



**GROUNDTECH**  
CONSULTING

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| <i>Plan Reference</i>       | <i>Revision</i> | <i>Title</i>          |
| GRO-22083-P01               | -               | Project Location Plan |
| WHI-TRI-ZZ-ZZ-DR-A-3500-P01 | -               | Proposed Site Plan    |

## 1.0 INTRODUCTION

### 1.1 Background

This Remedial Specification has been produced on behalf of Cornerstone Place and relates to the remediation of a site at Whitworth Road in Rochdale.

The site was most recently occupied by a children's play area, garages that are in poor condition, and a car park for adjacent residential properties. A summary of the findings of the investigations are outlined in Section 2.0.

### 1.2 Proposed Works

Remediation will be undertaken at the site to prepare it for development of the residential units as shown on Plan 'WHI-TRI-ZZ-ZZ-DR-A-3500-P01'. It is proposed to construct 3 No. blocks of apartments comprising 14 No. units with associated Public Open Space and infrastructure.

This Remedial Specification has been commissioned to facilitate the discharge of any pre-commencement planning conditions that are likely to be enforced with regard to land contamination.

### 1.3 Objectives

The objective of this Remedial Specification is to present details of the remedial objectives, how the remediation of the site will be implemented and to outline how the works will be validated. This Remedial Specification details how the works will be permitted under the current regulatory regime.

The remediation will ensure that upon completion of the residential development, it can be demonstrated that the ground and groundwater conditions at the site are appropriate for its intended use and risks to identified receptors have been reduced to an acceptable level.

The following Remedial Specification includes the protection measures required during the enabling works phase and to be installed in the construction phase of the redevelopment for a residential end use with plant uptake.

This is a dynamic document that may require updating at certain stages of the process, the revisions should be undertaken in agreement with the relevant regulatory bodies. In addition, this Remedial Specification is subject to the approval of the regulators pre-commencement.

### 1.4 Remediation Specification Scope

The scope of the Remedial Specification is in accordance with LCRM as follows:

- *Summary of the Conceptual Site Model.*
- *Summary of the Pollution Linkage Risk Assessment.*
- *Remediation Options Appraisal including detailed assessment of preferred options.*
- *Implementation of preferred remedial solution.*
- *Specification for the remediation works.*

## 1.5 Sources of Information

In preparing the Remedial Specification the following documents were reviewed and should be read in conjunction with this report:

- *PG Consulting Phase 1 Desk Study (Ref. PGC 388) dated 9 February 2022.*
- *Groundtech Consulting's Geo-Environmental Appraisal (Ref. GRO-22083-3479 1.1) dated 01 July 2022.*
- *Groundtech Consulting's Permanent Ground Gas Risk Assessment (Ref. GRO-22083-3813) dated 15 August 2022.*
- *Groundtech Consulting's Supplementary Geo-Environmental Appraisal (Ref. GRO-22083-4321\_1.1) dated 20 November 2023.*
- *Groundtech Consulting's Supplementary Geo-Environmental Appraisal – Block B (Ref. GRO-22083-4667) dated 10 August 2023.*

## 2.0 CONCEPTUAL SITE MODEL

### 2.1 Site Details

#### *Northern Plot (Block C)*

The northern plot is located at the intersection between Grasmere Street and Noon Sun Street, covers an area of approximately c.0.0025 hectares, and is topographically level.

The site is currently surfaced by tarmac and an electricity substation is located in the south western corner. It is currently utilised as parking space for surrounding residents and the nearby High Street. The tarmac is in poor condition and there are several small piles of litter spread around the edge of the plot. No vegetation is present on site or within an influencing distance.

The site is surrounded by the following features/land uses:

- *North* - *Residential properties.*
- *East* - *Noon Sun Street, commercial buildings, and Whitworth Road.*
- *South* - *Grasmere Street, Block B, and residential properties.*
- *West* - *Residential properties.*

#### *Central Plot (Block B)*

Block B is located directly south of Grasmere Street, covers an area of approximately c.0.015 hectares, and is topographically level.

The site used to house four storage sheds which were in very poor condition. These sheds have since been demolished and the site has been levelled. There is a thin strip of tarmac located along the eastern boundary. The deciduous tree noted in the original Ground Investigation in the north east corner is no longer present.

Block B is bound by the walls of the adjacent residential properties to the west, Grasmere Street to the north, Whitworth Road to the east and public parking to the south.

The site is surrounded by the following features/land uses:

- *North* - *Grasmere Street and residential properties.*
- *East* - *Whitworth Road and residential properties.*
- *South* - *Public parking and residential properties.*
- *West* - *Residential properties.*

#### *Southern Plot (Block A)*

The southern plot is located directly south of Derwent Street and west of Whitworth Road, covers an area of approximately c.0.078 hectares, and slopes gradually upwards from east to west.

The eastern half of the site comprises a maintained soft landscaping area, and the western half of the site comprises a disused children's playground. A tarmac footpath runs through the centre.

The eastern area is largely featureless with the exception of a large electrical billboard in the south east corner with associated concrete surfaced base and electrical junction box. The deciduous tree noted in the original Ground Investigation on the southern boundary is no longer present.

