# REMEDIATION STRATEGY
# FOR LAND AT
# DALZELL STREET
# MOOR ROW

**Prepared for: -**

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## 1.0 INTRODUCTION

### 1.1 Instruction

1.1.1 GeoCon Site Investigations Ltd (GeoCon) have been commissioned by Nigel Kay Homes to develop a Remediation Strategy on land at Dalzell Street, Moor Row.

1.1.2 It is understood that development proposals comprise the development of 60 residential properties with private gardens and associated access roadways and infrastructure.

### 1.2 Previous Surveys

1.2.1 Previous assessments conducted upon the site comprise the following, which should be read in conjunction with this strategy:

- GeoCon report dated August 2022, referenced 2016-1961, and entitled 'Phase I Desk Top Study Report (Preliminary Environmental Risk Assessment)'.
- GeoCon report dated September 2024, referenced GSI 2132 WG PII Report, and entitled 'Phase II Site Investigation'.

### 1.3 Objectives

1.3.1 The objectives of this remediation strategy are as follows:

- To outline the remedial strategy proposed at the site and the proposed verification strategy for agreement by the Local Planning Authority (LPA).

### 1.4 Limitations

1.4.1 The assessment and interpretation of the factual data obtained as part of this report has been undertaken in accordance with standard consulting practise and with current national and international guidance.

1.4.2 This report presents the observations made during the geoenvironmental site investigations and the factual data obtained. The conclusions and recommendations in this report are limited to those which can be made based on the findings of the survey and information provided by third parties. GeoCon assumes all third-party data to be true and correct. No responsibility can be accepted by GeoCon for inaccuracies in the information provided by any other party.

1.4.3 This report is written in the context of an agreed scope of works and should not be used in a different context. Furthermore, new information, improved practises, and changes in legislation may require the reinterpretation of the report in whole or in part after its original issue. GeoCon reserve the right to alter their conclusions and recommendations in the light of further information that may become available. This report is provided for the sole use of the client and their professional advisers and is confidential to them unless agreed otherwise in writing.

1.4.4 Ground conditions can be variable and change rapidly, especially in areas of Made Ground, however it is assumed that the ground conditions encountered and observed are typical and representative of the site as a whole. Most specifically with regard to this limited investigation, the ground conditions have been determined from a limited number of exploratory holes formed across the site, therefore only a small percentage of the total area of the site has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced. Conclusions drawn from the ground investigation should be read in this context. GeoCon cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

1.4.5 In addition, subsurface conditions including contaminant concentrations and groundwater levels may vary spatially with time. This factor should be given due consideration in the event that the information contained within this report is used after any significant period of time has elapsed.

## 2.0 SITE LOCATION AND DESCRIPTION

2.1.1 The site is located at Dalzell Street, Moor Row, Cumbria, at approximate National Grid Reference NGR: 300662, 514638.

2.1.2 A site location plan is presented as Drawing No. GSI 2132/01 in Appendix A.

### 2.2 Site Description

2.2.1 The site is an irregular shaped piece of land with an approximate area of 4.00Ha.

2.2.2 The topography of the site varies, with agricultural land largely level in the west (with localised undulations present) with a steep slope down to the River Keekle in the east. The land south of the agricultural land is at a lower level, with a small steep bank present along the border of the fields extended down to historical levelled and flat land. A slight dip in elevation is present from Dalzell Street to the west in the triangular portion of the site, rising up to the level of the agricultural land to the east.

2.2.3 The site is currently occupied by derelict land of a former railway goods yard along the southern portion of the site, with access gates at the west and reinforced concrete present along the extents to the east. The hardstanding present in this area is a mix from access roadway and concrete floor slabs with rebar exposed from the relict foundations of structures no longer present. Woodland is present along the southern border and grass and shrubs have grown intersecting the areas of hardstanding. This area of the site is considered 'Brownfield land' (and referred to as such throughout this report), with evidence of historical levelling present in the form of a steep 2.00m embankment up to the agricultural land to the north.

2.2.4 The agricultural land to the north extends east to west and is described as an undeveloped field used for grazing. A small triangular shaped portion of grassed land is present at the site's western extent, adjacent the access route and Dalzell Street. This area of site is referred to as 'Greenfield land' throughout this report.

2.2.5 An approximate distribution of the surface covering is given below in Table 2.1: Site Surface Covering.

**Table 2.1: Site Surface Covering**

| Type of Surface Cover | Distribution (%) |
|---|---|
| Soft Ground (grassed and landscaped areas) | 75 |
| Hardstanding | 25 |
| Roadways | - |
| Buildings | - |
| Water (ponds, streams) | - |

2.2.6 The site is bound by fencing and a cycle path to the south, the River Keekle to the east, agricultural land to the north and northwest and Dalzell Street to the west.

2.2.7 Access to the site is via an access road off Dalzell Street. However, the brownfield portion of site is enclosed in security fencing with a locked gate at the western extent.

## 2.3 Surrounding Area

2.3.1 The current surrounding land use to the site is generally agricultural to the north and west, and beyond the river to the east. To the south is a historical railway utilised as a cycle path with the village of Moor Row beyond.

2.3.2 The topography of the surrounding area gradually falls to the north, with the River Keekle to the east forming a river valley.

## 2.4 Future Site Usage

2.4.1 It is currently proposed to develop the land into a residential estate consisting of construction of 60 2 storey residential properties complete with soft landscaping and construction of access roadways, as shown on the client provided drawing (ref: 22/07/1026-04a) and contained with Appendix A.

2.4.2 This assessment has been carried out with reference to this proposed development plan as provided by the client, any changes to the proposed development may result in this assessment requirement updating.

## 3.0 BACKGROUND

### 3.1 General

3.1.1 The initial Phase I assessment identified an historical railway goods yard located on site along the southern portion of the site. No other development is noted on the existing agricultural fields. A risk to human health from land contamination was identified in the localised area of the historical goods yard, and potential to be impacting controlled water receptors. With regards to ground gas, a moderate to high risk was identified and the site residing within a Radon Affected Area.

3.1.2 The Phase I report identified a risk from potential shallow coal mining and associated gases with further investigation required. No mine entries, surface mining or outcrops are recorded beneath the site, but present in the wider surrounding area.

3.1.3 The intrusive Phase II Site Investigation was carried out by GeoCon between 24th June and 4th July 2024, consisting of eighteen Dynamic Sample boreholes (referenced DS01 to DS18) and seven rotary open hole boreholes (RO1 to RO7a) to depths of between 1.20 and 3.80mbgl and 45.00 and 48.00mbgl, respectively.

3.1.4 Nine of the Dynamic Sample / Rotary boreholes were installed with combined gas and groundwater monitoring standpipes, with the monitoring period carried between 10th July and 17th September 2024.

### 3.2 Encountered Geology

3.2.1 A generalised summary of the ground conditions encountered, depths to base, and thickness recorded from the exploratory hole records is presented below Table 3.1.

**Table 3.1: Summary of Ground Conditions**

| Geology / Strata | Depth (mbgl) | | | | Thickness (m) | | Locations encountered |
|---|---|---|---|---|---|---|---|
| | Top | | Base | | Min | Max | |
| | Min | Max | Min | Max | | | |
| Made Ground | 0.00 | - | 0.70 | 1.80 | 0.70 | 1.80 | DS09 to DS17a, RO2 TO RO4A |
| Topsoil | 0.00 | - | 0.30 | 0.30 | 0.30 | 0.30 | DS01 to DS08, DS18, RO1, RO5, RO6, RO7 |
| Superficial | 0.30 | 0.30 | 11.00 | 15.00 | 10.70 | 14.70 | All locations, with exception of RO4, DS11, DS17 |
| Bedrock | 11.00 | 15.00 | 45.00 | 48.00 | 34.00+ | | RO1 to RO6 |
| Intact Coal | 36.00 | 44.30 | 39.00 | 45.50 | 1.20 | 3.00 | RO2, RO3b |
| **Groundwater** | **Strike depth (mbgl)** | | **Rest Level (mbgl)** | | **Locations encountered** | | |
| | **Min** | **Max** | **Min** | **Max** | | | |
| Seepage | 1.00 | 2.10- | - | - | DS01, DS06, DS18 | | |
| Strike | - | - | - | - | - | | |

3.2.2 Made Ground was encountered in DS09 to DS17a, RO2 to RO4A from ground level to depths of between 0.70 and 1.80mbgl. These locations all reside within the 'Brownfield land' portion of the site.

3.2.3 The Made Ground generally concrete hardstanding overlaying granular material generally described as dark grey sandy gravel of brick, ash, limestone and mudstone with rare, suspected clinker in some locations, with a thickness ranging between 0.70 and 1.80m.

## 3.3 Risks to Human Health

3.3.1 All chemical results were compared against screening criteria for a residential end use with plant uptake. Only shallow made ground soils within the Brownfield portion of the site was affected by land contamination.

3.3.2 Twelve soil samples were tested for a Metals, Asbestos, PAHs and TPH-CWG suites.

3.3.3 No visual or olfactory evidence of contamination was encountered or observed during this ground investigation, in particular no obvious visual or olfactory evidence of mobile contamination was observed during the ground investigation.

