTING - Laboratory testing of soil | Water content | BS EN ISO 17892-1:2014 +A1:2022 |
| | Bulk density - linear measurement method | BS EN ISO 17892-2:2014 |
| | Determination of particle density – fluid pycnometer method | BS EN ISO 17892-3:2015 |
| | Determination of particle size distribution -sieving method -pipette method | BS EN ISO 17892-4:2016 |
| | Incremental loading oedometer test | BS EN ISO 17892-5: 2017 |
| | Unconsolidated undrained triaxial test | BS EN ISO 17892-8:2018 |
| | Determination of liquid limit by the fall cone method | BS EN ISO 17892-12 2018 +A2:2022 |
| | Determination of plastic limit | BS EN ISO 17892-12 2018 +A2:2022 |
| | Plasticity Index and Liquidity Index | BS EN ISO 17892-12 2018 +A2:2022 |

END



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Disclaimer

The results reported herein relate only to the material supplied to the laboratory.

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GEOTECHNICAL TESTING RESULTS



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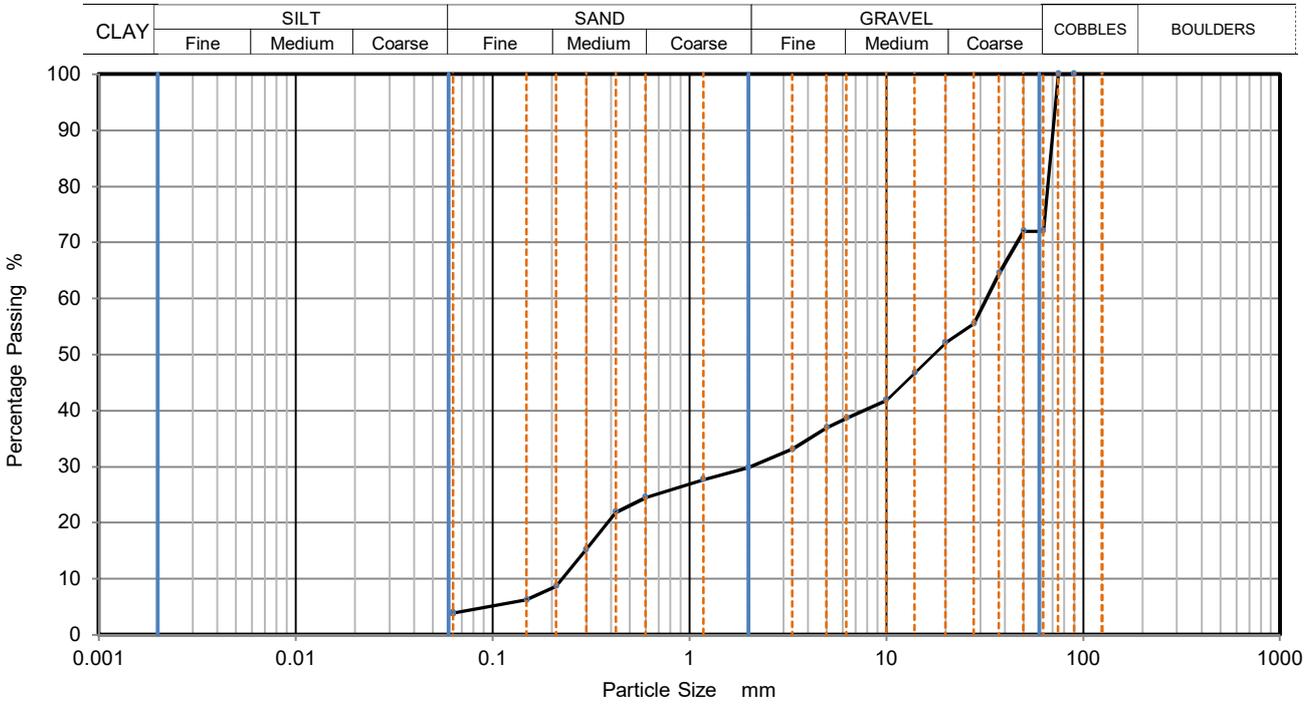
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PARTICLE SIZE DISTRIBUTION

| | |
|------------------|-----------------|
| Job Ref | C4503/24/E/6885 |
| Borehole/Pit No. | TP03 |
| Sample No. | B |
| Depth, m | 0.80 |
| Sample Type | B |
| KeyLAB ID | RGS_202502144 |

| | | | |
|--------------------|---|----------------|-------|
| Site Name | Royd Moor Farm, Thurlstone | | |
| Soil Description | Yellow gravelly SAND | | |
| Specimen Reference | 1 | Specimen Depth | 0.8 m |
| Test Method | ISO 17892 -4, by sieving on pre-dried or dry sample | | |



| Sieving | | Sedimentation | |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 72 | | |
| 50 | 72 | | |
| 37.5 | 65 | | |
| 28 | 56 | | |
| 20 | 52 | | |
| 14 | 47 | | |
| 10 | 42 | | |
| 6.3 | 39 | | |
| 5 | 37 | | |
| 3.35 | 33 | | |
| 2 | 30 | | |
| 1.18 | 28 | | |
| 0.6 | 25 | | |
| 0.425 | 22 | | |
| 0.3 | 15 | | |
| 0.212 | 9 | | |
| 0.15 | 6 | | |
| 0.063 | 4 | | |

| | |
|---------------------------|------------|
| Dry Mass of sample, g | 3867 |
| Sample Proportions | % dry mass |
| Very coarse | 28 |
| Gravel | 42 |
| Sand | 26 |
| Fines <0.063mm | 4 |
| Grading Analysis | |
| D100 | mm 75 |
| D60 | mm 32.4 |
| D30 | mm 2.07 |
| D10 | mm 0.227 |

Remarks

Preparation and testing in accordance with BS EN ISO 17892 - 4, unless noted below