The western area comprises a metal fence and gate surrounding a former children's playground surfaced by tarmac and paving slabs. All of the equipment has since been removed, and a small strip of rough grass is present to the south of the playground.

The plot is bound by timber knee rail fencing to the east, public parking and Derwent Street to the north, and adjacent residential properties to the south and west.

## 2.2 Site History

The earliest records indicate the site was occupied by residential properties from 1858. These buildings were demolished in the 1980s and replaced with a children's play area, garages and car park. These are present to date, except for the garages on Block B which have recently been demolished.

## 2.3 Geology and Hydrogeology

BGS records indicate the site is underlain by superficial Glacial Till with the solid geology being the Old Lawrence Rock which is typically sandstone.

The superficial deposits are classified by the EA as a Secondary Undifferentiated Aquifer and the bedrock is a Secondary A Aquifer.

The site is not within a Source Protection Zone and there is one potable water abstraction 432m north of the site.

## 2.4 Geology and Hydrogeology

The closest surface water feature is Hey Brook located 690m to the east.

## 2.5 Preliminary Conceptual Site Model

The following risks were determined by PG Consulting:

| Receptor                 | Level of Risk          |
|--------------------------|------------------------|
| <i>Human Health</i>      | <i>Low to Moderate</i> |
| <i>Controlled Waters</i> | <i>Moderate</i>        |
| <i>Ground Gas</i>        | <i>Moderate</i>        |

## 2.6 Ground Model

The following scope of works was undertaken by Groundtech Consulting as part of their initial and supplementary phases of investigation:

- 11 No. trial pits (TP01 to TP06 and TP101 to TP105) were excavated to a maximum depth of 3.6m bgl.
- 13 No. boreholes (WS01 to WS06 and WS101 to WS107) were drilled to a maximum depth of 4.45m bgl.

Hardsurfacing was typically encountered to 0.1m bgl and clayey gravelly sandy topsoil was present to a maximum depth of 0.46m bgl.

Made Ground was encountered to a maximum depth of 2.5m bgl and three main populations were observed in the investigations:

- *Firm dark brown mottled grey sandy gravelly clay including sandstone and brick was present at depths between 0.1m and 2.5m bgl in all exploratory hole locations.*
- *Light grey gravelly sand was observed locally within TP06 at a depth of 0.1m to 0.35m bgl.*
- *Dark brown black gravelly sand with minor constituents of brick, tarmac, sandstone, concrete, ceramics, plastic, glass, wood, metal, fabric, and chert was encountered in all exploratory holes from depths between 0.1m and 0.3m bgl to depths of up to 0.5m and 2.0m bgl.*

Natural strata generally conformed the published records and comprised;

- *Firm to stiff orange brown and dark grey brown occasionally silty sandy gravelly Clay with low cobble content. Minor constituents included sandstone, coal and quartzite and was encountered in all exploratory holes to depths of between 1.1m and 4.0m bgl.*
- *Dark grey clayey silty sandy Gravel of sandstone, quartzite, and coal was encountered in TP103, TP104, and WS102 from depths of between 2.2m and 2.8m and to depths of between 2.4m and 3.0m bgl.*

Weathered bedrock was encountered from depths of 2.1m bgl and comprised residually weathered Sandstone recovered as a clayey gravel.

Groundwater was generally observed in the natural clay strata between 2.0m and 3.45m bgl.

Observations made during the Site Investigation are summarised below:

- *Visual evidence of potential contamination was noted at locations TP101 and WS106 where ash was present in the Made Ground.*
- *Olfactory evidence of contamination was noted in the form of a faint hydrocarbon odour in WS103 at 0.3m bgl and a moderate organic odour in WS105 at 1.9m bgl.*
- *Basement structures were encountered in TP04 and TP05.*
- *Spalling of the trial pit sides was experienced in TP105 within the deep Made Ground.*

## 2.7 Geo-Environmental Testing Results

A summary of the soil testing results is provided below:

| Contaminant    | Number of Samples Tested | Elevations | Comments                                                                                                                                   |
|----------------|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Heavy Metals   | 14                       | 1          | 1 elevation of Lead in WS106 at 0.3m                                                                                                       |
| Asbestos       | 14                       | 1          | Chrysotile fibres detected in TP105 at 0.002% mass.                                                                                        |
| Speciated PAHs | 14                       | 6          | 1 elevation of naphthalene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene in WS103 at 0.3m. |
| TPH CWG        | 1                        | 2          | 1 elevation of aromatics EC16 to EC21 and EC21 to EC35 in WS103 at 0.3m.                                                                   |

The elevations of PAHs were encountered within the Made Ground present within the southern area (Block A) in WS103 whereas the elevated lead was located in Block C. Asbestos was detected in the northern area (Block C) in TP105 at a concentration of 0.002%mass.

The central area (Block B) had no elevated samples.

## **2.8 Ground Gas**

No concentrations of methane (CH<sub>4</sub>) have been recorded within the standpipes. However, detectable levels of carbon dioxide (CO<sub>2</sub>) were recorded up to a maximum level of 2.0% v/v together with associated depleted oxygen (O<sub>2</sub>) concentrations (minimum 16.9% v/v).

The site was classified as CS1 based on the GSV for carbon dioxide and in accordance with CIRIA C665, no gas precautions are necessary.

