



**Raise Rochdale PRU  
Mayfield Street  
Rochdale  
OL16 2UZ**

## Remediation Method Statement



March 2026

J26054  
Rev 1





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| Rev No | Status | Revision Details                | Date          | Approved for Issue |
|--------|--------|---------------------------------|---------------|--------------------|
| 0      | Final  |                                 | 19 March 2026 |                    |
| 1      | Final  | Addition of architects comments | 26 March 2026 |                    |

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## Contents

|     |                                         |   |
|-----|-----------------------------------------|---|
| 1.0 | Introduction.....                       | 1 |
| 2.0 | The Site .....                          | 2 |
| 3.0 | Ground Model .....                      | 3 |
| 4.0 | Risk Assessment .....                   | 4 |
| 5.0 | Remedial Objectives.....                | 5 |
| 6.0 | Remedial Recommendations.....           | 5 |
| 7.0 | Verification of Remedial Measures ..... | 5 |

## Appendix



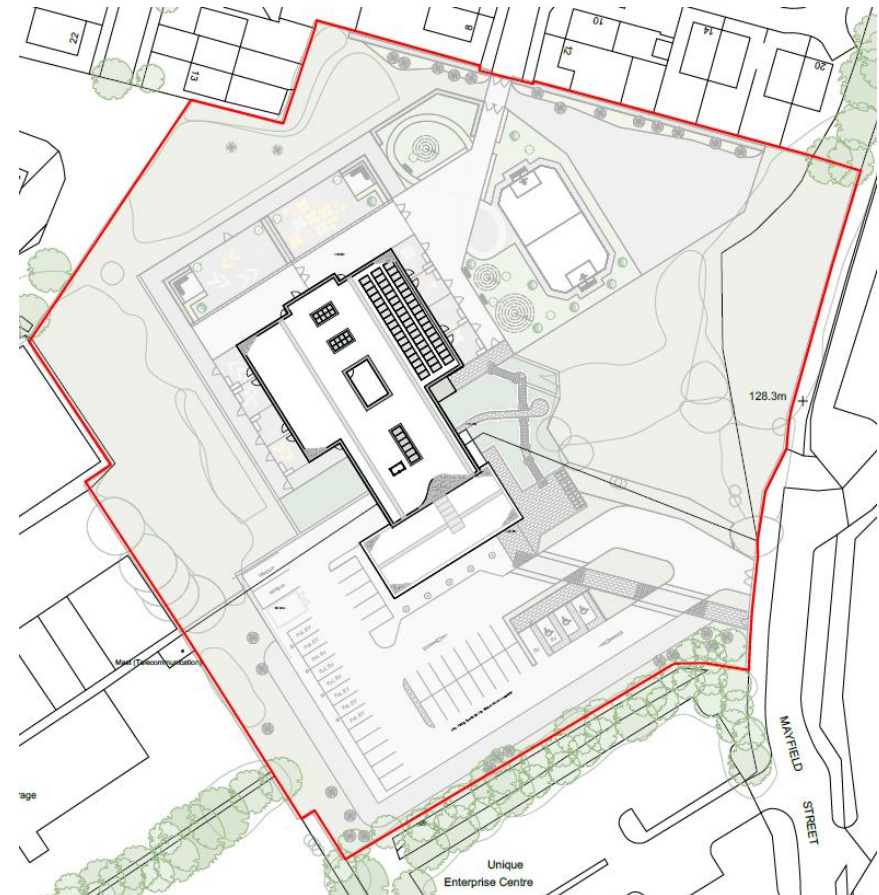
## 1.0 Introduction

It is understood that it is proposed to redevelop the site into a new special educational needs (SEN) school. This is to include a one, two and three storey split level building with associated parking, play space and landscaping.

A desk study and ground investigation has previously been carried out by GEA (Report Ref J25291 Rev 1, dated March 2026). The ground investigation identified the presence of elevated concentrations of arsenic, lead, total PAHs specifically benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene and asbestos contamination within the made ground and elevated concentrations of anthracene, fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene within the groundwater. Outline recommendations for dealing with the contamination were included in the report.

The previous report contains data pertinent to the site and should therefore be read in conjunction with this report.

The proposed layout of the development is shown opposite.





## 2.0 The Site

### 2.1 Site Description

The site is located to the northeast of Rochdale town centre, approximately 1.65 km northeast of Rochdale railway station. It is bounded to the north by residential properties and by a fire station as well as commercial and industrial units to the west. To the south, the site is bounded by car parks and to the east by a public footpath and Mayfield Street. The site may be additionally located by National Grid Reference SD907141.

A walkover of the site was carried out by a geotechnical engineer from GEA prior to fieldwork on 3<sup>rd</sup> October 2025. The site is irregular in shape measuring approximately 140 m north to south and 130 m west to east in maximum dimensions. The site is split into a northern part and a southern part, which are separated by an approximately 6 m high slope which is covered in shrubs, semi mature and mature trees.