Test performance date: 04/03/2025



PARTICLE SIZE DISTRIBUTION

Job Ref **C4503/24/E/6885**

Borehole/Pit No. TP04

Site Name Royd Moor Farm, Thurlstone

Sample No. B

Soil Description Yellow gravelly SAND

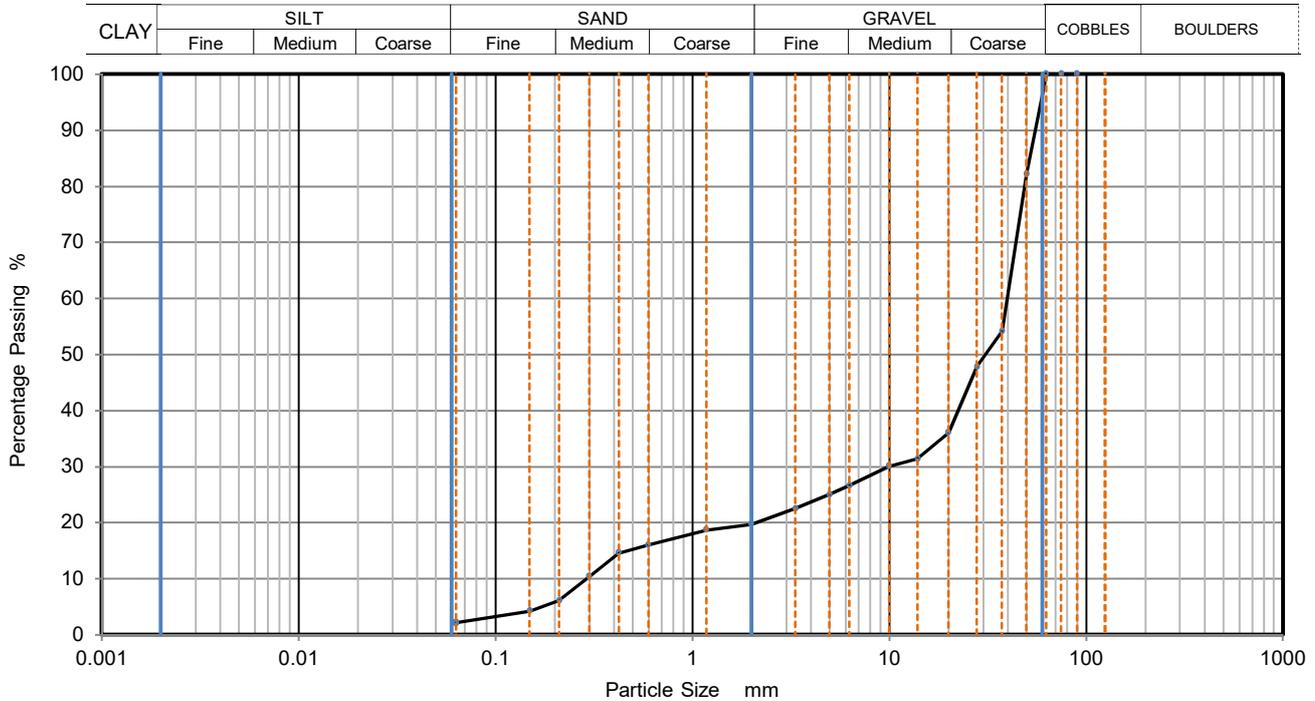
Depth, m 0.80

Specimen Reference 1 Specimen Depth 0.8 m

Sample Type B

Test Method ISO 17892 -4, by sieving on pre-dried or dry sample

KeyLAB ID RGS_202502145



| Sieving | | Sedimentation | |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 100 | | |
| 50 | 82 | | |
| 37.5 | 54 | | |
| 28 | 48 | | |
| 20 | 36 | | |
| 14 | 31 | | |
| 10 | 30 | | |
| 6.3 | 27 | | |
| 5 | 25 | | |
| 3.35 | 23 | | |
| 2 | 20 | | |
| 1.18 | 19 | | |
| 0.6 | 16 | | |
| 0.425 | 15 | | |
| 0.3 | 10 | | |
| 0.212 | 6 | | |
| 0.15 | 4 | | |
| 0.063 | 2 | | |

Dry Mass of sample, g 4553

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse | 0 |
| Gravel | 80 |
| Sand | 18 |
| Fines <0.063mm | 2 |

| Grading Analysis | | |
|------------------|----|------|
| D100 | mm | 63 |
| D60 | mm | 39.8 |
| D30 | mm | 9.82 |
| D10 | mm | 0.29 |

Remarks

Preparation and testing in accordance with BS EN ISO 17892 - 4, unless noted below

Test performance date: 04/03/2025

| | | | | |
|----------|---------|----------|---------------|--------------|
| Operator | Checked | Approved | Sheet printed | Fig 2 |
| EC | Harry | Harry | 10/03/2025 | |
| | | | | Sheet 2 |



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ENVIRONMENTAL TESTING RESULTS



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Analytical Report Number : 25-006726

| | | | |
|-----------------------------|------------------------|--|------------|
| Project / Site name: | Royd Moor, Thurlstone | Samples received on: | 12/02/2025 |
| Your job number: | C4503 24 E 6885_CHEM01 | Samples instructed on/ Analysis started on: | 12/02/2025 |
| Your order number: | | Analysis completed by: | 19/02/2025 |
| Report Issue Number: | 1 | Report issued on: | 19/02/2025 |
| Samples Analysed: | 9 soil samples | | |

Signed: 

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

| | |
|-----------|---------------------------------|
| soils | - 4 weeks from reporting |
| leachates | - 2 weeks from reporting |
| waters | - 2 weeks from reporting |
| asbestos | - 6 months from reporting |
| air | - once the analysis is complete |

Excel copies of reports are only valid when accompanied by this PDF certificate.