## **2.9 Remedial Strategy**

The proposed development is residential end use comprising the construction of three blocks of one-bedroom apartments with associated areas of hardsurfacing. The development will be largely covered in hardsurfacing or the proposed buildings, effectively acting as a cover system which would break the pathway to the underlying contaminated soils.

### *Cover System*

A 600mm thick, clean cover system overlying a contamination warning membrane or demarcation layer is recommended for areas of soft landscaping where Made Ground is present at formation level. Where natural soils are encountered, it is recommended that a nominal 150mm of clean suitable topsoil is provided in soft landscaped areas to provide a suitable medium for plant growth.

Topsoil found on site can be reused for soft landscaping in POS areas. Any anthropogenic material would need to be removed such as glass and brick. The topsoil on site is not suitable for reuse in areas where home grown produce is likely to be grown. More testing would be required in order to approve this use.

### *Vapours*

Elevated naphthalene has been recorded within the Made Ground soils of WS103. However, as part of the proposed development, the Made Ground in this area is to be stripped and removed during the enabling works in order to reduce site levels. Additionally, a piling mat comprising clean imported 6F2 crush material will be used in this area in order to install foundations. As the Made Ground in this area was only encountered up to a maximum depth of 0.5m, all of the Made Ground will be removed in order to reach natural strata depth. Therefore, no further action is required.

### *Water Supply Pipes*

Correct water supply pipe material should be installed, and PE is suitable based on the risk assessment undertaken.

### *Asbestos*

During the construction phase, asbestos control measures should be implemented. The works will be non-licenced with appropriate controls, PPE and monitoring. Soils may be hazardous for waste disposal purposes.

### *Obstructions*

Obstructions associated with former basements will require grubbing up as part of the enabling works.

#### *Watching Brief and Regulatory Approval*

A watching brief should be in place during ground works and construction. If previously unidentified contamination is encountered, work should cease in that area and Groundtech Consulting contacted for advice.

Regulatory compliance should be obtained pre-commencement to avoid delays during the construction phase which will have cost implications.

### **2.10 Geotechnical**

Foundation options were divided into the separate sections due to varying ground conditions. It is proposed to use traditional shallow foundations for Block C and mini driven piles have been recommended for Block A and Block B.

Consideration needs to be given to the basement structures encountered beneath all three areas of the site.

The use of SuDS drainage is not considered feasible due to the presence of deep Made Ground and cohesive soils which are capable of low soil infiltration rates.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

Made Ground is likely to be encountered at formation level for pavement design. Untreated Made Ground should be assumed to have a CBR value of less than 2.5%, unless proven otherwise.

### 3.0 POLLUTION LINKAGE ASSESSMENT REVIEW

The following section summarises the revised pollution linkage assessment undertaken by Groundtech Consulting.

#### 3.1 Human Health

| Receptor                      | Level of Risk | Comments                                                                                     |
|-------------------------------|---------------|----------------------------------------------------------------------------------------------|
| Site End Users                | Moderate      | Elevated lead, PAHs and TPH recorded.<br>No elevations in Block B.                           |
| Site End Users (Asbestos)     | Low           | Does not fall under CAR2012 but some measures required.                                      |
| Site End Users (VOCs)         | Low           | One pocket around WS103 due to vapour risk, however Made Ground is to be completely removed. |
| Adjacent Residents            | Low           | Significant source of mobile contamination not identified.                                   |
| Site End Users (water supply) | Moderate      | Made Ground at installation depth.                                                           |

#### 3.2 Controlled Waters

| Receptor                   | Level of Risk | Comments                                                      |
|----------------------------|---------------|---------------------------------------------------------------|
| Secondary Undifferentiated | Low           | No free phase encountered. Made Ground underlain by aquitard. |
| Secondary A Aquifers       | Low           | No free phase encountered. Made Ground underlain by aquitard. |
| Hey Brook                  | Low           | Significant distance from site.                               |

#### 3.3 Groundworkers

The following risks were revised by Groundtech Consulting:

| Receptor    | Level of Risk | Comments                                   |
|-------------|---------------|--------------------------------------------|
| Contractors | Moderate      | During enabling works / remediation phase. |

## 4.0 REMEDIATION PROPOSALS AND APPRAISAL

Remediation will be undertaken to ensure the site is suitable for its proposed residential end use which comprises the construction of three apartment blocks (Blocks A to C).

The required level of remediation, to the satisfaction of the relevant regulators and discharge planning conditions, will be accomplished through a combination of techniques as outlined in the subsequent sections.

The implementation of the remediation proposals will be in accordance with the following documented quality assurance procedures:

1. ***Detailed Remediation Specification*** which outlines the requirements to demonstrate the effectiveness of the remediation in order to meet the remediation objectives. These are detailed in the following sections of this report.
2. ***Final Verification Report*** which will provide a complete record of the remediation activities undertaken during the enabling phase and construction phase as part of the verification plan to support compliance with remediation objectives and criteria. The report will also contain descriptions of the works including photographic evidence and details of any unexpected conditions encountered during the remedial works and how they were dealt with.

In addition to the above, the preferred contractor will be required to secure all necessary permits and licences to allow remediation to be undertaken and prepare appropriate health and safety risk assessments and method statements in accordance with CDM Regulations 2015 and other relevant legislation. All roles and responsibilities should be agreed/delegated at a pre-start meeting.