The southern part of the site, which is located downslope, is an area of waste ground which, at the time of the investigation, was covered in cleared vegetation and felled trees, following a clearance exercise to provide access for this investigation. An area of shrubs, semi mature and mature trees is located along the southern edge, separating the site from the car park beyond the southern boundary. The surface is hummocky and uneven, sloping gently downwards towards the south and is accessed from Mayfield Street in the southeast through a secure gate.

The higher northern part of the site is an area of undeveloped soft landscaping containing numerous areas of shrubs and scattered saplings. An area of semi-mature and mature trees is located along the eastern edge and slopes gently down towards the southeast. This part of the site is accessed from the north through a pedestrian gate off Mill View Lane.

### 2.2 Background Information

The earliest map studied, dated 1851, shows the site to have been primarily occupied by open farmland with a drying shed as well as what were probably small residential or farming buildings in the centre and east. On the western boundary, additional residential buildings were present. Two mills and a boiler house were located approximately 50 m to the south, whilst a drying house and dye works were slightly further to the south.

By 1893, the drying shed had been removed and residential buildings constructed on the eastern boundary of the site. Further mills had been constructed approximately 90 m to the west, 150 m to the north and 60 m to the east. To the south, the aforementioned mills are noted as either disused or having been converted to unknown works. Reservoirs had been excavated approximately 20 m to the northwest, 110 m to the south and 130 m to the southeast.

By 1910, the dye works to the south had been demolished and several large cotton mills constructed. The mill to the west is noted as a carriage works and the reservoir to the south had been infilled. The 1930 map shows the formerly disused mill to the south had been expanded onto the southern boundary of the site.

By 1958, the structures in the centre of the site had been removed and allotment gardens were in the western part. What appears to be a large mound was located in the northeastern corner of the site and the mill in the south is labelled as a works. On the same map the carriage works to the west is no longer noted as such and many of the mills to the south are also noted as works. The reservoir to the northwest and one to the southeast had been infilled by this time and additional works had been constructed approximately 40 m to the southwest.

By 1971 all structures on site had been removed except for the works in the south which was labelled as a shoe factory. The works to the southwest had been expanded and the reservoir to the southeast filled in. An additional works had been constructed approximately 40 m to the north. The 1984 map labels the site as a yard with the works to the north of the site having expanded and extended onto the northernmost part of the site. The works in the south have also expanded and additional works had been established along the western boundary. Although not clearly shown, it is believed that a significant slope and level change between the northern and southern sites was created at this time.

The 2000 aerial image of the site shows that the works in the north had been expanded. By 2006 the works in the south had been demolished and at some time between 2006 and 2025, the remaining works in the north have been removed.



### 3.0 Ground Model

It is proposed to redevelop the site from an area of wasteland into a new SEN school. This is to include a one, two and three storey split level building with associated parking, play space and landscaping.

The desk study findings indicate that the site does have a potentially contaminative history as it has been developed with mills and works from sometime between 1893 and 1910 until 2006. On the basis of the fieldwork, the ground conditions can be characterised as follows:

- Ⓒ below a moderate to significant thickness of made ground, Alluvium is present, and is underlain by Glacial Till which extends to the maximum depth of the investigation, of 35.45 m (98.75 m OD);
- Ⓒ the made ground within the northern part of the site initially comprises dark greyish brown slightly sandy gravelly humic silt over dark grey, grey, greyish brown and brown sandy clayey gravel, sandy gravel, gravelly silty clay with fragments of brick, concrete, ash, clinker, ceramic, plastic, glass and metal with a slight organic odour to depths of between 2.80 m and 6.10 m ();
- Ⓒ the made ground within the southern part of the site initially comprises dark greyish brown slightly sandy gravelly humic silt or felled vegetation over dark grey, grey, greyish brown and brown sandy clayey gravel, sandy gravel, gravelly silty clay with fragments of brick, concrete, ash, clinker, ceramic, plastic, glass and metal to depths of between 0.50 m and 3.20 m (124.70 m OD and 127.70 m OD);
- Ⓒ obstructions such as remnant concrete slabs, brick walls and footings are present within the made ground within the southern part of the site;
- Ⓒ the Alluvium comprises light grey, yellowish brown very soft to firm sandy silt, clayey silt, slightly gravelly slightly sandy silty clay, pseudo-fibrous peat and sand extending to depths of between 5.60 m and 8.30 m (122.40 m OD and 129.85 m OD);
- Ⓒ Glacial Till consisting of stiff slightly gravelly slightly sandy silty clay, slightly sandy silty clay and silty clay and medium dense becoming dense very gravelly silty sand and very sandy gravel extending to the maximum depth of the investigation; 35.45 m (98.75 m OD);