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| Lab Sample Number | 451495 | 451496 | 451497 | 451498 | 451499 |
|--------------------------------------|---------------|-------------------------|---------------------------|---------------|---------------|
| Sample Reference | TP01 | TP02 | TP03 | TP04 | TP05 |
| Sample Number | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Water Matrix | N/A | N/A | N/A | N/A | N/A |
| Depth (m) | 0.20-0.30 | 0.10-0.20 | 0.10-0.20 | 0.10-0.20 | 0.60 |
| Date Sampled | 10/02/2025 | 10/02/2025 | 10/02/2025 | 10/02/2025 | 10/02/2025 |
| Time Taken | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | |

| | | | | | | | | |
|-------------------------------|----|------|------|-------|-------|------|-------|------|
| Stone Content | % | 0.1 | NONE | < 0.1 | < 0.1 | 36.8 | < 0.1 | 23.1 |
| Moisture Content | % | 0.01 | NONE | 19 | 18 | 14 | 17 | 17 |
| Total mass of sample received | kg | 0.1 | NONE | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |

Asbestos

| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected | Not-detected | Not-detected | Not-detected | Detected |
|--|------|-----|-----------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Analyst ID | N/A | N/A | N/A | KSZ | KSZ | KSZ | KSZ | KSZ |
| Actinolite detected | Type | N/A | ISO 17025 | - | - | - | - | Not-detected |
| Amosite detected | Type | N/A | ISO 17025 | - | - | - | - | Not-detected |
| Anthophyllite detected | Type | N/A | ISO 17025 | - | - | - | - | Not-detected |
| Chrysotile detected | Type | N/A | ISO 17025 | - | - | - | - | Detected |
| Crocidolite detected | Type | N/A | ISO 17025 | - | - | - | - | Not-detected |
| Tremolite detected | Type | N/A | ISO 17025 | - | - | - | - | Not-detected |

| | | | | | | | | |
|-------------------------------------|---|-------|-----------|---|---|---|---|-------|
| Asbestos % by hand picking/weighing | % | 0.001 | ISO 17025 | - | - | - | - | 0.008 |
|-------------------------------------|---|-------|-----------|---|---|---|---|-------|

| | | | | | | | | |
|---|------|-----|-----------|---|---|---|---|-------------------------------|
| Asbestos Containing Material Types Detected (ACM) | Type | N/A | ISO 17025 | - | - | - | - | Loose Fibres, Asbestos Cement |
|---|------|-----|-----------|---|---|---|---|-------------------------------|

General Inorganics

| | | | | | | | | |
|---|----------|-------|--------|-------|-------|-------|-------|-------|
| pH (L099) | pH Units | N/A | MCERTS | 6.3 | 7.8 | 8.2 | 8.7 | 9.7 |
| Free Cyanide | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphate as SO ₄ | % | 0.005 | MCERTS | 0.039 | 0.044 | 0.02 | 0.06 | 0.197 |
| Water Soluble Sulphate as SO ₄ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 15 | 41 | 11 | 160 | 170 |
| Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 7.37 | 20.3 | 5.5 | 77.7 | 85.4 |
| Water Soluble SO ₄ 16hr extraction (2:1) | mg/l | 1.25 | MCERTS | - | - | - | - | - |
| Organic Matter (automated) | % | 0.1 | MCERTS | 3.8 | 3.9 | 1.2 | 2.2 | 1.8 |
| Total Organic Carbon (TOC) - Automated | % | 0.1 | MCERTS | - | - | - | - | - |

Total Phenols

| | | | | | | | | |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| | | | | | | | | |
|---|--------------|--------------------------------|----------------------------------|---------------|---------------|---------------|---------------|---------------|
| Lab Sample Number | | | | 451495 | 451496 | 451497 | 451498 | 451499 |
| Sample Reference | | | | TP01 | TP02 | TP03 | TP04 | TP05 |
| Sample Number | | | | None Supplied |
| Water Matrix | | | | N/A | N/A | N/A | N/A | N/A |
| Depth (m) | | | | 0.20-0.30 | 0.10-0.20 | 0.10-0.20 | 0.10-0.20 | 0.60 |
| Date Sampled | | | | 10/02/2025 | 10/02/2025 | 10/02/2025 | 10/02/2025 | 10/02/2025 |
| Time Taken | | | | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | | | | |

Speciated PAHs

| | | | | | | | | |
|------------------------|-------|------|-----------|--------|--------|--------|--------|--------|
| Naphthalene | mg/kg | 0.05 | MCERTS | 0.14 | 0.09 | 0.08 | 0.08 | 0.13 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.06 | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 | 0.06 | < 0.05 | < 0.05 | 0.17 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.06 | 0.14 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.05 | 0.52 | < 0.05 | 0.63 | 1.3 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | 0.15 | < 0.05 | 0.13 | 0.19 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.12 | 2.2 | 0.05 | 1 | 1.3 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.11 | 2.2 | < 0.05 | 0.86 | 1.1 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | 0.06 | 1.3 | < 0.05 | 0.37 | 0.54 |
| Chrysene | mg/kg | 0.05 | MCERTS | 0.07 | 1.3 | < 0.05 | 0.51 | 0.67 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | 0.11 | 2.1 | < 0.05 | 0.51 | 0.66 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 | 0.88 | < 0.05 | < 0.05 | 0.26 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | 0.07 | 2.1 | < 0.05 | 0.46 | 0.53 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | 1.1 | < 0.05 | 0.28 | 0.23 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | 0.24 | < 0.05 | 0.05 | 0.07 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | 0.06 | 1.1 | < 0.05 | 0.33 | 0.28 |

Total PAH

| | | | | | | | | |
|-----------------------------|-------|-----|-----------|--------|------|--------|------|------|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 | 15.3 | < 0.80 | 5.34 | 7.61 |
|-----------------------------|-------|-----|-----------|--------|------|--------|------|------|

Heavy Metals / Metalloids

| | | | | | | | | |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 9.3 | 12 | 4.8 | 7.6 | 5.2 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 16 | 54 | 17 | 37 | 23 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 17 | 27 | 10 | 18 | 18 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 41 | 44 | 13 | 32 | 24 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.4 | 13 | 8.3 | 15 | 10 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 | 1.5 | < 1.0 | 1 | < 1.0 |
| Vanadium (aqua regia extractable) | mg/kg | 1 | MCERTS | 24 | 38 | 21 | 26 | 14 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 64 | 94 | 31 | 95 | 110 |