### 4.1 Outline Remediation Proposals

Based upon the findings of the Ground Investigations, risk assessment and the remediation options appraisal in accordance with LCRM, the following remediation processes will be carried out to produce a site which is suitable for its proposed residential end use and adhere with the General Requirements set out in *Appendix 2*.

The following phased remediation works will be undertaken to deliver the site suitable for the defined residential end use, the phases are divided into:

- *Enabling Works Phase.*
- *Construction Phase.*

The following remediation activities have been selected based on the Remedial Options Appraisal presented in *Appendix 3*:

- *Reduce site levels where required to achieve proposed levels.*
- *Materials management, comprising excavation, screening, and reuse of suitable material.*
- *Cut and fill earthworks exercise.*
- *Import crushed 6F2 material for piling mat and capping layer.*
- *Installation of a cover system in areas of soft landscaping.*
- *Disposal of excess or unsuitable soils.*

## 4.2 Enabling Works Phase

The following works are considered necessary during the enabling works phase:

- *Vegetation clearance and topsoil strip.*
- *Break out of all hardsurfacing and below ground obstructions and processing for re-use.*
- *Appropriate mitigation measures (by suitably trained operatives) during excavation, processing, screening and placement of Made Ground soils to mitigate the risks of asbestos fibres becoming airborne.*
- *Removal of all below ground substructure and crush to 6F2 classification.*
- *Cut site to required earthworks profile.*
- *Reuse of appropriate soils and materials management of soils.*
- *Import 6F2 crush to supplement deficit.*
- *Offsite disposal of unsuitable or excess material.*
- *Validation during the enabling works.*

It is anticipated the enabling works phase will be undertaken by a single contractor, referred to as the enabling works contractor.

All works need to be undertaken in accordance with the Remedial Specification. All remediation works are to be overseen by the supervising consultant under a site watching brief.

## 4.3 Construction Phase

It is anticipated that the construction phase of works will be undertaken by a separate contractor, referred to as the ground works contractor, who shall undertake the following:

- *Excavations for foundations.*
- *Excavations for service runs and drainage.*
- *Installation of correct level potable water supply pipe.*
- *Placement of clean validated subsoil/topsoil in areas of gardens and soft landscaping.*

All works need to be undertaken in accordance with the Remedial Specification. Following completion of the Construction Phase Validation Works, a final verification report completed by the supervising consultant will be required to be submitted to the regulators for approval.

## 4.4 Project Setup and Management

Prior to commencement of site activities, detailed planning of the project shall be undertaken including liaison with the client, supervising consultant, contractors and regulators. The Remedial Specification should be submitted to the relevant regulators for approval prior to commencement.

The project is to be operated under the Construction, Design and Management (CDM) Regulations, (2015).

Under the CDM regulations, the Client should appoint a Principal Designer, who will provide the Pre-construction Information Report and a Principal Contractor who would provide a comprehensive Construction Phase Health and Safety Plan (CPHASP) prior to works commencing. If the client does not appoint a Principal Designer, they will assume the role.



The Principal Designer will review the CPHASP and notify the local office of the Health and Safety Executive (HSE) of the works prior to commencing (via form F10), if necessary. The client is to nominate the Principal Contractor for each phase of works.

The appointed contractors will need to have suitable experience working in a similar setting, with similar ground conditions and with the contaminants of concern present at the site. It is the responsibility of the contractors to have read and understood the requirements of the Remedial Specification. Any queries should be clarified prior to the activity being undertaken.

## 5.0 IMPLEMENTATION OF SITE REMEDIATION PROCESSES

### 5.1 General

The following remedial works are required to break pollution linkages, to reduce risks to an acceptable level and make the site suitable for the proposed residential end-use.

### 5.2 Enabling Phase Implementation

#### *Activity E1 – Pre-Start and Site Clearance*

The enabling works contractor shall be responsible for the true and proper setting-out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour.

The enabling works contractor shall carefully protect and preserve all benchmarks, sight rails, pegs and other things used in setting out the works.

Should the enabling works contractor find any discrepancies on the drawings, they are to refer the matter to the client for verification before proceeding with the part of the works affected.

Before starting the site clearance works, the enabling works contractor shall verify with the client and/or architect which existing fences, gates, walls, roads, paved areas, trees, shrubs, etc., are to be removed and undertake dilapidation survey of all adjacent features/construction including but not limited to boundary walls/fences, adjacent footpaths and road constructions etc. The enabling works contractor shall be responsible for all costs associated with rectification of damage to adjacent features/construction including but not limited to boundary walls/fences, adjacent footpaths and road constructions etc. resulting from the enabling works.

The enabling works contractor shall investigate the features of the structures, ascertain if shock or vibration could damage surrounding property or equipment therein or buried utilities and check the existence of toxic or flammable substances.

Statutory service records are for information only. The enabling works contractor is to ensure that the records are current and complete through discussion with all appropriate statutory bodies and is responsible for all disconnection, diversion, sealing or removing of existing services as necessary (unless otherwise advised by the client).