- Ⓒ perched groundwater was encountered within the made ground at depths of 0.80 m and 3.30 m (127.10 m OD and 131.90 m OD) and groundwater was also encountered locally within the Alluvium at depths of 3.00 m and 7.70 m (122.40 m OD and 126.50 m OD), settling at 6.03 m (128.17 m OD). Groundwater was also encountered within the granular Glacial Till at 26.50 m (107.70 m OD), rising to a depth of 7.70 m (126.50 m OD);
- Ⓒ contamination testing has revealed the presence of arsenic, lead, total PAHs specially benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene and asbestos contamination within the made ground;
- Ⓒ groundwater contamination testing has revealed elevated concentrations of anthracene, fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene within the sample taken from the made ground; and
- Ⓒ elevated concentrations of methane up to 24 % have been recorded meaning Characteristic Value 2 conditions are recommended.



## 4.0 Risk Assessment

The table below sets out the risk pathways that could potentially be present following the redevelopment of the site, which will have a residential without plant uptake end use. This conceptual model is based upon the findings of the ground model developed in the light of the investigation findings and highlights areas where remedial work should be considered.

| SOURCE                                                                                                                                                                                                                                                                                                             | RECEPTOR                               | PATHWAY                                                                                                                | COMMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elevated concentrations of arsenic, lead, total PAHs specially benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene, and asbestos in the made ground<br><br>Elevated concentrations of anthracene, fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene within the groundwater. | End users                              | Direct soil and dust ingestion, consumption of soil and dust and inhalation of dust and vapours                        | End users may be exposed to contaminated soils within areas of soft landscaping and play space within the northern part and small areas of soft landscaping within the southern part of the site. The contaminated material could be excavated and disposed of off-site to remove the potential contaminant source and thus eliminate the potential risk, however the significant thickness of made ground, cost and timeframe to undertake this is not deemed feasible. The contaminated made ground will therefore need to be isolated from end users and from migration off site, using a clean cover system.                                                                       |
|                                                                                                                                                                                                                                                                                                                    | Vegetation                             | Uptake via soil through roots in landscaped areas and private gardens                                                  | Where areas of shrubbery are planned along the northern and southern site boundaries and locally surrounding the proposed building, there is a risk from contamination uptake by vegetation. The contaminated made ground will therefore need to be isolated using a clean cover system. If any trees or areas of shrubbery are to be retained, efforts should be made to place a clean cover system as close to the base of the tree as reasonable possible. Where clean cover systems are not possible close to the base, it is likely that shallow root systems would not allow for excavation and therefore contact with the contaminated soil beneath.                            |
|                                                                                                                                                                                                                                                                                                                    | Adjacent sites                         | Migration through made ground and Alluvium                                                                             | Elevated concentrations of anthracene, fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene have been identified within the groundwater, however the site is underlain by Alluvium and Glacial Till, which have low vertical permeability, thus the risk posed to the groundwater migrating to neighbouring sites is considered low.                                                                                                                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                                                                                                    | Ground workers and future site workers | Accidental ingestion of soil and inhalation and ingestion of soil derived dust, direct contact with contaminated soils | Site workers are likely to be exposed to contaminated soils via direct contact or inhalation. All site workers should be briefed on the presence of contamination within the soil and skin contact with soil will be minimized through the use of appropriate PPE and washing facilities will be provided and asbestos control measures should be put in place to minimise any exposure.                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                    | Groundwater                            | Percolation and leaching of surface run-off in areas of soft landscaping and permeable paving                          | Although arsenic, lead, benzo(b)fluoranthene and dibenz(a,h)anthracene identified are unlikely to be in a soluble form so it is unlikely that there will be leaching of contaminants from the made ground into adjacent sites. The site is underlain by Alluvium and Glacial Till, which have low vertical permeability, thus the risk posed to the groundwater within the deep aquifer is considered to be minimal. In any case, given the length of time that the site has been open to infiltration, any readily soluble contamination would likely have already dissolved and migrated from the site. Therefore, the remaining contamination is likely to be in an insoluble form. |
|                                                                                                                                                                                                                                                                                                                    | Buried services                        | Direct contact                                                                                                         | Based on the identified contamination, it is considered likely that the made ground will need to be considered in the design of buried services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ground Gas                                                                                                                                                                                                                                                                                                         | End users                              | Inhalation                                                                                                             | The desk study has not identified any sources of landfill gases on site or in the immediate surroundings, however, the ground investigation encountered a maximum thickness of 6.10 m of made ground which did not have a significant organic content. A regime of gas monitoring has identified localised elevated concentrations of methane within the made ground and therefore categorised the site as Characteristic Value 2..                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                    | Site Workers                           | Inhalation                                                                                                             | The site will be open to the atmosphere during excavation and ground works so any soil gases can dissipate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



## 5.0 Remedial Objectives

Based on the above risk assessment the following remedial objectives have been established for this development;

- eliminate the potential chronic human exposure pathways in soft landscaping areas, and protection of end users and ecological receptors on site; and
- protect ground workers and future site workers who will be exposed to the soil; and protect end users and other receptors on adjacent sites.