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| Lab Sample Number | 451495 | | | | 451496 | 451497 | 451498 | 451499 |
|--------------------------------------|---------------|-------------------------|---------------------------|--|---------------|---------------|---------------|---------------|
| Sample Reference | TP01 | | | | TP02 | TP03 | TP04 | TP05 |
| Sample Number | None Supplied | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| Water Matrix | N/A | | | | N/A | N/A | N/A | N/A |
| Depth (m) | 0.20-0.30 | | | | 0.10-0.20 | 0.10-0.20 | 0.10-0.20 | 0.60 |
| Date Sampled | 10/02/2025 | | | | 10/02/2025 | 10/02/2025 | 10/02/2025 | 10/02/2025 |
| Time Taken | None Supplied | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | | | | |

Petroleum Hydrocarbons

| TPHCWG - Aliphatic >EC5 - EC6 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
|--|-------|------|--------|---------|---------|---------|---------|---------|
| TPHCWG - Aliphatic >EC6 - EC8 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| TPHCWG - Aliphatic >EC8 - EC10 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| TPHCWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL} | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPHCWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL} | mg/kg | 2 | MCERTS | < 2.0 | 2.3 | < 2.0 | < 2.0 | < 2.0 |
| TPHCWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL} | mg/kg | 8 | MCERTS | < 8.0 | < 8.0 | < 8.0 | < 8.0 | < 8.0 |
| TPHCWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL} | mg/kg | 8 | MCERTS | < 8.0 | 85 | < 8.0 | < 8.0 | < 8.0 |
| TPHCWG - Aliphatic >EC5 - EC35 _{EH_CU+HS_1D_AL} | mg/kg | 10 | NONE | < 10 | 87 | < 10 | < 10 | < 10 |

| TPHCWG - Aromatic >EC5 - EC7 _{HS_1D_AR} | mg/kg | 0.01 | MCERTS | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
|---|-------|------|--------|---------|---------|---------|---------|---------|
| TPHCWG - Aromatic >EC7 - EC8 _{HS_1D_AR} | mg/kg | 0.01 | MCERTS | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| TPHCWG - Aromatic >EC8 - EC10 _{HS_1D_AR} | mg/kg | 0.02 | MCERTS | < 0.020 | < 0.020 | < 0.020 | < 0.020 | < 0.020 |
| TPHCWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR} | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPHCWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR} | mg/kg | 2 | MCERTS | < 2.0 | 2.1 | < 2.0 | < 2.0 | < 2.0 |
| TPHCWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR} | mg/kg | 10 | MCERTS | < 10 | < 10 | < 10 | < 10 | < 10 |
| TPHCWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR} | mg/kg | 10 | MCERTS | < 10 | 40 | < 10 | < 10 | < 10 |
| TPHCWG - Aromatic >EC5 - EC35 _{EH_CU+HS_1D_AR} | mg/kg | 10 | NONE | < 10 | 42 | < 10 | < 10 | < 10 |

VOCs

| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
|------------------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| Benzene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Toluene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Ethylbenzene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| p & m-Xylene | µg/kg | 8 | MCERTS | < 8.0 | < 8.0 | < 8.0 | < 8.0 | < 8.0 |
| o-Xylene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| Lab Sample Number | | | | 451500 | 451501 | 451502 | 451503 |
|--------------------------------------|-------|-------------------------|---------------------------|---------------|---------------|---------------|---------------|
| Sample Reference | | | | TP06 | TP01 | TP02 | TP06 |
| Sample Number | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| Water Matrix | | | | N/A | N/A | N/A | N/A |
| Depth (m) | | | | 0.10-0.20 | 0.50-0.60 | 0.30-0.40 | 0.60-0.80 |
| Date Sampled | | | | 10/02/2025 | 11/02/2025 | 11/02/2025 | 11/02/2025 |
| Time Taken | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | | | |

| | | | | | | | |
|-------------------------------|----|------|------|------|------|-----|------|
| Stone Content | % | 0.1 | NONE | 62.9 | 49.2 | 96 | 56.5 |
| Moisture Content | % | 0.01 | NONE | 11 | 13 | 6.7 | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 0.6 | 0.5 | 0.5 | 0.5 |

Asbestos

| | | | | | | | |
|--|------|-----|-----------|--------------|---|---|---|
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected | - | - | - |
| Asbestos Analyst ID | N/A | N/A | N/A | KSZ | - | - | - |
| Actinolite detected | Type | N/A | ISO 17025 | - | - | - | - |
| Amosite detected | Type | N/A | ISO 17025 | - | - | - | - |
| Anthophyllite detected | Type | N/A | ISO 17025 | - | - | - | - |
| Chrysotile detected | Type | N/A | ISO 17025 | - | - | - | - |
| Crocidolite detected | Type | N/A | ISO 17025 | - | - | - | - |
| Tremolite detected | Type | N/A | ISO 17025 | - | - | - | - |

| | | | | | | | |
|-------------------------------------|---|-------|-----------|---|---|---|---|
| Asbestos % by hand picking/weighing | % | 0.001 | ISO 17025 | - | - | - | - |
|-------------------------------------|---|-------|-----------|---|---|---|---|

| | | | | | | | |
|---|------|-----|-----------|---|---|---|---|
| Asbestos Containing Material Types Detected (ACM) | Type | N/A | ISO 17025 | - | - | - | - |
|---|------|-----|-----------|---|---|---|---|

General Inorganics

| | | | | | | | |
|---|----------|-------|--------|-------|------|-------|-----|
| pH (L099) | pH Units | N/A | MCERTS | 8 | 7.2 | 8.4 | 7.4 |
| Free Cyanide | mg/kg | 1 | MCERTS | < 1.0 | - | - | - |
| Total Sulphate as SO ₄ | % | 0.005 | MCERTS | 0.391 | - | - | - |
| Water Soluble Sulphate as SO ₄ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 1300 | 9.3 | 21 | 410 |
| Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 672 | - | - | - |
| Water Soluble SO ₄ 16hr extraction (2:1) | mg/l | 1.25 | MCERTS | - | 4.67 | 10.3 | 203 |
| Organic Matter (automated) | % | 0.1 | MCERTS | 0.7 | - | - | - |
| Total Organic Carbon (TOC) - Automated | % | 0.1 | MCERTS | - | 0.6 | < 0.1 | 0.2 |