3.3.4 Concentrations of contaminants reported above the screening criteria are presented in Table 3.2

**Table 3.2: Summary of Soil Chemical Testing Results**

| Determinand | No. Of samples analysed | Screening value (mg/kg) (where applicable) | Determinand concentration range (mg/kg) | | Locations exceeding screening value |
|---|---|---|---|---|---|
| | | | Min | Max | |
| Arsenic | 12 | 37 | 4.00 | 82.00 | DS11, DS13, DS16, DS17a |
| Lead | 12 | 210 | 11.00 | 341.00 | DS11, DS16 |
| Benzo(a)anthracene | 12 | 7.2 | BD | 7.40 | DS11 |
| Benzo(a)pyrene | 12 | 2.2 | BD | 15.50 | DS11 |
| Benzo(b)fluoranthene | 12 | 2.6 | 0.05 | 16.00 | DS11 |
| Dibenzo(ah)anthracene | 12 | 0.24 | 0.04 | 2.89 | DS11 |

*BD = Below Detection*

3.3.5 Twelve samples were analysed for asbestos screen. Asbestos fibres were detected in three of the samples, in the following locations, with subsequent quantification analysis undertaken on each:

- DS11 at 0.50mbgl: Loose Fibres of Chrysotile, quantified at 0.001%.
- DS13 at 0.90mbgl: Loose insulation of Chrysotile, quantified at 0.002%
- DS15 at 0.30mbgl: Loose fibres of Chrysotile, quantified at <0.001%

3.3.6 Impacted soils indicated by chemical testing indicate that shallow Made Ground, encountered beneath the Brownfield portion of site only (historical railway goods yard) to depths ranging between 0.50 and 0.90m, is affected by contamination. The Phase II site investigation therefore identified a low to moderate risk to site users and construction workers, and Low risk to adjacent neighbours, with remedial action required.

## 3.4 Risk to Controlled Waters

Groundwater

3.4.1 The Environment Agency aquifer classification scheme indicates that the superficial aquifer designation for the site is classed as Secondary Undifferentiated, while the bedrock aquifer designation for the site is classed as Principal aquifer and Secondary A aquifer at the eastern extents. No public drinking water abstractions are present within 2000m of the site.

3.4.2 Groundwater strikes were encountered during the investigation in three locations, with WS04 indicating a strike at 4.00mbgl and WS05 and WS07 indicating a strike at 3.00mbgl. Groundwater monitoring indicated a fluctuating resting water level ranging between dry, and 0.52 to 1.82mbgl where present,

with the deeper RO2 installation indicating a depth of 2.00 to 3.60mbgl in the southeast corner of site. It is considered groundwater when present flows to the east and the adjacent River Keekle.

3.4.3 It is considered that any remediation undertaken in respect of the site soils for human health protection will have a positive impact on reducing any perceived risk to groundwater, with the Phase II concluding a Very Low risk to groundwater receptors.

Surface Water

3.4.4 The nearest surface watercourse to the site is River Keekle located along the eastern boundary of the site, flowing to the southeast. There is one discharge consent located on site, for sewage discharge into a freshwater stream/river.

3.4.5 Due to close proximity of the water course, it is recommended that a silt trap is utilised to prevent any construction activities from negatively impacting the River. Any works within proximity to the river will also require a permit from the Environment Agency.

3.4.6 Therefore, based on the above information, the results of the soil testing, the distance of the surface water receptor to the site, and considering that natural attenuation, dilution and dispersion will take place, the risks to surface waters are considered to be **very low** at this stage.

### 3.5 Risks from Ground Gas

3.5.1 Two Historic Landfill Sites are recorded within 250m of the site. They are identified 80m east and 160m east, however due to the changes in topography and being intersected by the River Keekle, these are not considered to be impacting the site.

3.5.2 The site is indicated by the Coal Authority to be potentially underlain by shallow coal, with mine workings known in the wider site surroundings including mine entries.

3.5.3 Made Ground was only encountered within the former goods and railway yard, with Made Ground proven to 1.80mbgl in this area of site. Gravels typical of alluvium was encountered in the western portion of the site.

3.5.4 Gas monitoring was carried out on six occasions over a three-month period to assess the risks to the proposed commercial development from potential hazardous ground gasses; with ground gas monitoring standpipes installed at depths of between 2.00 and 5.00mbgl within the Made Ground and natural deposits.

3.5.5 Methane concentrations ranged below detection at <0.1% v/v; Carbon dioxide concentrations ranged between 0.20 and 14.1% v/v; oxygen concentrations ranged between 0.60 and 15.1% v/v; and flows were recorded between 0.0 and 1.70l/hr during the monitoring period. Areas affected by elevated CO2 relates to the area of natural alluvium in the west of the site.

3.5.6 Based on the gas monitoring and considering the elevated $CO_2$ and depleted oxygen and utilising the highest steady flow of 1.70l/hr, the site was categorised as falling under Characteristic Situation (CS) 2 – Low risk. The development site is also located within a Radon Affected Area, as between 10% and 30% of properties are above the action level. Consequently, in accordance with BR211 full radon protection measures are also necessary, as part of the gas protection measures.

## 4.0 REMEDIATION OUTLINE

4.1.1 The aim of this Remediation Strategy is to minimize the risk to identified receptors, in this case:

- Construction Workers, and
- Future residents of the proposed development

4.1.2 Sources of risk on site are identified as:

Land Contamination

- Concentrations above guideline values of Arsenic, Lead, Benzo(a)anthracene, Benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(ah)anthracene were recorded with in the granular made ground, alongside quantified asbestos within the Brownfield portion of site only, as defined on drawing GSI2132/03 and GSI2132/04 (Appendix A).

Ground Gas

- Based on the gas monitoring information the site was categorised as falling under Characteristic Situation (CS) 2 – Low risk, with gas protection measures required in the construction of new dwellings.

4.1.3 The investigation to date has been point specific, therefore there is potential for further contamination to be present on site in those areas not previously tested.

4.1.4 Based on the contamination profile identified and the proposed end use of the site, in order to meet the needs of this Remediation Strategy the recommendations as set out in Section 5.0 below are considered the appropriate approach.

## 5.0 REMEDIATION STRATEGY

### 5.1 Aims

5.1.1 The aims of this remediation strategy are the following:

- Resolve any identified and potential contamination issues in order to protect environmental receptors and render the site suitable for the proposed development with respect to the National Planning Policy Framework (NPPF).
- Render the site as unlikely to be defined as Contaminated Land as defined under Part 2A of the EPA.

### 5.2 Construction Activities

5.2.1 During the construction works, especially the groundworks, construction workers will be subject to an elevated level of risk.

5.2.2 As such, all personnel on site will comply with guidance provided in the Health and Safety Executive (HSE) document "Protection of Workers and the general public during the redevelopment of potentially Contaminated Land". In summary, the following should be provided by the appointed contractor:

- All staff to be suitably trained and competent.
- Protective clothing, footwear, glasses, suitable dust masks and gloves. (Personnel should be instructed in why and how they are to be used).
- Handwashing, eye-washing and boot-washing facilities.
- Damp down all exposed soils on site.
- Smoking shall be limited to designated areas.

### 5.3 Removal of Below Ground Obstructions

5.3.1 Obstructions in the form of relic foundations and infrastructure may be found on site during groundworks.

5.3.2 Where relict structures are found to retain fluid contaminants, they shall be drained and removed from site. The engineer should be notified to ensure that the appropriate action is taken, and records made for final validation.

5.3.3 Deep excavations for the removal of structures etc. will be unstable in the short term and side support may be necessary.

5.3.4 Suitable materials derived from the grubbing-up shall be stored in a location on site, to be agreed with the engineer, prior to crushing. Any unsuitable materials shall be removed to a suitable licensed landfill site as stipulated within the Materials Management Plan.

### 5.4 Contaminated Soils

5.4.1 Remedial measures are required with respect the new development and construction in the area defined as Brownfield portion of site.

5.4.2 In areas of the site where buildings and hardstanding are proposed the Made Ground can be left insitu as the buildings and hardstanding areas will break the 'pollutant linkage' and remove the pathway for contamination and come in to contact with the end users.

5.4.3 However, remedial measures are required with respect to any intended landscaped areas associated with the new construction. It is considered removal of a minimum of 600mm of Made Ground (or until natural strata where the Made Ground is <600mm thick) would reduce the risk to human health, by importing and providing a clean cover system in accordance with BRE Cover Systems for Land Regeneration which would reduce the risk to human health.

5.4.4 At this stage as a minimum, the Made Ground materials should be removed from site in accordance with BRE Cover systems for land regeneration 2004. This document recommends that based on the soil testing results, up to 600 mm of Made Ground below proposed formation level should be removed from site and replaced with clean inert materials comprising of clean inert imported topsoil material in line with BS 3882: 2015 Specification for topsoil.

5.4.5 During removal, it is recommended that a watching brief is present on site to record and validate the removal of materials.

5.4.6 Excavations should not be left open for longer than necessary, should be safely battered back and should be securely cordoned-off using 2.00m high safety fencing, with appropriate warning signs whenever excavations works are suspended

### 5.5 Export to Landfill

5.5.1 Any material exported from the site to landfill should be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and the Landfill (England and Wales) Regulations 2005.

5.5.2 A transfer note should be completed, signed and retained by the parties involved.

5.5.3 All hazardous waste going for disposal at landfills must be classified according to the new European Waste Catalogue (EWC).

5.5.4 A Hazardous Waste Assessment should be carried out on any materials requiring removal and disposal from site. Waste Acceptance Criteria (WAC) testing may also be required, and the results of the Hazardous Waste Assessment and WAC testing (if appropriate) should be presented to the landfill operator for their confirmation of waste category.

### 5.6 Dust Control

5.6.1 At all times during the excavation works, Best Practicable Means shall be employed to minimise dust and odour generation and their emission off site.