## 6.0 Remedial Recommendations

To address the remedial objectives, the remedial measures will include;

- in areas of soft landscaping, playing fields and areas of shrubbery, a clean cover system consisting of an imported layer of 'clean' certified topsoil and subsoil placed over an anti-dig separation layer will be installed;
- implementation of asbestos control measures when undertaking the siteworks;
- the undertaking of a United Utilities assessment to assess the use of barrier pipe;
- the adoption of appropriate working practices to minimise dust generation; and
- the adoption of building practices in relation to a CS2 building type;

## 7.0 Verification Plan

This section sets out how the remedial measures will be achieved and validated, with the validation report produced once the remediation has been completed

### 7.1 Soft Landscaped Areas and Playing Fields

#### Importation of soil

Prior to the importation of any topsoil for use within the areas proposed areas of soft landscaping, certification will be provided by the supplier and approved by GEA. The suitability of the material to be free of contaminants will be assessed against the GEA Screening Values, which are based on C4SL or LQM/CIEH S4UL for a residential with plant uptake end use, a copy of which is enclosed. The suitability of the soil with regard to nutrient levels specific to the planting scheme will be assessed by the landscape architect.

#### Installation of clean cover layer

The clean cover layer will extend to a depth of 300 mm for areas of soft landscaping and extended to a depth of 600 mm in areas of new planting, in accordance with BRE recommendations, the upper 150 mm of which will be classified as topsoil, in accordance with BS3882:2007. The clean cover layer will be separated from the contaminated soil at the base by a brightly coloured suitable 'anti-dig' layer to avoid soil mixing.

#### Insitu validation of clean cover layer

Photographs of the installation will be taken by the contractor along with records of the levels before and after installation, and these will be included in the validation report.

In addition to the above, confirmation of the correct installation of the clean cover layer will be validated by a series of trial holes and / or hand auger boreholes undertaken by GEA. In support of the visual examination, further samples of the material will be taken by GEA for laboratory testing and assessment against the adopted screening values for residential end use with plant uptake.

#### Frequency of analysis

Confirmatory soil samples will be taken at a rate of one sample per 50m<sup>3</sup> to 100m<sup>3</sup> of certified material and a minimum of three samples per source.



## Documentation

The validation report will include waste transfer documents for all exported and imported material, photographs of the capping layer, details of the certified imported soil and the results of the validation testing together with the thickness of the imported clean cover layer.

## 7.2 Asbestos

Whilst asbestos fibres have been identified within the made ground, fugitive emissions within a damp soil matrix or encapsulated below a soil cap are not considered likely, however an asbestos plan will need to be prepared for any excavations to mitigate the potential for fibre release.

These may include but are not limited to:

-  dampening down of ground to minimise the generation of dust;
-  sheeting of stockpiles;
-  road going vehicles separated from potentially contaminated soil by 'clean' haul roads
-  wheel wash facilities at the access point to site; and
-  all lorries containing contaminated fully sheeted prior to leaving site.

## 7.3 Services

Unless all areas of soil contamination along service runs are removed and verified, barrier pipe is likely to be required to protect water supply pipes from degradation and the permeation of organic compounds.

A United Utilities assessment that takes into account of the ground conditions and types of pipe material will be undertaken prior to the start of any works.

## 7.4 Site Workers

Site workers will be made aware of the potential for contamination in the soils and a programme of working will be identified to protect workers handling any soil. The method of site working will be in accordance with guidelines set out by HSE<sup>1</sup> and CIRIA<sup>2</sup>. Washing facilities will be provided and site workers will be encouraged to wash prior to eating and to use appropriate PPE when on site to minimise skin contact with the soil.

Stockpiling of soil will be minimised on the site. If any areas of made ground are left exposed for long periods measures will be required to prevent dust generation.

## 7.4 Gas Protection Measures

Six gas monitoring visits have been undertaken, as deemed appropriate from CIRIA C665, has classified the site as CS2, meaning the following measures should be utilised during development:

-  ventilation of confined spaces within buildings;
-  well-constructed raft or ground floor slab;
-  minimum penetration of ground slab by services;
-  low-permeability gas membrane, possibly in the form of the mercury vapour membrane as mentioned previously; or
-  a passively ventilated underfloor sub-space with very good performance, which may take the form of an open void or void former beneath a suspended slab or a granular sub-venting layer beneath a raft.