Total Phenols

| | | | | | | | |
|----------------------------|-------|---|--------|-------|---|---|---|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | - | - | - |
|----------------------------|-------|---|--------|-------|---|---|---|

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| | | | | | |
|---|--------------|--------------------------------|----------------------------------|---------------|---------------|
| Lab Sample Number | | 451500 | 451501 | 451502 | 451503 |
| Sample Reference | | TP06 | TP01 | TP02 | TP06 |
| Sample Number | | None Supplied | None Supplied | None Supplied | None Supplied |
| Water Matrix | | N/A | N/A | N/A | N/A |
| Depth (m) | | 0.10-0.20 | 0.50-0.60 | 0.30-0.40 | 0.60-0.80 |
| Date Sampled | | 10/02/2025 | 11/02/2025 | 11/02/2025 | 11/02/2025 |
| Time Taken | | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | |

Speciated PAHs

| | | | | | | | |
|------------------------|-------|------|-----------|--------|---|---|---|
| Naphthalene | mg/kg | 0.05 | MCERTS | 0.13 | - | - | - |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Phenanthrene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.08 | - | - | - |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 | - | - | - |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | 0.07 | - | - | - |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 | - | - | - |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 | - | - | - |

Total PAH

| | | | | | | | |
|-----------------------------|-------|-----|-----------|--------|---|---|---|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 | - | - | - |
|-----------------------------|-------|-----|-----------|--------|---|---|---|

Heavy Metals / Metalloids

| | | | | | | | |
|-----------------------------------|-------|-----|--------|-------|---|---|---|
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 22 | - | - | - |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 | - | - | - |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 | - | - | - |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 40 | - | - | - |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 33 | - | - | - |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 22 | - | - | - |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 | - | - | - |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 27 | - | - | - |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 | - | - | - |
| Vanadium (aqua regia extractable) | mg/kg | 1 | MCERTS | 47 | - | - | - |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 68 | - | - | - |

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone

| Lab Sample Number | 451500 | | | 451501 | 451502 | 451503 |
|--------------------------------------|---------------|-------------------------|---------------------------|---------------|---------------|---------------|
| Sample Reference | TP06 | | | TP01 | TP02 | TP06 |
| Sample Number | None Supplied | | | None Supplied | None Supplied | None Supplied |
| Water Matrix | N/A | | | N/A | N/A | N/A |
| Depth (m) | 0.10-0.20 | | | 0.50-0.60 | 0.30-0.40 | 0.60-0.80 |
| Date Sampled | 10/02/2025 | | | 11/02/2025 | 11/02/2025 | 11/02/2025 |
| Time Taken | None Supplied | | | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Test Limit of detection | Test Accreditation Status | | | |

Petroleum Hydrocarbons

| TPHCWG - Aliphatic >EC5 - EC6 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | - | - | - |
|--|-------|------|--------|---------|---|---|---|
| TPHCWG - Aliphatic >EC6 - EC8 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | - | - | - |
| TPHCWG - Aliphatic >EC8 - EC10 _{HS_1D_AL} | mg/kg | 0.01 | MCERTS | < 0.010 | - | - | - |
| TPHCWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL} | mg/kg | 1 | MCERTS | < 1.0 | - | - | - |
| TPHCWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL} | mg/kg | 2 | MCERTS | < 2.0 | - | - | - |
| TPHCWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL} | mg/kg | 8 | MCERTS | < 8.0 | - | - | - |
| TPHCWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL} | mg/kg | 8 | MCERTS | < 8.0 | - | - | - |
| TPHCWG - Aliphatic >EC5 - EC35 _{EH_CU+HS_1D_AL} | mg/kg | 10 | NONE | < 10 | - | - | - |

| TPHCWG - Aromatic >EC5 - EC7 _{HS_1D_AR} | mg/kg | 0.01 | MCERTS | < 0.010 | - | - | - |
|---|-------|------|--------|---------|---|---|---|
| TPHCWG - Aromatic >EC7 - EC8 _{HS_1D_AR} | mg/kg | 0.01 | MCERTS | < 0.010 | - | - | - |
| TPHCWG - Aromatic >EC8 - EC10 _{HS_1D_AR} | mg/kg | 0.02 | MCERTS | < 0.020 | - | - | - |
| TPHCWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR} | mg/kg | 1 | MCERTS | < 1.0 | - | - | - |
| TPHCWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR} | mg/kg | 2 | MCERTS | < 2.0 | - | - | - |
| TPHCWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR} | mg/kg | 10 | MCERTS | < 10 | - | - | - |
| TPHCWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR} | mg/kg | 10 | MCERTS | < 10 | - | - | - |
| TPHCWG - Aromatic >EC5 - EC35 _{EH_CU+HS_1D_AR} | mg/kg | 10 | NONE | < 10 | - | - | - |

VOCs

| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 5 | MCERTS | < 5.0 | - | - | - |
|------------------------------------|-------|---|--------|-------|---|---|---|
| Benzene | µg/kg | 5 | MCERTS | < 5.0 | - | - | - |
| Toluene | µg/kg | 5 | MCERTS | < 5.0 | - | - | - |
| Ethylbenzene | µg/kg | 5 | MCERTS | < 5.0 | - | - | - |
| p & m-Xylene | µg/kg | 8 | MCERTS | < 8.0 | - | - | - |
| o-Xylene | µg/kg | 5 | MCERTS | < 5.0 | - | - | - |

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Environmental Science

Analytical Report Number: 25-006726
Project / Site name: Royd Moor, Thurlstone
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

| Sample Number | Sample ID | Sample Depth (m) | Sample Weight (g) | Asbestos Containing Material Types Detected (ACM) | PLM Results | Asbestos by hand picking/weighing (%) | Total % Asbestos in Sample |
|---------------|-----------|------------------|-------------------|---|-------------|---------------------------------------|----------------------------|
| 451499 | TP05 | 0.60 | 126 | Loose Fibres, Asbestos Cement | Chrysotile | 0.008 | 0.008 |