### 5.7 Previously Unidentified Contaminants

5.7.1 Should any suspected contaminated materials other than those detailed in this and previous reports be encountered during the re-development, then it should be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

5.7.2 Should any visual or olfactory evidence of contamination be identified during the removal of below ground obstructions and the turning over of made ground appropriate samples shall be taken by the Engineer for chemical analysis. The Engineer shall check the nature of materials excavated for visual and olfactory evidence of hydrocarbon contamination throughout the remedial works. Depending on the results, the excavated materials shall either be returned to the works beneath the proposed cover system or disposed of, off-site to a suitable licensed facility.

5.7.3 Any grossly contaminated soil/fill found during construction works shall be placed in temporary stockpiles on hardstanding or high density Visqueen and be suitability covered to minimize the potential for dust/odour nuisance and prevent surface water runoff. Samples of arisings material will be taken to

determine whether this material is suitable for re-use on site following crushing in line with the earthwork specification.

5.7.4 Once the laboratory analysis of the material is available an assessment should be undertaken to determine whether it can be retained on-site as part of the Material Management Plan or whether it should be disposed off-site.

5.7.5 Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

### 5.8 Gas Protection Measures

5.8.1 This site has been categorised as falling under Characteristic Situation (CS) 2 – Low risk 2.

5.8.2 It is noted that full Radon protection measures are required and therefore should be suitably designed in accordance with BRE211, whilst also incorporating sufficient gas protection measures based on BS 8485.

5.8.3 BS 8485:2015 recommends a point system for protection measures. The proposed development would class as building type A, and therefore this development would require a total of 3.5 points. BS 8485:2015 provides details of the different options that can be used in order to make up the required points which include a combination of a structural barrier, ventilation measures and gas resistant membrane.

5.8.4 A gas membrane is required to be incorporated into the design in order to meet this requirement.

5.8.5 The gas resistant membrane should be designed to meet all of the following criteria:

- Sufficiently impervious to the gases with a methane transmission rate of <40.0 ml/day/m2/atm.
- Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions.
- Sufficiently strong to withstand in service stresses.
- Sufficiently strong to withstand the installation process and following trades until covered.
- Capable after installation of providing a complete barrier to the entry of the relevant gas.
- And, verified in accordance with CIRIA C735.

5.8.6 Any structural barrier should have appropriate grading of waterproofing to afford further points of gas protection. The designer should also incorporate appropriate ventilation to account for the 3.5 points required.

### 5.9 Drainage and Services Installations

5.9.1 It is recommended that statutory services are consulted at an early stage, with respect to the ground conditions within which they will lay services, in order to enable them to assess if any protection measures are required.

5.9.2 Underground services, comprising BT Lines, gas mains, combined and foul sewers, CCTV and possible fibre optic cables may all impact the site, and the design team and Client should familiarise themselves with their presence.

5.9.3 All drainage installations are anticipated to encounter made ground. Any suitable made ground arisings from drainage trenches etc., if not returned to the original excavation must be placed beneath proposed

hard end-use areas of the site, placed beneath a cover of suitable thickness in garden and landscaped areas, or disposed off-site adhering to the guidelines outlined above.

### 5.10 Materials Management Plan

5.10.1 The Materials Management Plan should allow for remediation of the site soils in the landscaped areas during the appropriate phase of the works.

5.10.2 The Materials Management Plan should also refer to this strategy in respect to:

- Materials arising from the encountering of previously unidentified contamination.
- Materials arising from the removal of below ground obstructions.
- Control of water.
- Contamination related Health and Safety issues, including dust control.

5.10.3 GeoCon does not provide advice on Materials Management Plans, specialist advice from those qualified to sign off on such should be sought.

## 6.0 VALIDATION

6.1.1 Validation chemical testing should be provided by the supplier of any capping material to be imported to confirm its suitability for use on site. All soil imported should be certified prior to import to be suitable for use as BS2883:2015 compliant for topsoil.

6.1.2 Irrespective of the above, all materials to be used within soft landscaping areas, irrespective of its source, should be independently tested for its chemical composition in terms of soil contamination as identified in Section 6.1.3 below.

6.1.3 GeoCon has adopted the approach as identified in the YALPAG Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners and Consultants: Version 4.1 – June 2021 in its verification process. The minimum analysis to be undertaken on materials for use within the cover system is detailed in Table 6.1 below.

**Table 6.1: Proposed Testing frequency and analysis**

| Soil Source | Testing Frequency | Minimum | Analysis suite |
|---|---|---|---|
| Site sourced Topsoil (Greenfield portion) | 1 sample per 250m$^3$ | 6 | Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen. |
| Imported soils: brownfield source | 1 sample per 50m$^3$ | 6 | Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen. |
| Imported soils: greenfield / manufactured soil source | 1 sample per 250m$^3$ | 3 | Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen. |

6.1.4 Where any material is deemed to be unsuitable for use in the 600mm capping layer, either by GeoCon or the Local Authority/Environment Agency, the Contractor shall make provision for the costs of sampling, testing and removal of, said unacceptable materials from excavations and shall make provisions for delays associated with material testing and classification prior to disposal.

6.1.5 Depth validation of the capping system will be required within landscaped areas. The validation will comprise a hand dug pits, with photographic record and insitu testing of all soil will be undertaken as part of the verification. Samples should be taken from each validation pit for subsequent testing. The Validation Report will include the following:

- Remediation Strategy (including copies of confirmation from regulatory authorities agreeing criteria).
- Photographic evidence of the removal of material from site.
- Detailed drawings of the excavated areas showing the extent of the material removal operation.
- Details of the provenance of the subsoil and topsoil (to be provided by contractor).
- Copy of Consignment Notes relating to the movement of wastes to a licensed waste management facility.
- Laboratory analysis of validation soil samples and assessment of suitability for use.
- Logs indicating the minimum 600mm thickness of cover soils within each pit excavated.
- A drawing indicating the location of cover thickness validation pits.
- Detailed drawings showing all sampling locations for chemical testing.
- Details of the design of the gas/vapour protection measures adopted for the development.

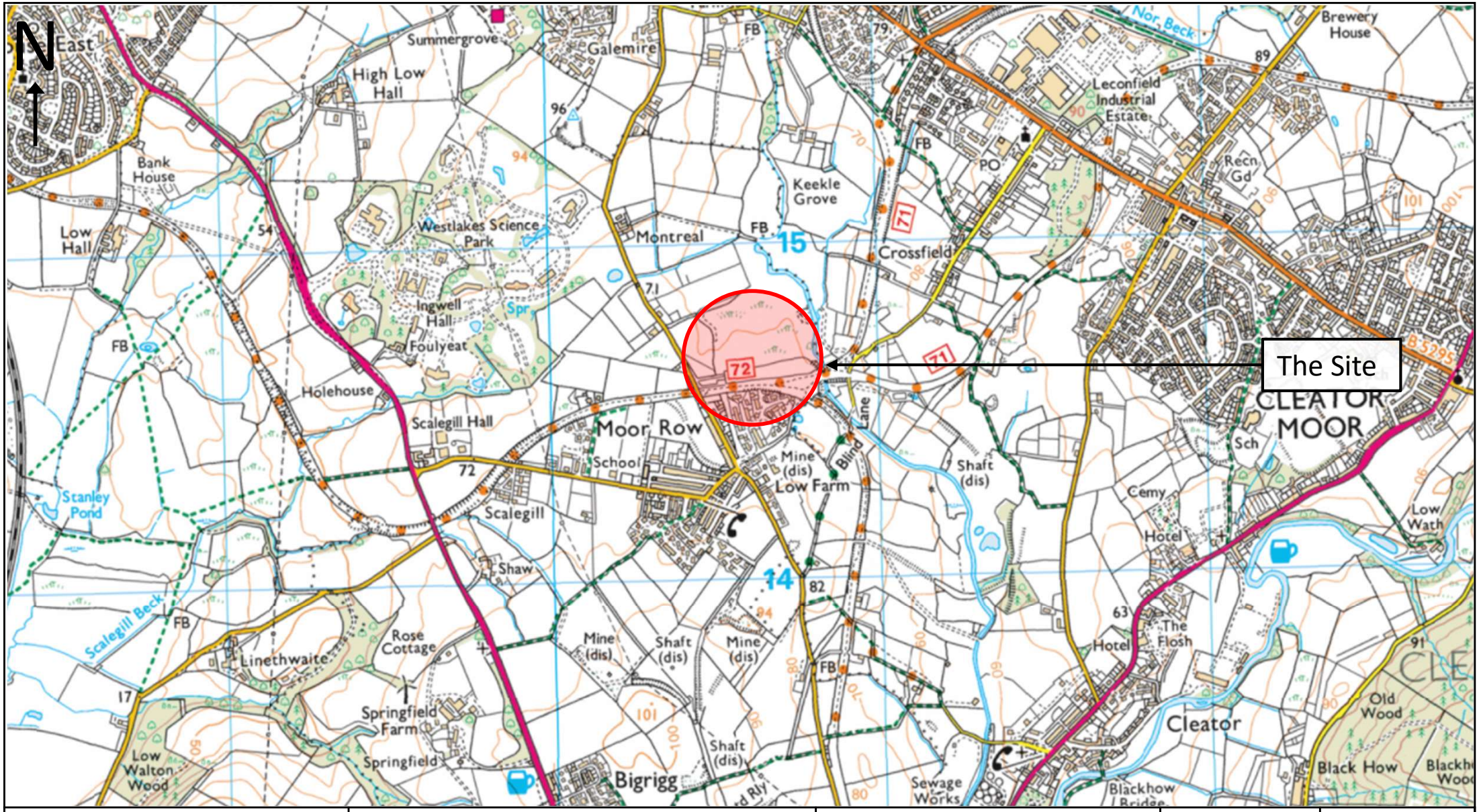
- Details of any gas membrane installation, including confirmation of compliance with the installation specification by the installer and independent validator in accordance with CIRIA C735.
- Photographic evidence obtained during the installation process of the gas protection membrane.
- Details of any variation from the adopted strategy due to unforeseen circumstances.
- Details of any previously unidentified contamination encountered.
- Details of any potentially contaminative activity occurrences that took place.
- Production of a Validation Report.