Trees, boundaries and other features of interest, which are to be retained, shall be clearly identified and protected by a robust fence to avoid accidental impact damage and prevent excavation within the root zone of influence of foundations. All works shall be undertaken in accordance with BS 5387: 1991 'Trees in relation to Construction'. All other trees and shrubs shall be grubbed up and disposed of appropriately off site.

Prior to any works, the site shall be cleared of rubbish, debris and approved vegetation. Surface vegetation shall be stripped from all areas prior to trafficking with heavy plant and the surface vegetation is to be chipped and stockpiled.

Topsoil should be stripped and stockpiled to be removed offsite

The enabling works contractor shall maintain records detailing the approximate location of any unsuitable material disposed, including a brief description.

All movement of materials shall be recorded and records shall be kept detailing the nature and quantity of materials, haulier details, final destination and any other relevant information.

Water or liquids shall not be pumped or emptied into the existing sewers/drainage system without the appropriate treatment and written permission of the relevant authority. If mobile tankers/bowsers are to be used, then disposal shall be at suitably licensed facilities in accordance with current legislation.

Documentation/certification of all materials disposed of are to be included in the H&S file prepared by the enabling works contractor.

#### *Activity E2 - Break out of Hardstanding and Below Ground Obstructions and Processing for Reuse*

The enabling works contractor shall demolish, break up and remove all below ground structures. These include, but are not limited to slabs, drains, hardsurfacing, foundations, relic structures, utility ducts, basements etc.

All broken up materials shall be segregated and stockpiled within the approved working area of the site. Material shall be stockpiled at locations to be agreed with the Client and after submission of the detailed method statements.

During the excavation of slabs etc, the enabling works contractor will undertake additional visual investigation, with any additional plausible source-pathway receptor linkages identified to be added to the remedial requirements.

The enabling works contractor shall provide adequate protection against collapse of the excavations and suitable groundwater control measures shall be put in place until the voids are backfilled to a suitable geotechnical specification.

The enabling works contractor shall ensure that, where structures or services cross the site boundary and are to remain, the risk of any future contamination entering or leaving the site area through these pollution linkages is negligible. The enabling works contractor shall state his methodology for ensuring this requirement.

All unsuitable materials are to be removed from site to a suitably licensed facility.

As part of the enabling works, it is proposed to excavate and remove all of the Made Ground around WS103 (Block A in the south) in order to reduce site levels for the proposed apartments. Made Ground was encountered in WS103 to a maximum depth of 0.5m bgl, therefore the risk from elevated naphthalene is to be removed offsite.

#### *Activity E3 - Reuse of Soils and Placement of Soils*

Testing of soils prior to placement is required as set out in the Remedial Specification.

If, in the opinion of the Consultant, the material is not suitable for use, the contractor is to remove and dispose of it in accordance with the Remedial Specification, at the contractors cost.

#### *Activity E4 - Offsite Disposal of Unsuitable or Surplus Material*

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material (i.e. the contractor) to form their own view on whether or not it is waste. This includes determining when waste has been treated in some way it can cease to be classed as waste for a particular purpose. All arisings should be regarded as contaminated unless proven otherwise. Any soils to be removed from site are to be

removed to a licensed waste management facility. The waste is to be taken by a registered waste carrier in accordance with applicable Waste Management Regulations.

Any soils to be removed from site are to be removed to a licensed waste management facility and the waste is to be transported by a registered waste carrier in accordance with applicable Waste Management Regulations.

All testing to allow disposal of waste is to be undertaken by the contractor at the contractors cost.

Waste consignment/transfer notices will be required and are to be retained by the contractor. Copies of all waste consignment/transfer notices are to be provided to Groundtech Consulting for inclusion in a validation report.

#### *Activity E5 - Validation Criteria During Enabling Works*

The following sections detail validation criteria to be used during the enabling works.

#### **Testing**

All materials re-used on site or stockpiled for reuse shall be tested prior to the completion of the enabling works contract. Any unsuitable materials shall be removed from site in accordance with this Remedial Specification.

All testing during the enabling works shall be undertaken by the contractor and all sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2015 'Code of Practice for Site Investigations' and BS 10175:2011+A1:2013 'Investigation of Potentially Contaminated Sites – Code of Practice'.

The contractor shall undertake all testing at a laboratory which holds UKAS and MCERTS accreditation for the specific tests.

#### **General Reuse**

The following requirements are proposed for general reuse:

- *No visual contamination (oil staining etc).*
- *Minimal deleterious material (organics, wood, metal etc).*
- *No visible Asbestos Containing Material (ACM).*
- *Below the RTVs as presented in the table above.*

The visual requirements in the list above are to be confirmed by the watching brief by a suitably qualified geo-environmental engineer.

### **5.3 Construction Phase Implementation**

It is the responsibility of the contractor to have read and understood the requirements of the Remedial Specification and any geotechnical specification documents. If there are any queries, please contact Groundtech Consulting for clarification.

The following will be undertaken during the construction phase of works by the ground works contractor. The ground works contractor shall undertake:

- *Excavations for foundations.*
- *Excavations for service runs and drainage.*

- *Installation of correct level potable water supply pipe.*
- *Placement of clean validated subsoil/topsoil in areas of gardens and soft landscaping.*

#### *Activity C1 - Installation of Correct level of Potable Water Supply Pipe*

A local water company risk assessment has not yet been undertaken on the soils at the proposed potable water supply pipe depth, this should be undertaken prior to utilities being installed at the site to determine the correct level of protection required for the potable water supply pipe.