All proposed protection measures will be installed and validated by suitably qualified contractors, with detailed records that will be included as part of a validation report to be submitted, upon completion, to confirm that all works have been carried out in accordance with the proposed protection scheme.

1 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land*  
HMSO

2 CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association



## 7.5 Unknown Contamination

Prior to the commencement of ground works, a site induction meeting will be held, attended by the developer and site workers, where the appointed geoenvironmental engineer will brief the workers on the history of the site and the nature of any contaminated soils they may encounter. This information will be included in the Discovery Strategy which will also be displayed in the site office, along with the contact names and numbers of the geoenvironmental engineers, so that contact can easily be made if any suspicious substances are encountered. If, during development, contamination not previously identified is found to be present at the site, the Council will be informed immediately and no further development (unless otherwise agreed in writing by the Council) will be carried out until a report indicating the nature of the contamination and how it is to be dealt with is submitted to, and agreed in writing by, the Council. A copy of the discovery strategy is included in the attached appendix.

In the event that contamination is not encountered, a statement to this effect by a suitably qualified and experienced individual will be provided.

## 7.6 Reporting

On completion of the remedial works, a report will be prepared documenting the satisfactory undertaking of all of the remediation proposals and of any duty of care under the waste management legislation, together with an assessment of the suitability of the soils remaining beneath the site in respect of the proposed residential development. The report will include written and photographic records of the site inspections carried out, together with the results of the validation analyses and will present an assessment of the condition of the remediated site with respect to the end use.



## Appendix

Discovery Strategy  
Generic Risk Based Screening Values  
Groundwater Screening Values

## DISCOVERY STRATEGY - GROUNDWORK PHASE POTENTIALLY CONTAMINATED GROUND

**Project name:** Brownhill School SEN Hub, Rochdale

**Project Ref:** J26054

**Date prepared:** 19 March 2026

**Project engineer:** Luke Montgomery

**Supervising engineer:** Martin Cooper

*This Discovery Strategy must be complied with fully.*

### 1.0 INTRODUCTION

It is proposed to redevelop the site into a new special educational needs (SEN) school. This is to include a main building of single-storey and two-storey construction with the step spanning an existing site level difference as well as a multi-use games area, an area of car parking and bus drop off bays along with areas of soft landscaping.

### 2.0 HOW TO IDENTIFY POTENTIAL CONTAMINATED MATERIAL

- Malodorous or oddly coloured soil
- Silvery metal liquid (mercury)
- Looks oily and has an oily odour
- Solvent, organic type of odour
- Man made materials in fill such as paint cans, car parts, glass fragments
- Contains fragments of white asbestos sheeting, lagging or insulation, coal/coke clinker
- Subsurface concrete / metal structures including buried tanks  
(Examples only – this list is not exhaustive. If in any doubt ask)

### 3.0 PROCEDURE

On the discovery of any suspicious pockets of material during the redevelopment the following procedure should be followed:

- Stop Work
- Site personnel to immediately inform the Site Manager. Do not investigate it yourself.
- The Site Manager will initially decide if the material is potentially contaminated and will inform GEA. The area will be cordoned off and work will cease in the vicinity.
- GEA will attend site to sample material for laboratory testing and will attempt to quantify the volume. The Local Authority Environmental Health Officer will then be notified that potentially contaminated material has been discovered and will be forwarded laboratory data and a remedial strategy for their approval in the event that the material is to be classified as contaminated.
- Work may only recommence once written approval has been received from the Local Planning Authority