## 7.0 REFERENCES

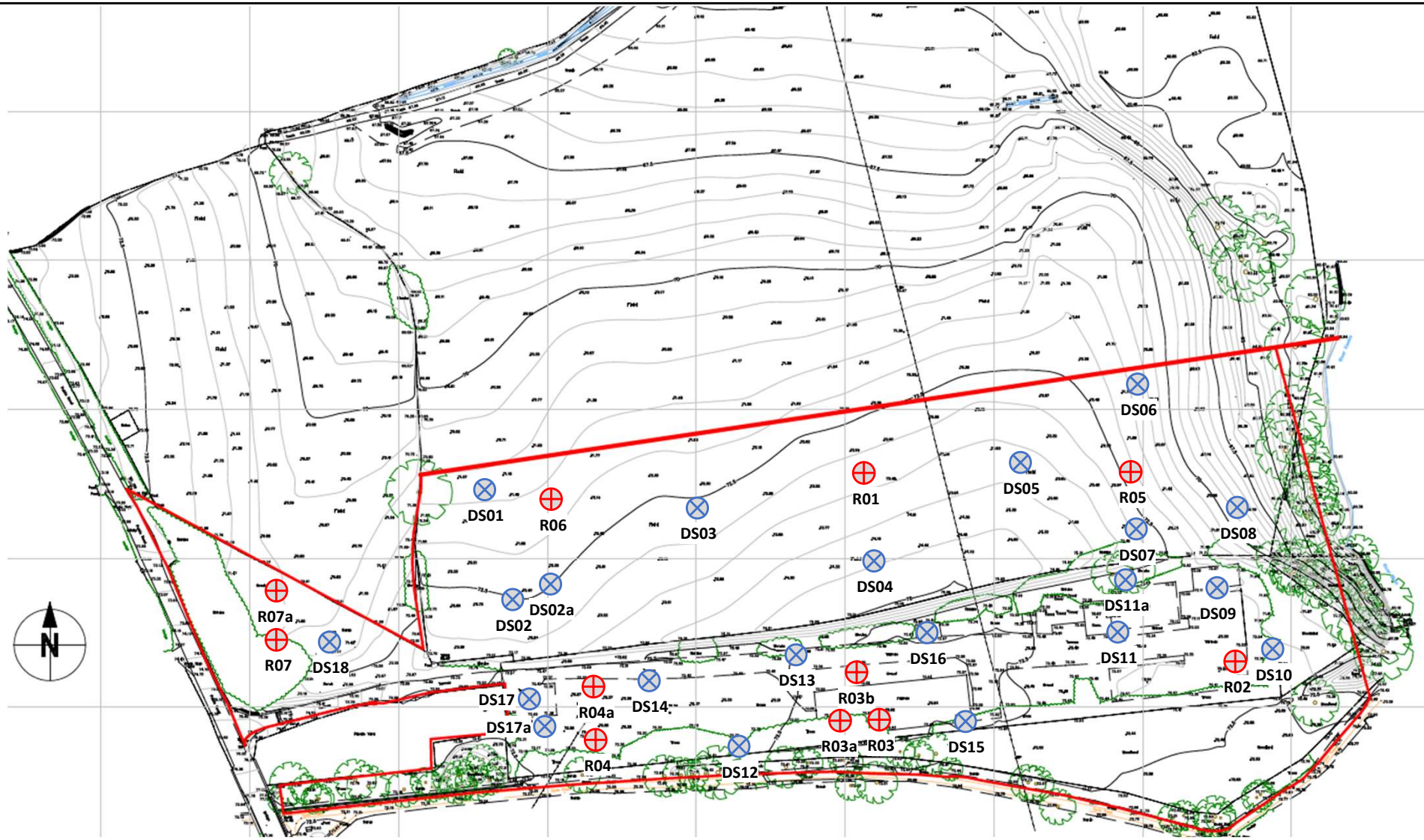

- *AGS: A clients guides and tool kit*
- *Bowles, J. E. (1996): Foundation analysis and design, McGraw-Hill, New York.*
- *British Geological Survey (BGS): 1:50'000 geological maps of the area*
- *British Geological Survey (BGS): Open geoscience online mapping tool*
- *BS 5930: code of Practise for Site Investigation Amendment 2*
- *BS 10175: Code of Practise for the Investigation of Potentially Contaminated Sites*
- *BRE 410 (2004): Working platforms for tracked plant: Good practice guide to the design, installation, maintenance and repair of ground-supported working platforms, BRE Press, Garston.*
- *BRE 211 Radon: Guidance on protective measures for new buildings*
- *CIRIA 552: Contaminated Land Risk Assessment; A Guide to Good Practise 2001*
- *CIRIA 665: Assessing the Risks Posed by Hazardous Ground Gases for Buildings 2007*
- *Coal Authority: Coal authority mining report and Cheshire brine subsidence report*
- *Contaminated Land: Applications in Real Environments (CL:AIRE): 'The Soil Generic Assessment Criteria for Human Health Risk Assessment' GAC's.*
- *David Norbury: Soil and Rock Descriptions in Engineering Practise*
- *Department of the Environment: DOE industry profiles*
- *EN ISO 14688-1: Geotechnical investigation and testing -- Identification and classification of soil -- Part 1: Identification and description*
- *EN ISO 14688-2: Geotechnical investigation and testing -- Identification and classification of soil -- Part 2: Principles for a classification*
- *EN ISO 14689: Geotechnical investigation and testing -- Identification and classification of rock -- Part 1: Identification and description*
- *Environment Agency (EA): EA Online & What's in my back yard*
- *Environment Agency (EA): Soil Guideline Values (SGVs)*
- *International Society of Rock Mechanics (ISRM): Commission on Testing Methods (1985) Suggested Method for Determining Point Load Strength, Int. J. Rock Mech. Min. Sci. and Geomech. Abstr. 22, 1985, pp.51-60.*
- *Land Quality Management (LQM): Generic Screening Criteria (GACs)*
- *Landmark: Envirocheck report and Envirocheck analysis online historical mapping tool*
- *Ordnance survey: OS Landranger map for the area; OS open data online mapping tool*
- *Planning Policy 23: Planning and Pollution Control, Office of The Deputy Prime Minister 2004*
- *R&D Publication CLR 8: Assessment of risks to human health from land contamination*
- *R&D Publication CLR 10: The Contaminated Land Exposure Model (CLEA)*
- *R&D Publication CLR 11: Model Procedure for the Management of Contaminated Land DEFRA 2004*
- *Stroud M.A: The standard penetration test in insensitive clays, Proceedings of the European Symposium on Penetration Testing, Stockholm, 1975, Vol 2, pp 367 – 75.*
- *UK Specification for Ground Investigation Second Edition 2012*

# APPENDIX A

# DRAWINGS




| | | | | |
|---|---|---|---|---|
| GEOCON | GeoCon Site Investigations Ltd<br>GeoCon Suite, Arden House,<br>Shepley Lane Industrial Estate,<br>Hawk Green, Marple,<br>Stockport. Greater Manchester<br>SK6 7JW<br>Tel: 0161 713 0714<br>Email: info@geoconsiteinvestigations.com<br>Web: www.geoconsiteinvestigations.com | **PROJECT DETAILS**<br>GSI 2132: LAND OFF DALZIELL ST, MOOR ROW | **DRAWING NUMBER**<br>GSI 2132/01 | **SCALE**<br>N.T.S |
| | | TITLE<br>SITE LOCATION PLAN | DATE<br>JULY 2024 | DRAWN BY<br>WG |