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 25-006726

Project / Site name: Royd Moor, Thurlstone

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|-------------------|------------------|---------------|-----------|--|
| 451495 | TP01 | None Supplied | 0.20-0.30 | Brown sand with gravel and vegetation |
| 451496 | TP02 | None Supplied | 0.10-0.20 | Brown loam and clay with gravel and vegetation |
| 451497 | TP03 | None Supplied | 0.10-0.20 | Brown loam and clay with vegetation and stones |
| 451498 | TP04 | None Supplied | 0.10-0.20 | Brown loam and clay with gravel and vegetation |
| 451499 | TP05 | None Supplied | 0.6 | Brown loam and sand with vegetation and stones |
| 451500 | TP06 | None Supplied | 0.10-0.20 | Brown clay and sand with vegetation and stones |
| 451501 | TP01 | None Supplied | 0.50-0.60 | Brown loam and sand with vegetation and stones |
| 451502 | TP02 | None Supplied | 0.30-0.40 | Brown clay and sand with vegetation and stones |
| 451503 | TP06 | None Supplied | 0.60-0.80 | Brown loam and sand with vegetation and stones |

Analytical Report Number : 25-006726

Project / Site name: Royd Moor, Thurlstone

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|--|---------------|--------------------|----------------------|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Asbestos Quantification - Gravimetric | Asbestos quantification by gravimetric method - in house method based on references | HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft) | A006B | D | ISO 17025 |
| Organic matter (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method) | In-house method | L009B | D | MCERTS |
| Total organic carbon (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method) | In-house method | L009B | D | MCERTS |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Total sulphate (as SO ₄ in soil) | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES | In-house method | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| BTEX and/or Volatile organic compounds in soil | Determination of volatile organic compounds in soil by headspace GC-MS | In-house method based on USEPA 8260 | L073B | W | MCERTS |
| Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil | Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic | In-house method | L076B/L088-PL | D/W | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Free cyanide in soil | Determination of free cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |

Analytical Report Number : 25-006726

Project / Site name: Royd Moor, Thurlstone

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|------------------------|--|-----------------------------|---------------|--------------------|----------------------|
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution



< ENVIRONMENTAL > < GEOTECHNICAL >

End of Report



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☎ 01484 604354 Company No. 5130864