### GEA CONTACT DETAILS

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|                                                                                                                                                                                                                                                                                            |             |                                                              |                                              |                                                 |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------|----------------------------------------------|-------------------------------------------------|---------------------------------------|
|  <b>GEA</b>                                                                                                                                                                                                |             | Geotechnical & Environmental Associates<br>www.gea-ltd.co.uk |                                              | <b>Generic Risk-Based Soil Screening Values</b> |                                       |
| <b>Site</b> Brownhill School SEN Hub, Rochdale                                                                                                                                                                                                                                             |             |                                                              |                                              | <b>Job Number</b><br>J25291                     |                                       |
| <b>Client</b> Rochdale Borough Council                                                                                                                                                                                                                                                     |             |                                                              |                                              | <b>Sheet</b><br>1 / 2                           |                                       |
| <b>Engineer</b> Adept Consulting Engineers                                                                                                                                                                                                                                                 |             |                                                              |                                              |                                                 |                                       |
| <b>Proposed End Use</b> Residential without plant uptake                                                                                                                                                                                                                                   |             |                                                              |                                              |                                                 |                                       |
| <b>Soil Organic Matter content %</b> 6.0                                                                                                                                                                                                                                                   |             |                                                              |                                              |                                                 |                                       |
|                                                                                                                                                                                                                                                                                            |             |                                                              |                                              |                                                 |                                       |
| <b>Contaminant</b>                                                                                                                                                                                                                                                                         |             |                                                              | <b>Contaminant</b>                           |                                                 |                                       |
| <b>Screening Value mg/kg</b>                                                                                                                                                                                                                                                               |             |                                                              | <b>Screening Value mg/kg</b>                 |                                                 |                                       |
| <b>Data Source</b>                                                                                                                                                                                                                                                                         |             |                                                              | <b>Data Source</b>                           |                                                 |                                       |
| <b>Metals</b>                                                                                                                                                                                                                                                                              |             |                                                              | <b>Hydrocarbons</b>                          |                                                 |                                       |
| Arsenic                                                                                                                                                                                                                                                                                    | 40          | C4SL                                                         | Banded TPH (8-10)                            | 415                                             | Calc1                                 |
| Cadmium                                                                                                                                                                                                                                                                                    | 149         | C4SL                                                         | Banded TPH (10-12)                           | 1846                                            | Calc1                                 |
| Chromium (III)                                                                                                                                                                                                                                                                             | 910         | S4UL                                                         | Banded TPH (12-16)                           | 3846                                            | Calc1                                 |
| Chromium (VI)                                                                                                                                                                                                                                                                              | 21          | C4SL                                                         | Banded TPH (16-21)                           | 2923                                            | Calc1                                 |
| Copper                                                                                                                                                                                                                                                                                     | 7,100       | S4UL                                                         | Banded TPH (21-35)                           | 2923                                            | Calc1                                 |
| Lead                                                                                                                                                                                                                                                                                       | 310         | C4SL                                                         | Benzene                                      | 3.3                                             | C4SL                                  |
| Elemental Mercury                                                                                                                                                                                                                                                                          | 1.2         | S4UL                                                         | Toluene                                      | 610                                             | SGV                                   |
| Inorganic Mercury                                                                                                                                                                                                                                                                          | 56          | S4UL                                                         | Ethyl Benzene                                | 350                                             | SGV                                   |
| Nickel                                                                                                                                                                                                                                                                                     | 180         | S4UL                                                         | Xylene                                       | 230                                             | SGV                                   |
| Selenium                                                                                                                                                                                                                                                                                   | 595         | SGV                                                          | Aliphatic C5-C6                              | 160                                             | S4UL                                  |
| Zinc                                                                                                                                                                                                                                                                                       | 40,000      | S4UL                                                         | Aliphatic C6-C8                              | 530                                             | S4UL                                  |
| <b>Anions</b>                                                                                                                                                                                                                                                                              |             |                                                              | Aliphatic C8-C10                             | 150                                             | S4UL                                  |
| Soluble Sulphate                                                                                                                                                                                                                                                                           | 500 mg/l    | Structures                                                   | Aliphatic C10-C12                            | 770                                             | S4UL                                  |
| Sulphide                                                                                                                                                                                                                                                                                   | 50          | Structures                                                   | Aliphatic C12-C16                            | 4400                                            | S4UL                                  |
| Chloride                                                                                                                                                                                                                                                                                   | 400         | Structures                                                   | Aliphatic C16-C35                            | 110,000                                         | S4UL                                  |
| <b>Others</b>                                                                                                                                                                                                                                                                              |             |                                                              | Aromatic C6-C7                               | See Benzene                                     | S4UL                                  |