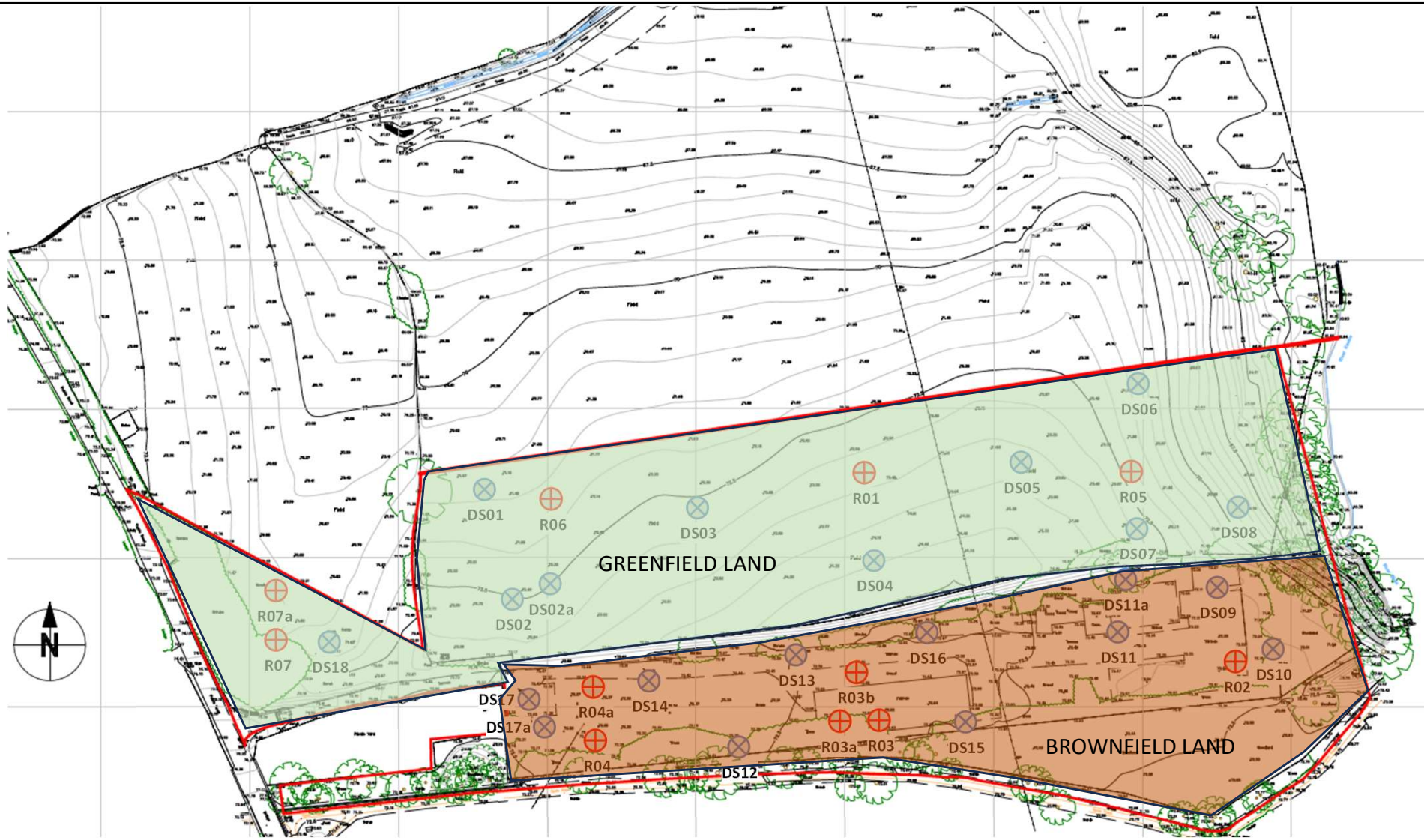



Rotary Open Hole (RO)

Dynamic Sample Borehole (DS)

GeoCon Site Investigations Ltd
GeoCon Suite, Arden House,
Shepley Lane Industrial Estate,
Hawk Green, Marple,
Stockport. Greater Manchester
SK6 7JW
Tel: 0161 713 0714
Email: info@geoconsiteinvestigations.com
Web: www.geoconsiteinvestigations.com

| PROJECT DETAILS | DRAWING NUMBER | SCALE |
|---|---|---|
| GSI 2132: LAND OFF DALZIELL ST, MOOR ROW | GSI 2132/02 | N.T.S |
| **TITLE** | **DATE** | **DRAWN BY** |
| EXPLORATORY HOLE PLAN | JULY 2024 | WG |




⊕ Rotary Open Hole (RO)  ⊗ Dynamic Sample Borehole (DS)

GeoCon Site Investigations Ltd
GeoCon Suite, Arden House,
Shepley Lane Industrial Estate,
Hawk Green, Marple,
Stockport. Greater Manchester
SK6 7JW
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Web: www.geoconsiteinvestigations.com

| PROJECT DETAILS | DRAWING NUMBER | SCALE |
|---|---|---|
| GSI 2132: LAND OFF DALZIELL ST, MOOR ROW | GSI 2132/03 | N.T.S |
| **TITLE** | **DATE** | **DRAWN BY** |
| SITE DESIGNATION PLAN | JULY 2024 | WG |


Remediation extents for cover systems in areas of soft landscaping

GeoCon Site Investigations Ltd
GeoCon Suite, Arden House,
Shepley Lane Industrial Estate,
Hawk Green, Marple,
Stockport. Greater Manchester
SK6 7JW
Tel: 0161 713 0714
Email: info@geoconsiteinvestigations.com
Web: www.geoconsiteinvestigations.com

| PROJECT DETAILS | DRAWING NUMBER | SCALE |
|---|---|---|
| GSI 2132: LAND OFF DALZIELL ST, MOOR ROW | GSI 2132/04 | N.T.S |
| **TITLE** | **DATE** | **DRAWN BY** |
| Remediation Zoning Plan | SEPT 2024 | WG |

# APPENDIX B

# CHEMICAL TESTING RESULTS

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT
## SUPPLEMENT TO TEST REPORT 24/06491/1

**Amendments:** Request for Additional Analysis

**Envirolab Job Number:** 24/06491
**Issue Number:** 2 **Date:** 16 July, 2024

**Client:**
Geocon Site Investigations Ltd
Arden House
Shepley Lane Industrial Estate
Hawk Green, Marple
Stockport
Greater Manchester
UK
SK6 7JW

**Project Manager:** Use - Mailing list/Use - Mailing list 2
**Project Name:** Moor Row, Cumbria
**Project Ref:** GSI 2132
**Order No:** PO 24/0418
**Date Samples Received:** 28/06/24
**Date Instructions Received:** 02/07/24
**Date Analysis Completed:** 16/07/24