Appendix 4

Soil Screening Value Comparison Sheet



Rogers Geotechnical Services: Soil Screening Values Comparison Sheet



| Rogers Geotechnical Services Ltd: Soil Screening Value (SSV) Comparison Sheet | | | | | | | | | | | | | | |
|---|----------------------|-----|------|---|-------------|---------|---------|---------|---------|---------|---------|--|------|------|
| Job Number | C4503/24/E/6885 | | | A = WS Atkins PLC, Atrisk Soil Screening Values. A+ = Values updated June 2017. A* = Atrisk's SSV is lower than i2's detectable limit for this compound. B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report. C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter. D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a limit of 102 should be used. | | | | | | | | KEY | | |
| Job Name | Royd Moor House Farm | | | | | | | | | | | <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Exceeds SSV </div> <div style="width: 45%;"> Exceeds 2017, Below 2015 </div> </div> | | |
| Date | 19.02.2025 | | | Sample Location | TP01 | TP02 | TP03 | TP04 | TP05 | TP06 | | TP01 | TP02 | |
| Client | Kingsman Homes | | | Depth Top | 0.20 | 0.10 | 0.10 | 0.10 | 0.60 | 0.10 | | 0.50 | 0.30 | 0.60 |
| | | | | Depth Base | 0.30 | 0.20 | 0.20 | 0.20 | | 0.20 | | 0.60 | 0.40 | 0.80 |
| Determinand | Units | Ref | LOD | Residential With Plant Uptake 1% | | | | | | | | | | |
| | | | | Atrisk 2015 (No Free Product) | Atrisk 2017 | | | | | | | | | |
| Cadmium | mg/kg | C | 0.2 | | 22.1 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | | | |
| Chromium (Hexavalent) | mg/kg | B/C | 1.8 | 20.5 | 3.62 | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 | | | |
| Copper | mg/kg | A+ | 1.0 | | 4730 | 17.00 | 27.00 | 10.00 | 18.00 | 18.00 | 33.00 | | | |
| Mercury | mg/kg | A/D | 0.3 | | 8.81 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | | |
| Nickel | mg/kg | A+ | 1.0 | | 136 | 8.40 | 13.00 | 8.30 | 15.00 | 10.00 | 27.00 | | | |
| Lead | mg/kg | C | 1.0 | | 200 | 41.00 | 44.00 | 13.00 | 32.00 | 24.00 | 22.00 | | | |
| Zinc | mg/kg | A+ | 1.0 | | 20000 | 64.00 | 94.00 | 31.00 | 95.00 | 110.00 | 68.00 | | | |
| Vanadium | mg/kg | A+ | 1.0 | | 136 | 24.00 | 38.00 | 21.00 | 26.00 | 14.00 | 47.00 | | | |
| Arsenic | mg/kg | C | 1.0 | | 37 | 9.30 | 12.00 | 4.80 | 7.60 | 5.20 | 22.00 | | | |
| Selenium | mg/kg | A | 1.0 | | 375 | < 1.0 | 1.50 | < 1.0 | 1.00 | < 1.0 | < 1.0 | | | |
| Cyanide (Free) | mg/kg | A | 1.0 | | 34 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | | |
| Total Phenols | mg/kg | A | 1.0 | | 267 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | | |
| Naphthalene | mg/kg | A+ | 0.05 | | 0.829 | 0.17 | 0.09 | 0.08 | 0.08 | 0.13 | 0.13 | | | |
| Acenaphthylene | mg/kg | | 0.05 | | | < 0.05 | < 0.05 | < 0.05 | 0.06 | < 0.05 | < 0.05 | | | |
| Acenaphthene | mg/kg | A+ | 0.05 | 608 | 157 | < 0.05 | 0.06 | < 0.05 | < 0.05 | 0.17 | < 0.05 | | | |
| Fluorene | mg/kg | A+ | 0.05 | | 735 | < 0.05 | < 0.05 | < 0.05 | 0.06 | 0.14 | < 0.05 | | | |
| Phenanthrene | mg/kg | | 0.05 | | | 0.05 | 0.52 | < 0.05 | 0.63 | 1.30 | < 0.05 | | | |
| Anthracene | mg/kg | A+ | 0.05 | | 10200 | < 0.05 | 0.15 | < 0.05 | 0.13 | 0.19 | < 0.05 | | | |
| Fluoranthene | mg/kg | A+ | 0.05 | | 983 | 0.12 | 2.20 | 0.05 | 1.00 | 1.30 | 0.08 | | | |
| Pyrene | mg/kg | A+ | 0.05 | | 668 | 0.11 | 2.20 | < 0.05 | 0.86 | 1.10 | 0.07 | | | |
| Benzo[a]anthracene | mg/kg | A | 0.05 | 4.52 | 1.71 | 0.06 | 1.30 | < 0.05 | 0.37 | 0.54 | < 0.05 | | | |
| Chrysene | mg/kg | A | 0.05 | 585 | 0.44 | 0.07 | 1.30 | < 0.05 | 0.51 | 0.67 | < 0.05 | | | |
| Benzo[b]fluoranthene | mg/kg | A | 0.05 | 7.72 | 1.22 | 0.11 | 2.10 | < 0.05 | 0.51 | 0.66 | 0.07 | | | |
| Benzo[k]fluoranthene | mg/kg | A | 0.05 | 84.4 | 0.686 | < 0.05 | 0.88 | < 0.05 | < 0.05 | 0.26 | < 0.05 | | | |
| Benzo[a]pyrene | mg/kg | B/C | 0.05 | 4.95 | 1.51 | 0.07 | 2.10 | < 0.05 | 0.46 | 0.53 | < 0.05 | | | |
| Indeno(1,2,3-c,d)Pyrene | mg/kg | A* | 0.05 | 7.31 | 0.0614 | < 0.05 | 1.10 | < 0.05 | 0.28 | 0.23 | < 0.05 | | | |
| Dibenz(a,h)Anthracene | mg/kg | A | 0.05 | 0.838 | 0.00393 | < 0.05 | 0.24 | < 0.05 | 0.05 | 0.07 | < 0.05 | | | |
| Benzo[g,h,i]perylene | mg/kg | A | 0.05 | 96.2 | 0.0187 | 0.06 | 1.10 | < 0.05 | 0.33 | 0.28 | < 0.05 | | | |
| Total Of 16 PAH's | mg/kg | | 0.8 | | | < 0.80 | 15.30 | < 0.80 | 5.34 | 7.61 | < 0.80 | | | |
| Aliphatic TPH >C5-C6 | mg/kg | A+ | 0.02 | | 42.7 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | | |
| Aliphatic TPH >C6-C8 | mg/kg | A+ | 0.02 | 0 | 99.3 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | | |
| Aliphatic TPH >C8-C10 | mg/kg | A+ | 0.05 | | 13.9 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | | |
| Aliphatic TPH >C10-C12 | mg/kg | A+ | 1.0 | 81.7 | 49.9 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | | |
| Aliphatic TPH >C12-C16 | mg/kg | A+ | 2.0 | 385 | 20.9 | < 2.0 | 2.30 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | | | |
| Aliphatic TPH >C16-C21 | mg/kg | A+ | 8.0 | | 210000 | < 8.0 | < 8.0 | < 8.0 | < 8.0 | < 8.0 | < 8.0 | | | |
| Aliphatic TPH >C21-C35 | mg/kg | A+ | 8.0 | | 210000 | < 8.0 | 85.00 | < 8.0 | < 8.0 | < 8.0 | < 8.0 | | | |
| Aliphatic TPH >C35-C44 | mg/kg | | 10.0 | | | | | | | | | | | |
| Total Aliphatic Hydrocarbons | mg/kg | | 10.0 | | | | | | | | | | | |
| Aromatic TPH >C5-C7 | mg/kg | A+ | 0.01 | | 0.137 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | | |
| Aromatic TPH >C7-C8 | mg/kg | A+ | 0.01 | 0 | 113 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | | |
| Aromatic TPH >C8-C10 | mg/kg | A+ | 0.05 | | 20.5 | < 0.020 | < 0.020 | < 0.020 | < 0.020 | < 0.020 | < 0.020 | | | |



Rogers Geotechnical Services: Soil Screening Values Comparison Sheet



| Rogers Geotechnical Services Ltd: Soil Screening Value (SSV) Comparison Sheet | | | | | | | | | | | | | | | | |
|---|----------------------|-------|-----|---|----------------------------------|-------|--------------|--------------|--------------|--------------|------------|--|-------|-------|--------|------|
| Job Number | C4503/24/E/6885 | | | A = WS Atkins PLC, Atrisk Soil Screening Values. A+ = Values updated June 2017. A* = Atrisk's SSV is lower than i2's detectable limit for this compound. B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report. C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter. D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a limit of 102 should be used. | | | | | | | | KEY | | | | |
| Job Name | Royd Moor House Farm | | | | | | | | | | | Exceeds SSV Exceeds 2017, Below 2015 Below limit of detection (LOD) | | | | |
| Date | 19.02.2025 | | | Sample Location | | TP01 | TP02 | TP03 | TP04 | TP05 | TP06 | | TP01 | | | TP02 |
| Client | Kingsman Homes | | | Depth Top | | 0.20 | 0.10 | 0.10 | 0.10 | 0.60 | 0.10 | | 0.50 | 0.30 | 0.60 | |
| | | | | Depth Base | | 0.30 | 0.20 | 0.20 | 0.20 | | | 0.20 | | 0.60 | 0.40 | 0.80 |
| Determinand | | Units | Ref | LOD | Residential With Plant Uptake 1% | | | | | | | | | | | |
| Aromatic TPH >C10-C12 | | mg/kg | A+ | 1.0 | 70 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | | | | |
| Aromatic TPH >C12-C16 | | mg/kg | A+ | 2.0 | 165 | 155 | < 2.0 | 2.10 | < 2.0 | < 2.0 | < 2.0 | | | | | |
| Aromatic TPH >C16-C21 | | mg/kg | A+ | 10.0 | | 319 | < 10 | < 10 | < 10 | < 10 | < 10 | | | | | |
| Aromatic TPH >C21-C35 | | mg/kg | A+ | 10.0 | | 1120 | < 10 | 40.00 | < 10 | < 10 | < 10 | | | | | |
| Aromatic TPH >C35-C44 | | mg/kg | | 10.0 | | | | | | | | | | | | |
| Total Aromatic Hydrocarbons | | mg/kg | | 10.0 | | | | | | | | | | | | |
| Total Petroleum Hydrocarbons | | mg/kg | | 10.0 | | | | | | | | | | | | |
| pH | | | | N/A | | | 6.30 | 7.80 | 8.20 | 8.70 | 9.70 | | 8.00 | 7.20 | 8.40 | 7.40 |
| Sulphate (2:1 Water Soluble) as SO4 | | mg/l | | 0.00125 | | | 7.37 | 20.30 | 5.50 | 77.70 | 85.40 | 672.00 | 4.67 | 10.30 | 203.00 | |
| ACM Type | | | | N/A | | | Not detected | Not detected | Not detected | Not detected | Chrysotile | Not detected | | | | |
| Asbestos Identification | | % | | | | | | | | | 0.008 | | | | | |
| ACM Detection Stage | | | | N/A | | | | | | | | | | | | |
| Moisture | | % | | 0.01 | | | 19.00 | 18.00 | 14.00 | 17.00 | 17.00 | 11.00 | 13.00 | 6.70 | 11.00 | |
| Soil Colour | | | | N/A | | | | | | | | | | | | |
| Other Material | | | | N/A | | | | | | | | | | | | |
| Soil Texture | | | | N/A | | | | | | | | | | | | |
| Sulphate (Total) | | % | | 0.005 | | | | | | | | | | | | |
| Organic Matter | | % | | 0.1 | | | 3.80 | 3.90 | 1.20 | 2.20 | 1.80 | 0.70 | | | | |