#### *Activity C2 - Appropriate Materials Handling and Stockpiling to Allow Reuse of Excavated Soils*

The contractor is to undertake a watching brief for materials which may potentially be contaminated during excavations of foundations and drainage. If suspect materials are encountered, the soils are to be stockpiled separately and Groundtech Consulting contacted immediately.

Any imported materials are to be tested by the contractor in accordance with this Remedial Specification to demonstrate they are suitable from a geotechnical and geo-environmental engineering perspective.

#### *Activity C3: Installation of the Cover System in areas of Soft Landscaping*

A clean cover system is required in soft landscaped areas to reduce the risk to an acceptable level. The cover system installation by the ground works contractor should be undertaken in the following steps:

1. *Undertake geo-environmental testing and assessment of all imported soils for use within the cover system to establish they are suitable for use. Groundtech Consulting should be provided with the testing certificates prior to import and additional testing may be required.*
2. *Validation of the installation and thickness of the cover system to be undertaken by Groundtech Consulting.*

The cover system requirements are set out below based on the specific use:

| Specific Use                         | Requirements                                                                                                                                                                                      |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <i>600mm of inert growing medium (inclusive of min. 150mm of topsoil), overlying a remediation break layer (0.1m thick compacted inert gravel or high tensile strength permeable geotextile).</i> |
| <i>Gardens and Public Open Space</i> | <i>A nominal 150mm of clean suitable topsoil is to be provided in soft landscaped areas to provide a suitable medium for plant growth where natural soils are present at formation level.</i>     |

#### ***Physical Requirements of Imported Soils***

The imported material is to be confirmed by visual inspection of the material by the consultant, material must be free from:

- *Asbestos, metal, plastic, wood, glass, tarmac, brick, paper, concrete or other potentially hazardous foreign material which could cause injury.*
- *Aggressive / invasive weeds (especially Japanese Knotweed and Giant Hogweed) and bulk vegetative growth.*
- *Asbestos - nil*

Imported Topsoil should be as agreed with the client and where possible should conform to BS 3882:2015. It should be noted that clay soils are not recommended as they are likely to become waterlogged during handling and placement.

### Geo-Environmental Requirements of Imported Soils

Any imported soils should be from a source not expected to be contaminated and meet both physical and chemical criteria, as detailed in this Remedial Specification.

Prior to importation of topsoil, subsoil or granular material from a commercial supplier, certification should be obtained from the supplier detailing the source site, its previous and current land use and relevant test results. A copy of this should also be forwarded to Groundtech Consulting for review and comparison against the import criteria.

If the proposed source is not from a commercial supplier, Groundtech Consulting recommend that the source is tested to confirm it is appropriate for use prior to import.

For material from a natural source, testing should be undertaken at a rate of one test per 250m<sup>3</sup>, with a minimum of three tests to be undertaken on any individual source material.

If the source of the material is not natural, chemical testing should be undertaken at a rate of one test per 100m<sup>3</sup>, with a minimum of five tests to be undertaken on any individual source material.

The results of geo-environmental testing are to be compared with the criteria presented in *Appendix 4*. If any of these thresholds are exceeded the material shall be considered to be unsuitable unless treatment, further testing and risk assessment shows it to be satisfactory.

Testing should be carried out for the following general suite of contaminants:

- *Arsenic, Boron (water soluble), Cadmium, Chromium (total and hexavalent), Copper, Mercury, Nickel, Lead, Selenium, Zinc, Total Cyanide, pH, Speciated Polycyclic Aromatic Hydrocarbons, Total Phenol and Organic Matter.*
- *Total TPH and speciated TPH (TPHCWG), if required.*
- *Asbestos screening.*

## **6.0 SUPERVISION, VERIFICATION AND REPORTING**

Necessary changes to the agreed Implementation Plan, arising during the course of the works, are to be agreed in writing with the Local Authority prior to being undertaken on site.

It is recommended that details of the environmental works undertaken, the rationale and design for the implementation of this strategy and verification details of the works undertaken are appended to the deeds for the property to ensure the site is sold with full knowledge of the works undertaken and the ground conditions present.

### **6.1 Site Supervision**

Remediation works are to be undertaken with a part time site watching brief by Groundtech Consulting (The Consultant).

The contractor is to provide appropriate geo-environmental engineer supervision during excavation and validation works.

The ground works contractor is to provide supervision by an appropriate, experienced person who has read and understand the requirements of this Remedial Specification.

### **6.2 Collection of Samples**

All sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2015 'Code of Practice for Site Investigations' and BS 10175:2011+A2:2017 'Investigation of Potentially Contaminated Sites – Code of Practice'.

Soils for inorganic analysis will be sealed in air-tight polythene tubs, and soils for organic analysis will be sealed in amber glass jars with the minimal practicable headspace.

Groundwater samples will be collected in suitable containers and with the correct preservatives, as provided by the laboratory.

All samples shall be scheduled on chain of custody forms prior to being dispatched to the UKAS accredited laboratory for analysis. The contractor shall undertake all testing at a laboratory which holds UKAS and MCERTS accreditation for the specific tests.