**Approved by:**

Gemma Berrisford
Deputy Client Services Supervisor

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/4 | 24/06491/11 | 24/06491/19 | 24/06491/28 | 24/06491/30 | 24/06491/34 | 24/06491/38 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS02 | DS04 | DS07 | DS10 | DS11 | DS12 | DS13 | | | |
| Depth to Top | 0.10 | 0.40 | 0.20 | 0.30 | 0.50 | 0.70 | 0.90 | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 24-Jun-24 | 24-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOLID | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4AE | 6AE | 6AE | 7 | 4A | 4AE | 4AE | | | |
| % Stones >10mm$_A$ | 0.8 | 6.3 | 5.4 | <0.1 | <0.1 | 42.1 | <0.1 | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 5.93 | 7.10 | 6.18 | 8.50$^U$ | 8.46 | 8.40 | 7.89 | pH | 0.01 | A-T-031s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | <1$^U$ | <1 | <1 | <1 | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | mg/kg | 0.2 | A-T-050s |
| Total Organic Carbon$_D$$^{M\#}$ | 4.91 | 0.44 | 6.17 | 7.71$^U$ | 13.1 | 1.67 | 29.3 | % w/w | 0.03 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 17 | 6 | 24 | 4$^U$ | 82 | 12 | 56 | mg/kg | 1 | A-T-024s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | <0.5$^U$ | 0.9 | <0.5 | 0.6 | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 24 | 14 | 35 | 18$^U$ | 187 | 31 | 105 | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 25 | 22 | 14 | 10$^U$ | 21 | 9 | 8 | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | <1 | <1 | <1 | <1 | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 44 | 11 | 63 | 14$^U$ | 341 | 18 | 92 | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 17 | 11 | 13 | 8$^U$ | 32 | 17 | 61 | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | <1$^U$ | 3 | <1 | 2 | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 37 | 15 | 24 | 199$^U$ | 307 | 34 | 147 | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/4 | 24/06491/11 | 24/06491/19 | 24/06491/28 | 24/06491/30 | 24/06491/34 | 24/06491/38 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS02 | DS04 | DS07 | DS10 | DS11 | DS12 | DS13 | | | |
| Depth to Top | 0.10 | 0.40 | 0.20 | 0.30 | 0.50 | 0.70 | 0.90 | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 24-Jun-24 | 24-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOLID | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4AE | 6AE | 6AE | 7 | 4A | 4AE | 4AE | | | |
| **Asbestos in Soil (inc. matrix) ^** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | NAD$^{U}$ | Chrysotile | NAD | Chrysotile | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | - | - | - | - | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | - | Loose Fibres | - | Loose Insolation | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | | A-T-045 |
| | | | | | | | | | | |
| **Asbestos in Soil Quantification % (Hand Picking & Weighing)** | | | | | | | | | | |
| Asbestos in soil % composition (hand picking and weighing)$_{D}$ | - | - | - | - | 0.001 | - | 0.002 | % w/w | 0.001 | A-T-054 |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/4 | 24/06491/11 | 24/06491/19 | 24/06491/28 | 24/06491/30 | 24/06491/34 | 24/06491/38 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS02 | DS04 | DS07 | DS10 | DS11 | DS12 | DS13 | | | |
| Depth to Top | 0.10 | 0.40 | 0.20 | 0.30 | 0.50 | 0.70 | 0.90 | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 24-Jun-24 | 24-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOLID | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4AE | 6AE | 6AE | 7 | 4A | 4AE | 4AE | | | |
| **PAH-16MS** | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | <0.01$^U$ | 0.32 | <0.01 | 0.05 | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | <0.01$^U$ | 0.28 | <0.01 | 0.08 | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | <0.02 | <0.02 | <0.02$^U$ | 0.41 | <0.02 | 0.41 | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | 0.16 | <0.04 | 0.09 | <0.04$^U$ | 7.40 | <0.04 | 1.60 | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.16 | <0.04 | 0.09 | <0.04$^U$ | 15.5 | <0.04 | 1.45 | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.21 | <0.05 | 0.16 | <0.05$^U$ | 16 | <0.05 | 1.88 | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | 0.11 | <0.05 | 0.08 | <0.05$^U$ | 14 | <0.05 | 0.92 | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | 0.09 | <0.07 | <0.07 | <0.07$^U$ | 5.97 | <0.07 | 0.72 | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | 0.20 | <0.06 | 0.14 | <0.06$^U$ | 7.50 | <0.06 | 1.72 | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | <0.04$^U$ | 2.89 | <0.04 | 0.20 | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.36 | <0.08 | 0.20 | <0.08$^U$ | 5.82 | <0.08 | 3.66 | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | <0.01$^U$ | 0.09 | <0.01 | 0.06 | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.12 | <0.03 | 0.09 | <0.03$^U$ | 13.6 | <0.03 | 1.04 | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | <0.03$^U$ | 0.51 | <0.03 | 0.22 | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.15 | <0.03 | 0.10 | 0.04$^U$ | 1.55 | 0.08 | 1.43 | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.27 | <0.07 | 0.15 | <0.07$^U$ | 5.76 | <0.07 | 2.95 | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 1.83 | <0.08 | 1.10 | <0.08$^U$ | 97.6 | 0.08 | 18.4 | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/4 | 24/06491/11 | 24/06491/19 | 24/06491/28 | 24/06491/30 | 24/06491/34 | 24/06491/38 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS02 | DS04 | DS07 | DS10 | DS11 | DS12 | DS13 | | | |
| Depth to Top | 0.10 | 0.40 | 0.20 | 0.30 | 0.50 | 0.70 | 0.90 | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 24-Jun-24 | 24-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | 25-Jun-24 | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOLID | SOIL - ES | SOIL - ES | SOIL - ES | | | |
| Sample Matrix Code | 4AE | 6AE | 6AE | 7 | 4A | 4AE | 4AE | | | |
| **TPH CWG with Clean Up** | | | | | | | | | | |
| Ali >C5-C6$_A$ | - | - | <0.01 | <0.05 | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | - | - | 0.01 | <0.05 | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | - | - | <1 | <1 | <5 | 2 | 6 | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | - | - | <1 | <1$^U$ | <5 | 1 | 4 | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | - | - | <1 | <1$^U$ | <5 | 3 | 8 | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | - | - | 1 | 2$^U$ | 9 | 3 | 11 | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | - | - | 13 | 2$^U$ | 66 | 8 | 75 | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | - | - | 14 | 4 | 76 | 18 | 104 | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | - | - | <1 | <1 | <5 | 1 | 5 | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | - | - | <1 | <1 | 6 | 1 | 5 | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | - | - | 1 | <1 | 18 | 6 | 20 | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | - | - | 4 | 2$^U$ | 35 | 9 | 30 | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | - | - | 10 | 1$^U$ | 378 | 16 | 69 | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | - | - | 15 | 3 | 437 | 33 | 129 | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | - | - | 29 | 7 | 512 | 50 | 234 | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | - | - | <0.01 | <0.05$^U$ | <0.01 | <0.01 | <0.05 | mg/kg | 0.01 | A-T-022s |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/43 | 24/06491/44 | 24/06491/48 | 24/06491/51 | 24/06491/53 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS14 | DS15 | DS16 | DS17a | DS18 | | | | | |
| Depth to Top | 0.90 | 0.30 | 0.60 | 0.50 | 0.10 | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 25-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | | | |
| Sample Matrix Code | 4A | 4AE | 4A | 4A | 6AE | | | | | |
| % Stones >10mm$_A$ | 21.1 | <0.1 | 3.1 | 6.0 | <0.1 | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 8.55 | 8.35 | 7.69 | 7.98 | 7.09 | | | pH | 0.01 | A-T-031s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | <1 | <1 | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | | | mg/kg | 0.2 | A-T-050s |
| Total Organic Carbon$_D$$^{M\#}$ | 19.4 | 15.9 | 24.1 | 22.5 | 7.13 | | | % w/w | 0.03 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 13 | 37 | 59 | 46 | 17 | | | mg/kg | 1 | A-T-024s |
| Cadmium$_D$$^{M\#}$ | 0.8 | 1.1 | 8.0 | <0.5 | 0.6 | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 81 | 138 | 333 | 67 | 43 | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 12 | 20 | 44 | 14 | 20 | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | <1 | <1 | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 90 | 92 | 229 | 81 | 78 | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | 0.70 | <0.17 | <0.17 | 0.21 | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 61 | 44 | 114 | 48 | 20 | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | 2 | 2 | 4 | 2 | 2 | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 159 | 199 | 626 | 82 | 73 | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/43 | 24/06491/44 | 24/06491/48 | 24/06491/51 | 24/06491/53 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS14 | DS15 | DS16 | DS17a | DS18 | | | | | |
| Depth to Top | 0.90 | 0.30 | 0.60 | 0.50 | 0.10 | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 25-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | | | |
| Sample Matrix Code | 4A | 4AE | 4A | 4A | 6AE | | | | | |
| **Asbestos in Soil (inc. matrix) ^** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | Chrysotile | NAD | NAD | NAD | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | - | - | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | Loose Fibres | - | - | - | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | N/A | N/A | | | | | A-T-045 |
| | | | | | | | | | | |
| **Asbestos in Soil Quantification % (Hand Picking & Weighing)** | | | | | | | | | | |
| Asbestos in soil % composition (hand picking and weighing)$_{D}$ | - | <0.001 | - | - | - | | | % w/w | 0.001 | A-T-054 |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/43 | 24/06491/44 | 24/06491/48 | 24/06491/51 | 24/06491/53 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS14 | DS15 | DS16 | DS17a | DS18 | | | | | |
| Depth to Top | 0.90 | 0.30 | 0.60 | 0.50 | 0.10 | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 25-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | | | |
| Sample Matrix Code | 4A | 4AE | 4A | 4A | 6AE | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | 0.02 | 0.04 | <0.01 | 0.02 | 0.04 | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | <0.01 | 0.04 | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | 0.07 | 0.18 | 0.03 | 0.04 | 0.15 | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | 0.31 | 0.70 | 0.11 | 0.13 | 0.93 | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.31 | 0.58 | 0.11 | 0.12 | 0.87 | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.40 | 0.71 | 0.18 | 0.15 | 1.24 | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | 0.19 | 0.35 | 0.07 | 0.10 | 0.55 | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | 0.15 | 0.27 | <0.07 | <0.07 | 0.44 | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | 0.36 | 0.74 | 0.15 | 0.17 | 1.14 | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.05 | <0.08 | <0.04 | <0.04 | 0.15 | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.59 | 1.26 | 0.19 | 0.23 | 2.05 | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | 0.02 | 0.04 | <0.01 | 0.01 | 0.04 | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.21 | 0.39 | 0.08 | 0.10 | 0.65 | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | 0.05 | 0.05 | 0.04 | 0.04 | <0.03 | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.33 | 0.74 | 0.14 | 0.22 | 0.84 | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.48 | 1.03 | 0.15 | 0.21 | 1.56 | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 3.49 | 7.10 | 1.25 | 1.54 | 10.7 | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/06491**

**Client Project Name: Moor Row, Cumbria**

**Client Project Ref: GSI 2132**

| Lab Sample ID | 24/06491/43 | 24/06491/44 | 24/06491/48 | 24/06491/51 | 24/06491/53 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | DS14 | DS15 | DS16 | DS17a | DS18 | | | | | |
| Depth to Top | 0.90 | 0.30 | 0.60 | 0.50 | 0.10 | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 25-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | 26-Jun-24 | | | | | |
| Sample Type | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | SOIL - ES | | | | | |
| Sample Matrix Code | 4A | 4AE | 4A | 4A | 6AE | | | | | |
| **TPH CWG with Clean Up** | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | 2 | 1 | 2 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | 2 | <1 | 1 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 2 | 4 | 1 | 3 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | 5 | 3 | 3 | 3 | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 35 | 37 | 12 | 18 | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 16 | 49 | 42 | 22 | 21 | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | 2 | 2 | 3 | 2 | 1 | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | 2 | 1 | 2 | <1 | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 4 | 10 | 5 | 8 | 4 | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 4 | 16 | 5 | 8 | 15 | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 8 | 39 | 8 | 15 | 51 | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 18 | 70 | 23 | 35 | 72 | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 33 | 119 | 66 | 57 | 93 | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.05 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** Geocon Site Investigations Ltd, Arden House, Shepley Lane Industrial Estate , Hawk Green, Marple, Stockport, Greater Manchester, UK, SK6 7JW

**Project:** Moor Row, Cumbria

**Clients Project No:** GSI 2132

**Project No:** 24/06491

**Date Received:** 02/07/2024 (am)

**Cool Box Temperatures (°C):** 15.2-16.0

| **Lab Sample ID** | 24/06491/28 |
|---|---|
| **Client Sample No** | |
| **Client Sample ID/Depth** | DS10 0.30m |
| **Date Sampled** | 25/06/24 |
| **Deviation Code** | |
| F | ✓ |

*Key*
*F* *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

## HOLDING TIME EXCEEDANCES

| **Lab Sample ID** | 24/06491/28 |
|---|---|
| **Client Sample No** | |
| **Client Sample ID/Depth** | DS10 0.30m |
| **Date Sampled** | 25/06/24 |
| Cyanide (total) | ✓ |
| PAH-16MS | ✓ |
| VPHCWG | ✓ |

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/06491/4 | 24/06491/11 | 24/06491/19 | 24/06491/28 | 24/06491/30 | 24/06491/34 | 24/06491/38 | 24/06491/43 | 24/06491/44 | 24/06491/48 | 24/06491/51 | 24/06491/53 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | | | |
| Client Sample ID/Depth | DS02 0.10m | DS04 0.40m | DS07 0.20m | DS10 0.30m | DS11 0.50m | DS12 0.70m | DS13 0.90m | DS14 0.90m | DS15 0.30m | DS16 0.60m | DS17a 0.50m | DS18 0.10m |
| Date Sampled | 24/06/24 | 24/06/24 | 25/06/24 | 25/06/24 | 25/06/24 | 25/06/24 | 25/06/24 | 25/06/24 | 26/06/24 | 26/06/24 | 26/06/24 | 26/06/24 |
| A-T-019s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 14/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-022s | | | 05/07/2024 | 12/07/2024 | 05/07/2024 | 05/07/2024 | 09/07/2024 | 09/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 |
| A-T-024s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 16/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-031s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 16/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-032s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 16/07/2024 | 05/07/2024 | 08/07/2024 | 05/07/2024 | 08/07/2024 | 05/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-040s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 16/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-042sTCN | 05/07/2024 | 05/07/2024 | 05/07/2024 | 12/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 |
| A-T-044 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 15/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-045 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 11/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 | 04/07/2024 |
| A-T-050s | 08/07/2024 | 08/07/2024 | 08/07/2024 | 12/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 | 08/07/2024 |
| A-T-054 | | | | | 05/07/2024 | | 05/07/2024 | | 05/07/2024 | | | |
| A-T-055s | | | 05/07/2024 | 12/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 |
| Calc-As Recd | | | 05/07/2024 | 12/07/2024 | 05/07/2024 | 05/07/2024 | 09/07/2024 | 09/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 | 05/07/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