| Organic Carbon (%)                                                                                                                                                                                                                                                                         | 6           | Methanogenic potential                                       | Aromatic C7-C8                               | See Toluene                                     | S4UL                                  |
| Total Cyanide                                                                                                                                                                                                                                                                              | 140         | WRAS                                                         | Aromatic C8-C10                              | 270                                             | S4UL                                  |
| Total Mono Phenols                                                                                                                                                                                                                                                                         | 520         | SGV                                                          | Aromatic C10-C12                             | 1200                                            | S4UL                                  |
| <b>PAH</b>                                                                                                                                                                                                                                                                                 |             |                                                              | Aromatic C12-C16                             | 2500                                            | S4UL                                  |
| Naphthalene                                                                                                                                                                                                                                                                                | 13.10       | S4UL                                                         | Aromatic C16-C21                             | 1900                                            | S4UL                                  |
| Acenaphthylene                                                                                                                                                                                                                                                                             | 6,000       | S4UL                                                         | Aromatic C21-C35                             | 1900                                            | S4UL                                  |
| Acenaphthene                                                                                                                                                                                                                                                                               | 6,000       | S4UL                                                         | PRO (C <sub>5</sub> –C <sub>10</sub> )       | 1723                                            | Calc2                                 |
| Fluorene                                                                                                                                                                                                                                                                                   | 4,500       | S4UL                                                         | DRO (C <sub>12</sub> –C <sub>28</sub> )      | 118,800                                         | Calc2                                 |
| Phenanthrene                                                                                                                                                                                                                                                                               | 1,500       | S4UL                                                         | Lube Oil (C <sub>28</sub> –C <sub>44</sub> ) | 111,900                                         | Calc2                                 |
| Anthracene                                                                                                                                                                                                                                                                                 | 37,000      | S4UL                                                         | <b>TPH</b>                                   | <b>500</b>                                      | Trigger to consider speciated testing |
| Fluoranthene                                                                                                                                                                                                                                                                               | 1,600       | S4UL                                                         | <b>Chlorinated Solvents</b>                  |                                                 |                                       |
| Pyrene                                                                                                                                                                                                                                                                                     | 3,800       | S4UL                                                         | 1,1,1 trichloroethane (TCA)                  | 40                                              | S4UL                                  |
| Benzo(a)anthracene                                                                                                                                                                                                                                                                         | 15.0        | S4UL                                                         | tetrachloroethane (PCA)                      | 8.2                                             | S4UL                                  |
| Chrysene                                                                                                                                                                                                                                                                                   | 32          | S4UL                                                         | tetrachloroethene (PCE)                      | 1.6                                             | C4SL                                  |
| Benzo(b)fluoranthene                                                                                                                                                                                                                                                                       | 4.0         | S4UL                                                         | trichloroethene (TCE)                        | 0.045                                           | C4SL                                  |
| Benzo(k)fluoranthene                                                                                                                                                                                                                                                                       | 110.0       | S4UL                                                         | 1,2-dichloroethane (DCA)                     | 0.41                                            | C4SL                                  |
| Benzo(a)pyrene                                                                                                                                                                                                                                                                             | 5.30        | C4SL                                                         | vinyl chloride (Chloroethene)                | 0.029                                           | C4SL                                  |
| Indeno(1 2 3 cd)pyrene                                                                                                                                                                                                                                                                     | 46.0        | S4UL                                                         | tetrachloromethane (Carbon tetra             | 0.13                                            | S4UL                                  |
| Dibenz(a h)anthracene                                                                                                                                                                                                                                                                      | 0.32        | S4UL                                                         | trichloromethane (Chloroform)                | 4.2                                             | S4UL                                  |
| Benzo (g h i)perylene                                                                                                                                                                                                                                                                      | 360         | S4UL                                                         |                                              |                                                 |                                       |
| <b>Total PAH Screen</b>                                                                                                                                                                                                                                                                    | <b>75.7</b> | B(a)P / 0.15                                                 |                                              |                                                 |                                       |
| <b>Notes</b>                                                                                                                                                                                                                                                                               |             |                                                              |                                              |                                                 |                                       |
| Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment. |             |                                                              |                                              |                                                 |                                       |
| C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk                                                                                                                                                                                                           |             |                                                              |                                              |                                                 |                                       |
| SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL                                                                                                                                                            |             |                                                              |                                              |                                                 |                                       |
| S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk                                                                                                                                                                                                             |             |                                                              |                                              |                                                 |                                       |
| Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil                                                                                                                                                                |             |                                                              |                                              |                                                 |                                       |
| Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction                                                                                                                                                                                                    |             |                                                              |                                              |                                                 |                                       |
| Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration                                                                                                                                                          |             |                                                              |                                              |                                                 |                                       |