Appendix 5

Fill Screening Values

Rogers Geotechnical Services Ltd.

Atkins ATRISK Soil Screening Values (SSVs) - Residential With Plant Uptake Landuse

| Tox Data Report No. | Compound | Residential with Homegrown Produce Landuse (mg/kg) | | | | Reference |
|--|--------------------------|--|-----------------|--------------|-----------------|-----------|
| | | SOM: 1% | | SOM: 6% | | |
| <i>Metals</i> | | | | | | |
| | | SOM: 1% | | SOM: 6% | | |
| 3 | Cadmium | 22.1 | | 22.1 | | C |
| 4 | Chromium VI | 3.62 | 20.5 | 3.63 | 20.5 | B/C |
| | Copper | 4730 | | 4790 | | A+ |
| 7 | Mercury | 8.81 | | 15.80 | | A/D |
| 8 | Nickel | 136 | | 136 | | A+ |
| | Lead | 200 | | 200 | | C |
| | Zinc | 20000 | | 20300 | | A+ |
| | Vanadium | 136 | | 138 | | A+ |
| <i>Semi and Non Metals</i> | | | | | | |
| 1 | Arsenic | 37 | | 37 | | C |
| 10 | Selenium | 375 | | 375 | | A |
| | Free Cyanide | 34 | | 34 | | A |
| 9 | Phenols (total) | 267 | | 1200 | | A |
| <i>Poly Aromatic Hydrocarbons</i> | | | | | | |
| | | Free product | No free product | Free product | No free product | |
| 20 | Napthalene | 0.829 | | 12.2 | | A+ |
| | Acenaphthene | 157 | 608 | 2760 | | A+ |
| | Fluorene | 735 | | 2610 | | A+ |
| | Anthracene | 10200 | | 26200 | | A+ |
| | Fluoranthene | 983 | | 2980 | | A+ |
| | Pyrene | 668 | | 2120 | | A+ |
| | Benzo(a)anthracene | 1.71 | 4.52 | | | A |
| 2 | Chrysene | 0.44 | 585 | | | A |
| 2 | Benzo(b)fluoranthene | 1.22 | 7.72 | | | A |
| 2 | Benzo(k)fluoranthene | 0.686 | 84.4 | | | A |
| 2 | Benzo(a)pyrene | 1.51 | 4.95 | 2.05 | 4.95 | B/C |
| 2 | Dibenzo(a,h)anthracene | 0.00393 | 0.838 | | | A* |
| 2 | Indeno(1,2,3-cd)pyrene | 0.0614 | 7.31 | | | A |
| 2 | Benzo(g,h,i)perylene | 0.0187 | 96.2 | | | A |
| <i>Petroleum Hydrocarbons</i> | | | | | | |
| | Aliphatic C5-C6 | 42.7 | | 369 | | A+ |
| | Aliphatic C6-C8 | 99.3 | | 768 | 1240 | A+ |
| | Aliphatic C8-C10 | 13.9 | | 204 | | A+ |
| | Aliphatic C10-C12 | 49.9 | 81.7 | 297 | 1180 | A+ |
| | Aliphatic C12-C16 | 20.9 | 385 | 125 | 4130 | A+ |
| | Aliphatic C16-C21 | 210000 | | 210100 | | A+ |
| | Aliphatic C21-C35 | 210000 | | 210100 | | A+ |
| | Aromatic C5-C7 (Benzene) | 0.137 | | 0.871 | | A+ |
| | Aromatic C7-C8 (Toluene) | 113 | | 780 | | A+ |
| | Aromatic C8-C10 | 20.5 | | 232 | | A+ |
| | Aromatic C10-C12 | 70 | | 468 | | A+ |
| | Aromatic C12-C16 | 155 | 165 | 830 | | A+ |
| | Aromatic C16-C21 | 319 | | 1040 | | A+ |
| | Aromatic C21-C35 | 1120 | | 1710 | | A+ |
| <i>Others</i> | | | | | | |
| Asbestos Not Detected | | | | | | |
| A+ = Values update June 2017. | | | | | | |
| A* Atrisk's SSV is lower than Chemtest's detectable limit for this compound. | | | | | | |
| B = Health Criterion Values (available from toxicological reviews published in the C4SL project methodology report). | | | | | | |
| C = Category 4 Screening Levels (C4SLs). | | | | | | |
| D = SSV provided is for Methyl Mercury. | | | | | | |