# APPENDIX C

# CHEMICAL SCREENING CRITERIA

# GeoCon Site Investigations Ltd

**GENERIC SCREENING CRITERIA**
**FOR**
**GENERIC QUANTITATIVE RISK ASSESSMENT**

**January 2023**

| Compound / Determinands | Source / Reference | Residential WITH consumption of home-grown vegetables | | | Residential WITHOUT consumption of home-grown vegetables | | | Commercial | | | Allotments | | | Public Open Space - Residential | | | Public Open Space - Parks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 % SOM | 2.5% SOM | 6 % SOM | 1 % SOM | 2.5% SOM | 6 % SOM | 1 % SOM | 2.5% SOM | 6 % SOM | 1 % SOM | 2.5% SOM | 6 % SOM | 1 % SOM | 2.5% SOM | 6 % SOM | 1 % SOM | 2.5% SOM | 6 % SOM |
| | | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Antimony | C | 141 | - | 222 | 437 | - | 437 | 4650 | - | 4650 | - | - | 58.3 | 749 | - | 749 | 3090 | - | 3090 |
| Arsenic | A | 37 | 37 | 37 | 40 | 40 | 40 | 640 | 640 | 640 | 43 | 43 | 43 | 79 | 79 | 79 | 170 | 170 | 170 |
| Barium | C | 56.8 | - | 110 | 1340 | - | 1340 | 22000 | - | 22000 | - | - | 18.1 | 2680 | - | 2680 | 5770 | - | 63 |
| Beryllium | A | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 12 | 12 | 12 | 35 | 35 | 35 | 2.2 | 2.2 | 2.2 | 532 | 532 | 532 |
| Boron | A | 290 | 290 | 290 | 11000 | 11000 | 11000 | 240000 | 240000 | 240000 | 45 | 45 | 45 | 21000 | 21000 | 21000 | 46000 | 46000 | 46000 |
| Cadmium (pH 6, 7, 8) | A | 11 | 11 | 11 | 85 | 85 | 85 | 190 | 190 | 190 | 1.9 | 1.9 | 1.9 | 120 | 120 | 120 | 532 | 532 | 532 |
| Chromium III | A | 910 | 910 | 910 | 910 | 910 | 910 | 8600 | 8600 | 8600 | 18000 | 18000 | 18000 | 1500 | 1500 | 1500 | 33000 | 33000 | 33000 |
| Chromium VI | A | 6 | 6 | 6 | 6 | 6 | 6 | 33 | 33 | 33 | 1.8 | 1.8 | 1.8 | 7.7 | 7.7 | 7.7 | 220 | 220 | 220 |
| Copper | A | 2400 | 2400 | 2400 | 7100 | 7100 | 7100 | 68000 | 68000 | 68000 | 520 | 520 | 520 | 12000 | 12000 | 12000 | 44000 | 44000 | 44000 |
| Lead | B | 210 | 210 | 210 | 330 | 330 | 330 | 6000 | 6000 | 6000 | 84 | 84 | 84 | 760 | 760 | 760 | 1400 | 1400 | 1400 |
| Mercury (elemental) | A | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 58 | 58 | 58 | 21 | 21 | 21 | 16 | 16 | 16 | 30 | 30 | 30 |
| Mercury (Inorganic) | A | 40 | 40 | 40 | 56 | 56 | 56 | 1100 | 1100 | 1100 | 19 | 19 | 19 | 120 | 120 | 120 | 240 | 240 | 240 |
| Mercury (methyl) | A | 11 | 11 | 11 | 15 | 15 | 15 | 320 | 320 | 320 | 6 | 6 | 6 | 40 | 40 | 40 | 68 | 68 | 68 |
| Molybdenum | C | 95.2 | - | 97.4 | 673 | 673 | 673 | 17600 | 17600 | 17600 | 17 | 17 | 17 | 1360 | 1360 | 1360 | 2880 | 2880 | 2880 |
| Nickel | A | 180 | 180 | 180 | 180 | 180 | 180 | 980 | 980 | 980 | 230 | 230 | 230 | 230 | 230 | 230 | 3400 | 3400 | 3400 |
| Selenium | A | 250 | 250 | 250 | 430 | 430 | 430 | 12000 | 12000 | 12000 | 88 | 88 | 88 | 1100 | 1100 | 1100 | 1800 | 1800 | 1800 |
| Vanadium | A | 410 | 410 | 410 | 1200 | 1200 | 1200 | 9000 | 9000 | 9000 | 91 | 91 | 91 | 2000 | 2000 | 2000 | 5000 | 5000 | 5000 |
| Zinc | A | 3700 | 3700 | 3700 | 40000 | 40000 | 40000 | 730000 | 730000 | 730000 | 620 | 620 | 620 | 81000 | 81000 | 81000 | 170000 | 170000 | 170000 |
| **Non-Metals / Inorganics** | | | | | | | | | | | | | | | | | | | |
| Free-Cyanide (Total) | C | 34 | 34 | 34 | 34 | 34 | 34 | 373 | 373 | 373 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 |
| **Phenol and Chlorophenols** | | | | | | | | | | | | | | | | | | | |
| Phenol | A | 280 | 550 | 1100 | 750 | 1300 | 2300 | 760 | 1500 | 3200 | 66 | 140 | 280 | 760 | 1500 | 3200 | 760 | 1500 | 3200 |
| Chlorophenols | A | 0.87 | 2 | 4.5 | 94 | 150 | 210 | 3500 | 4000 | 4300 | 0.13 | 0.3 | 0.7 | 620 | 620 | 620 | 1100 | 1100 | 1100 |
| Pentachlorophenol | A | 0.22 | 0.52 | 1.2 | 27 | 29 | 31 | 400 | 400 | 400 | 0.03 | 0.08 | 0.19 | 60 | 60 | 60 | 110 | 120 | 120 |
| **Poly Aromatic Hydrocarbons (PAH)** | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | A | 210 | 510 | 1100 | 3000 | 4700 | 6000 | 84000 | 97000 | 100000 | 34 | 85 | 200 | 15000 | 15000 | 15000 | 29000 | 30000 | 30000 |
| Acenaphthylene | A | 170 | 420 | 920 | 2900 | 4600 | 6000 | 83000 | 97000 | 100000 | 28 | 69 | 160 | 15000 | 15000 | 15000 | 29000 | 30000 | 30000 |
| Anthracene | A | 2400 | 5400 | 11000 | 31000 | 35000 | 37000 | 520000 | 540000 | 540000 | 380 | 950 | 2200 | 74000 | 74000 | 74000 | 150000 | 150000 | 150000 |
| Benzo(a)anthracene | A | 7.2 | 11 | 13 | 11 | 14 | 15 | 170 | 170 | 180 | 2.9 | 6.5 | 13 | 29 | 29 | 29 | 49 | 56 | 62 |
| Benzo(a)pyrene | A | 2.2 | 2.7 | 3 | 3.2 | 3.2 | 3.2 | 35 | 35 | 36 | 0.97 | 2 | 3.5 | 5.7 | 5.7 | 5.7 | 11 | 12 | 13 |
| Benzo(b)fluoranthene | A | 2.6 | 3.3 | 3.7 | 3.9 | 4 | 4 | 44 | 44 | 45 | 0.99 | 2.1 | 3.9 | 7.1 | 7.2 | 7.2 | 13 | 15 | 16 |
| Benzo(ghi)perylene | A | 320 | 340 | 350 | 360 | 360 | 360 | 3900 | 4000 | 4000 | 290 | 470 | 640 | 640 | 640 | 640 | 1400 | 1500 | 1600 |
| Benzo(k)fluoranthene | A | 77 | 93 | 100 | 110 | 110 | 110 | 1200 | 1200 | 1200 | 37 | 75 | 130 | 190 | 190 | 190 | 370 | 410 | 440 |
| Chrysene | A | 15 | 22 | 27 | 30 | 31 | 32 | 350 | 350 | 350 | 4.1 | 9.4 | 19 | 57 | 57 | 57 | 93 | 110 | 120 |
| Dibenzo(ah)anthracene | A | 0.24 | 0.28 | 0.3 | 0.31 | 0.32 | 0.32 | 3.5 | 3.6 | 3.6 | 0.14 | 0.27 | 0.43 | 0.57 | 0.57 | 0.58 | 1.1 | 1.3 | 1.4 |
| Fluoranthene | A | 280 | 560 | 890 | 1500 | 1600 | 1600 | 23000 | 23000 | 23000 | 52 | 130 | 290 | 3100 | 3100 | 3100 | 6300 | 6300 | 6400 |
| Fluorene | A | 170 | 400 | 860 | 2800 | 3800 | 4500 | 63000 | 68000 | 71000 | 27 | 67 | 160 | 9900 | 9900 | 9900 | 20000 | 20000 | 20000 |
| Indeno(123-cd)pyrene | A | 27 | 36 | 41 | 45 | 46 | 46 | 500 | 510 | 510 | 9.5 | 21 | 39 | 82 | 82 | 82 | 150 | 170 | 180 |
| Naphthalene | A | 2.3 | 5.6 | 13 | 2.3 | 5.6 | 13 | 190 | 460 | 1100 | 4.1 | 10 | 24 | 4900 | 4900 | 4900 | 1200 | 1900 | 3000 |
| Phenanthrene | A | 95 | 220 | 440 | 1300 | 1500 | 1500 | 2200 | 22000 | 23000 | 15 | 38 | 90 | 3100 | 3100 | 3100 | 6200 | 6200 | 6300 |
| Pyrene | A | 620 | 1200 | 2000 | 3700 | 3800 | 3800 | 54000 | 54000 | 54000 | 110 | 270 | 620 | 7400 | 7400 | 7400 | 15000 | 15000 | 15000 |
| PAH (Total 16) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Petroleum Hydrocarbons (TPH CWG)** | | | | | | | | | | | | | | | | | | | |
| MTBE | C | 27.6 | - | 220 | 33.3 | - | 318 | 3140 | - | 22400 | - | - | 108 | 73600 | - | 75000 | 70800 | - | 117000 |
| Benzene | A | 0.087 | 0.17 | 0.37 | 0.38 | 0.7 | 1.4 | 27 | 47 | 90 | 0.017 | 0.034 | 0.075 | 72 | 72 | 73 | 90 | 100 | 110 |
| Toluene | A | 130 | 290 | 660 | 880 | 1900 | 3900 | 56000 | 110000 | 180000 | 22 | 51 | 120 | 56000 | 56000 | 56000 | 87000 | 95000 | 100000 |
| Ethylbenzene | A | 47 | 110 | 260 | 83 | 190 | 440 | 5700 | 13000 | 27000 | 16 | 39 | 91 | 24000 | 24000 | 25000 | 17000 | 22000 | 27000 |
| o-Xylene | A | 60 | 140 | 330 | 88 | 210 | 480 | 6600 | 15000 | 33000 | 28 | 67 | 160 | 41000 | 42000 | 43000 | 17000 | 24000 | 33000 |
| m-Xylene | A | 59 | 140 | 320 | 82 | 190 | 450 | 6200 | 14000 | 31000 | 31 | 74 | 170 | 41000 | 42000 | 43000 | 17000 | 24000 | 32000 |
| p-Xylene | A | 56 | 130 | 310 | 79 | 180 | 430 | 5900 | 14000 | 30000 | 29 | 69 | 160 | 41000 | 42000 | 43000 | 17000 | 24000 | 31000 |
| TPH Aliphatic EC5-6 | A | 42 | 78 | 160 | 42 | 78 | 160 | 3200 | 5900 | 12000 | 730 | 1700 | 3900 | 570000 | 590000 | 600000 | 95000 | 130000 | 180000 |
| TPH Aliphatic EC>6-8 | A | 100 | 230 | 530 | 100 | 230 | 530 | 7800 | 17000 | 40000 | 2300 | 5600 | 13000 | 600000 | 610000 | 620000 | 150000 | 220000 | 320000 |
| TPH Aliphatic EC>8-10 | A | 27 | 65 | 150 | 27 | 65 | 150 | 2000 | 4800 | 11000 | 320 | 770 | 1700 | 13000 | 13000 | 13000 | 14000 | 18000 | 21000 |
| TPH Aliphatic EC>10-12 | A | 130 | 330 | 760 | 130 | 330 | 770 | 9700 | 23000 | 47000 | 2200 | 4400 | 7300 | 13000 | 13000 | 13000 | 21000 | 23000 | 24000 |
| TPH Aliphatic EC>12-16 | A | 1100 | 2400 | 4300 | 1100 | 2400 | 4400 | 59000 | 82000 | 90000 | 11000 | 13000 | 13000 | 13000 | 13000 | 13000 | 25000 | 25000 | 26000 |
| TPH Aliphatic EC>16-35 | A | 65000 | 92000 | 110000 | 65000 | 92000 | 110000 | 1600000 | 1700000 | 1800000 | 260000 | 270000 | 270000 | 250000 | 250000 | 250000 | 450000 | 480000 | 490000 |
| TPH Aliphatic EC>35-44 | A | 65000 | 92000 | 110000 | 65000 | 92000 | 110000 | 1600000 | 1700000 | 1800000 | 260000 | 270000 | 270000 | 250000 | 250000 | 250000 | 450000 | 480000 | 490000 |
| TPH Aromatic EC5-7 | A | 70 | 140 | 300 | 370 | 690 | 1400 | 26000 | 46000 | 86000 | 13 | 27 | 57 | 56000 | 56000 | 56000 | 76000 | 84000 | 92000 |
| TPH Aromatic EC>7-8 | A | 130 | 290 | 660 | 860 | 1800 | 3900 | 56000 | 110000 | 180000 | 22 | 51 | 120 | 56000 | 56000 | 56000 | 87000 | 95000 | 100000 |
| TPH Aromatic EC>8-10 | A | 34 | 83 | 190 | 47 | 110 | 270 | 3500 | 8100 | 17000 | 8.6 | 21 | 51 | 5000 | 5000 | 5000 | 7200 | 8500 | 9300 |
| TPH Aromatic EC>10-12 | A | 74 | 180 | 380 | 250 | 590 | 1200 | 16000 | 28000 | 34000 | 13 | 31 | 74 | 5000 | 5000 | 5000 | 9200 | 9700 | 10000 |
| TPH Aromatic EC>12-16 | A | 140 | 330 | 660 | 1800 | 2300 | 2500 | 36000 | 37000 | 38000 | 23 | 57 | 130 | 5100 | 5100 | 5000 | 10000 | 10000 | 10000 |
| TPH Aromatic EC>16-21 | A | 260 | 540 | 930 | 1900 | 1900 | 1900 | 28000 | 28000 | 28000 | 46 | 110 | 260 | 3800 | 3800 | 3800 | 7600 | 7700 | 7800 |
| TPH Aromatic EC>21-35 | A | 1100 | 1500 | 1700 | 1900 | 1900 | 1900 | 28000 | 28000 | 28000 | 370 | 820 | 1600 | 3800 | 3800 | 3800 | 7800 | 7800 | 7900 |
| TPH Aromatic EC>35-44 | A | 1100 | 1500 | 1700 | 1900 | 1900 | 1900 | 28000 | 28000 | 28000 | 370 | 820 | 1600 | 3800 | 3800 | 3800 | 7800 | 7800 | 7900 |
| TPH Aliphatic + Aromatic EC>44-70 | A | 1600 | 1800 | 1900 | 1900 | 1900 | 1900 | 28000 | 28000 | 28000 | 1200 | 2100 | 3000 | 3800 | 3800 | 3800 | 7800 | 7800 | 7900 |