GEA

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## Generic Risk-Based Soil Screening Values

**Site** Brownhill School SEN Hub, Rochdale

**Client** Rochdale Borough Council

**Engineer** Adept Consulting Engineers

**Job Number**  
J25291

**Sheet**  
2 / 2

Proposed End Use **Residential without plant uptake**

The key generic assumptions for this end use are as follows;

- ☐ that groundwater will not be a critical risk receptor;
- ☐ that the critical receptor for human health will be a young female aged 0 to 6 years old;
- ☐ that the exposure duration will be six years;
- ☐ that the building type equates to a terraced house.
- ☐ that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours;

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of the generic screening value there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include:

- ☐ additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- ☐ site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- ☐ soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

**Tier 1 Groundwater Screening Values**

|                 |                                    |                   |        |
|-----------------|------------------------------------|-------------------|--------|
| <b>Site</b>     | Brownhill School SEN Hub, Rochdale | <b>Job Number</b> | J25291 |
| <b>Client</b>   | Rochdale Borough Council           | <b>Sheet</b>      | 1 / 1  |
| <b>Engineer</b> | Adept Consulting Engineers         |                   |        |

| Contaminant                 | Screening Value µg/l | Rationale        |
|-----------------------------|----------------------|------------------|
| <b>Metals</b>               |                      |                  |
| Arsenic                     | 50                   | EQS              |
| Boron                       | 1,000                | DWS              |
| Cadmium                     | 5                    | DWS              |
| Chromium                    | 50                   | DWS              |
| Copper                      | 60                   | EQS              |
| Iron                        | 200                  | DWS              |
| Lead                        | 10                   | DWS              |
| Mercury                     | 1                    | DWS              |
| Nickel                      | 20                   | DWS/EQS          |
| Zinc                        | 75                   | EQS              |
| <b>Anions</b>               |                      |                  |
| Ammonium (NH <sub>4</sub> ) | 500                  | DWS              |
| Bromate (BrO <sub>3</sub> ) | 10                   | DWS              |
| Chloride                    | 250,000              | DWS              |
| Fluoride                    | 1,500                | DWS              |
| Nitrate                     | 50,000               | DWS              |
| Sulphate                    | 250,000              | DWS              |
| <b>Hydrocarbons</b>         |                      |                  |
| Benzene                     | 10                   | CL:AIRE          |
| Toluene                     | 75                   | CL:AIRE          |
| Ethyl Benzene               | 300                  | CL:AIRE          |
| Xylene                      | 30                   | CL:AIRE          |
| Aliphatic C5-C6             | 15,000               | CL:AIRE          |
| Aliphatic C6-C8             | 5,400                | Solubility limit |
| Aliphatic C8-C10            | 300                  | CL:AIRE          |
| Aliphatic C10-C12           | 34                   | Solubility Limit |
| Aliphatic C12-C16           | 0.8                  | Solubility Limit |
| Aliphatic C16-C21           | 0.0013               | Solubility Limit |
| Aliphatic C21-C35           | 0.0013               | Solubility Limit |
| Aromatic C6-C7              | 10                   | See Benzene      |
| Aromatic C7-C8              | 75                   | See Toluene      |
| Aromatic C8-C10             | 500                  | CL:AIRE          |
| Aromatic C10-C12            | 90                   | CL:AIRE          |
| Aromatic C12-C16            | 90                   | CL:AIRE          |
| Aromatic C16-C21            | 90                   | CL:AIRE          |
| Aromatic C21-C35            | 90                   | CL:AIRE          |

| Contaminant                            | Guideline Value µg/l | Data Source     |
|----------------------------------------|----------------------|-----------------|
| <b>Others</b>                          |                      |                 |
| Cyanide                                | 50                   | DWS             |
| Total Mono Phenols                     | 10                   | EQS             |
| Pentachlorophenol                      | 0.4                  | EQS             |
| Organochlorine pesticides              | 0.03                 | DWS             |
| Other Pesticides                       | 0.075                | DWS             |
| Total pesticides                       | 0.5                  | DWS             |
| Tributyltin                            | 0.0015               | EQS             |
| pH                                     | <6.5, >9.5           | DWS             |
| Electrical conductivity (µS/cm)        | 2,500                | DWS             |
| <b>PAH</b>                             |                      |                 |
| Naphthalene                            | 2.40                 | EQS             |
| Anthracene                             | 0.10                 | EQS             |
| Fluoranthene                           | 0.10                 | EQS             |
| Benzo(b)fluoranthene                   | 0.08                 | EQS             |
| Benzo(g,h,i)perylene                   | 0.002                | Sum of both EQS |
| Indeno(1,2,3-cd)pyrene                 |                      |                 |
| Benzo(a) pyrene                        | 0.01                 | DWS             |
| <b>Total PAH</b>                       | 0.1                  | DWS             |
| <b>Chlorinated Solvents</b>            |                      |                 |
| Trichloromethane (chloroform)          | 2.5                  | EQS             |
| Tetrachloromethane (CCl <sub>4</sub> ) | 3                    | DWS             |
| vinyl chloride (Chloroethene)          | 0.5                  | DWS             |
| Cis 1,2-dichloroethene (DCE)           | 10                   | GEA             |
| trichloroethene (TCE)                  | 10                   | DWS/EQS         |
| tetrachloroethene (PCE)                | 10                   | DWS/EQS         |
| 1,2-dichloroethane (DCA)               | 3                    | DWS             |
| 1,1,1 trichloroethane (TCA)            | 100                  | EQS             |
| 1,1,2 trichloroethane (TCA)            | 400                  | EQS             |

**Notes**

Concentrations measured above these screening values may indicate groundwater contamination and thus require further, site specific risk assessment.

DWS - Based on United Kingdom Drinking Water Standard - Drinking Water Inspectorate & Health Protection Agency, 2009

EQS - Generally based around Environmental Quality Standards for the longterm mean in Freshwater -Environment Agency, Dec 2011

WHO - Based on World Health Organisation, Guidelines for Drinking-water Quality, 2010

CL:AIRE - Based on recommendation in Petroleum Hydrocarbons in Groundwater 2017 using largely WHO data

GEA - estimation based on EQS for similar compounds

Solubility Limit - screening value set at the published solubility limit where other published threshold values exceed this concentration





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