# GeoCon Site Investigations Ltd

January 2023

## GENERIC SCREENING CRITERIA

## FOR

## GENERIC QUANTITATIVE RISK ASSESSMENT

| Generic Screening Criteria Reference Guide: | |
|---|---|
| **Soils - Generic Screening Criteria Source Reference** | |
| **A** | LQM/CIEH S4ULs for Human Health Risk Assessment Values 2015 |
| **B** | Defra C4SL's 2014 |
| **C** | AtRisk Soil Screening Values and Water Screening Values Produced by Atkins 2017 |
| **D** | NHBC Technical Extra 15 - 2014 |
| **E** | UK (CLEA) Soil Guideline Value 2009 |
| **F** | CL:AIRE GAC Values December 2009 |
| **Waters - Generic Screening Criteria Source Reference** | |
| **1** | Environmental Quality Standard from List 2 EC Dangerous Substances Directive (76/464/EEC) - Freshwater |
| **2** | Environmental Quality Standard from EC Surface Water Abstraction Directive (75/440/EEC) - Imperative (A1) |
| **3** | Drinking Water Standard from World Health Organisation (WHO) Guidelines for Drinking Water Quality, 1984 - health value |
| **4** | Environmental Quality Standard from List 2 EC Dangerous Substances Directive (76/464/EEC) - Freshwater (hardness related) |
| **5** | Environmental Quality Standard from EC Surface Water Abstraction Directive (75/440/EEC) - Imperative (A2) |
| **6** | Drinking Water Standard from World Health Organisation (WHO) Guidelines for Drinking Water Quality, 1984 - ATO |
| **7** | Ayscough *et al.* (2002) Proposed Environmental Quality Standards for Ethylbenzene in Water (EA R&D Technical Report P2-115/TR4). |
| **8** | UK Drinking Water Inspectorate - threshold for objectionable odour/taste of 5µg/l to 10µg/l |
| **9** | US EPA advisory limits (1997). As published in Environment Agency "The fuel additive MTBE a groundwater protection issue?" booklet. |
| **10** | Ahlberg *et al.* (2001) An Environmental Risk Assessment of MTBE use in Europe. ECETOC/EFOA Task Force on ERA of MTBE. |
| **11** | Environmental Quality Standard from List 1 EC Dangerous Substances Directive (76/464/EEC) - Freshwater |
| **12** | As Presented in Appendix 8 "Selected Water Quality Standards" in Hydrogeological Risk Assessments for Landfills (LFTGN01 - Environment Agency, March 2003). |
| **13** | UK Drinking Water Standards (DWS) |
| **14** | Environment Agency, Environmental Quality Standards (EQS) 2015 |
| **Abbreviations** | |
| SOM | Soil Organic Matter |