### **6.3 Enabling Works Validation**

The report will be prepared by Groundtech Consulting and will provide a summary of the key elements of work and will be referenced to the agreed redevelopment strategy and planning requirements with supporting information presented within appendices.

On completion of the enabling works validation to development level, the appropriate documentation will be forwarded to the client, for forwarding to the Local Authority.

## 6.4 Construction Phase Works Verification

### *Potable Water Supply Pipe Installation*

It is the responsibility of the ground works contractor to record photographic evidence of the installation of pipework. This photographic evidence is to be provided to Groundtech Consulting for inclusion in the Verification Report

### *Cover System*

Verification of the installation of the cover system thickness is required. Testing of imported soils will be required in accordance with this Remedial Specification. Groundtech Consulting should be notified when the cover system has been placed and will undertake a visual inspection and random spot check excavations.

If the cover system is deemed to be inadequate, the site manager will be informed and advised on remedial measures. Verification of the cover system will only be carried out where the cover system has been completed.

The cover system validation report will include:

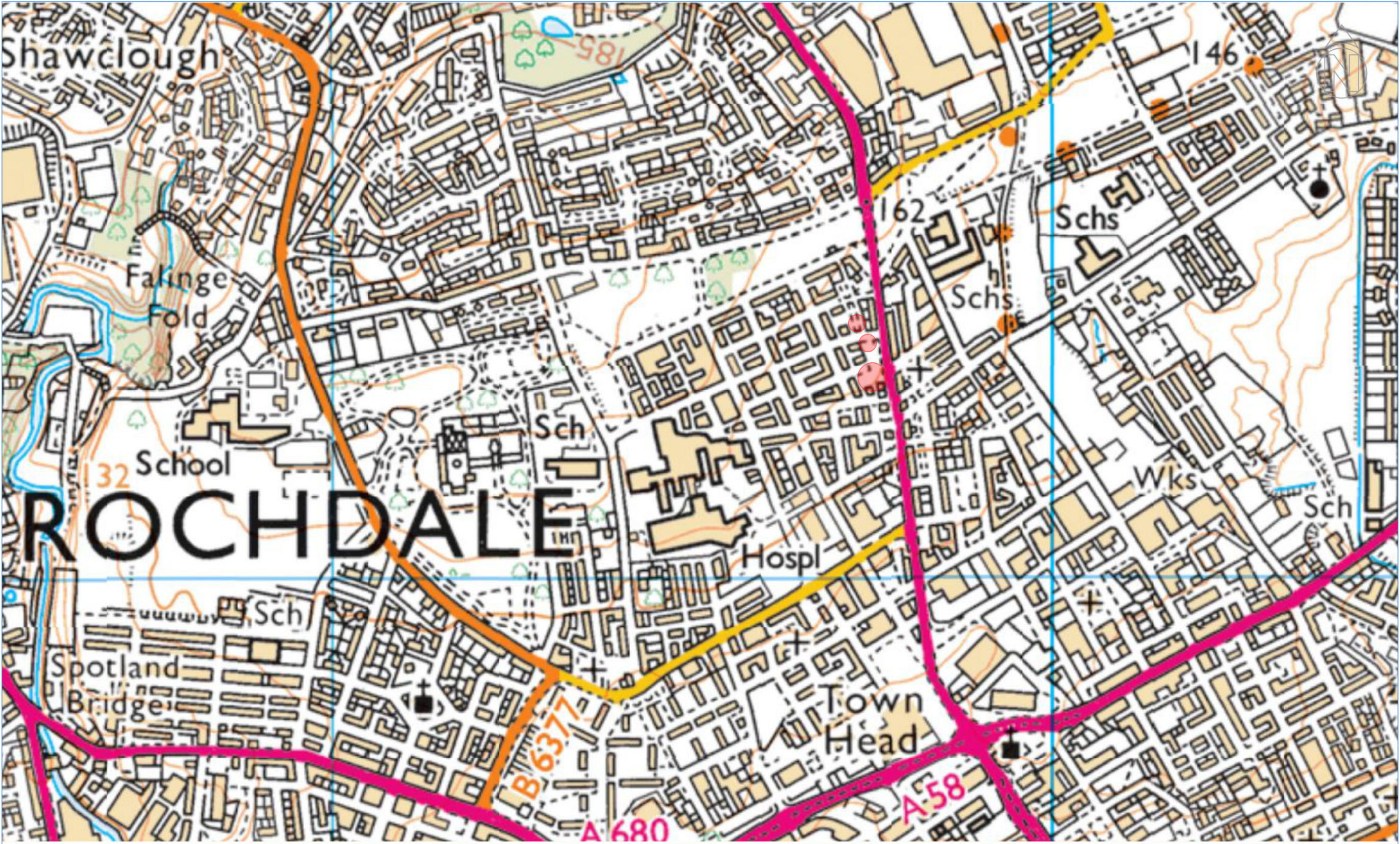
- *Confirmation of the source of imported material.*
- *Confirmation of the physical suitability of the material as per Section.*
- *Confirmation that the geo-environmental test results pass when compared to the appended RTVs.*

## 7.0 CONTINGENCY PLAN AND AREAS OF UNEXPECTED CONTAMINATION

There is potential for areas of unexpected contamination to be present, due to the former use of the site. The strategy for unexpected contamination must be relayed to all site personnel during the enabling works phase and outline a clear allocation of responsibility for reporting and dealing with contamination.

Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the requirement to report this to the client and Groundtech Consulting.

## APPENDIX 1 - Plans



|                                                  |                          |               |      |         |      |             |  |                                            |
|--------------------------------------------------|--------------------------|---------------|------|---------|------|-------------|--|--------------------------------------------|
| <div>GROUNDTECH<br/>CONSULTING</div> <div></div> | CLIENT                   | DATE          |      |         |      | Status      |  | <div>Notes</div> <div> SITE LOCATION</div> |
|                                                  | CORNERSTONE PLACE        | JUNE 2022     |      |         |      | Preliminary |  |                                            |
|                                                  | PROJECT TITLE            | SCALE         |      |         |      | Draft       |  |                                            |
|                                                  | WHITWORTH ROAD, ROCHDALE | NTS           |      |         |      | Issued      |  |                                            |
|                                                  | PLAN TITLE               | PLAN NUMBER   |      |         |      | For Comment |  |                                            |
|                                                  | PROJECT LOCATION PLAN    | GRO-22083-P01 | Rev. | Details | Date | Approved    |  |                                            |

[illegible]

## APPENDIX 2 - General Requirements

## 1. Compliance with Legislation and Standards

The works are to be undertaken in compliance with all relevant British Standards, codes of practice, regulations, guidance and legislation. Whilst not an exhaustive list, works shall be in compliance with the latest revision of all relevant legislation, HSE Guidelines and good working practice including, but not be limited to, the following:

- *The Health and Safety at Work etc. Act 1974.*
- *Construction Health Safety and Welfare Regulations 1996.*
- *Health and Safety Executive 'Protection of Workers and the General Public during Redevelopment of Contaminated Land' HS (G) 66, HMSO 1991.*
- *The Construction, Design and Management Regulations 2007.*
- *The Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations).*
- *The Control of Asbestos Regulations, 2012.*

The Contractor is responsible for obtaining all necessary approvals, licences, consents and permits from regulatory bodies and third parties prior to commencement.

## 2. Licences, Permits and Consents

Any conditions associated planning permission should be addressed prior to carrying out the works.

It will be a requirement of the Contractor to obtain any of the necessary permits and undertake the appropriate notifications and assessments.

The Contractor should only expect approvals have been sought by others where explicitly provided to the Contractor or advised in writing.

Reuse of soils will need to be undertaken in accordance with the "Definition of Waste: Development Industry Code of Practice - Definition of Waste. Development Industry Code of Practice", Version 2 2011 i.e. in accordance with an approved Materials Management Plan and Qualified Person Declaration.

## 3. Health and Safety Requirements

The Principal Contractor must manage the risks in accordance with their legal requirements and all works are to be undertaken in compliance with all relevant regulations, guidance and legislation. A Construction Phase Health and Safety Plan (CPHASP) will be required to be submitted to the CDM co-ordinator, the Client and the LPA in advance of mobilisation to site. The CPHASP will be passed to the Site Manager who will implement all Health and Safety measures on site. The Site Manager will fully induct the Site Operatives prior to commencement of any works. The CPHASP will be kept as an open document and will be adapted as required to during the project. As a minimum, this will include:

- *Welfare arrangements, storage and security.*
- *Air monitoring requirements (and action levels).*
- *Traffic management plan.*
- *Segregation of working areas and site welfare (and decontamination units if required).*
- *Site inductions, daily safety briefings and toolbox talks.*
- *Activity specific risk assessments.*
- *Method statement briefings.*
- *Daily inspection records.*
- *Permits to work.*

During the works it will be necessary to protect the health and safety of the site personnel.

General guidance on these matters is given in the Health and Safety Executive (HSE) document 'Protection of Workers and the General Public during the Redevelopment of Contaminated Land' HS (G) 66. In summary, the following measures are suggested to provide a minimum level of protection:

- *All ground workers should be issued with protective clothing (including high visibility clothing), hard hats, footwear and gloves, personnel instructed as to how it should be used.*

- *All personnel shall wear hard hats, high visibility clothing and protective footwear at all times.*
- *Ensure that everyone on site complies with the health and safety plan.*
- *Take reasonable steps to ensure that only authorised persons are allowed on site.*
- *Display, where they can be easily read, any notification that has been sent to the Health and Safety Executive.*
- *Hand washing and boot cleaning facilities shall be provided.*
- *No smoking except in designated areas.*
- *Good practices relating to personal hygiene shall be adopted.*
- *Prepare method statements for construction operations as required by the Principal Designer.*
- *Provide the CDM Co-ordinator with any other relevant information.*

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed, approved to the Principal Designers satisfaction and issued in accordance with the CDM Regulations.

The Construction Phase Health and Safety Plan (CPHASP) should pay particular attention to the following hazards which may be encountered:

- *Potentially hazardous or contaminated materials used or encountered on site.*
- *Deep excavations.*
- *The potential for ground gases and risks on confined spaced entry.*
- *Working in the vicinity of existing underground or overhead services.*
- *Working in confined spaces.*
- *Working on, or in the vicinity of highways.*
- *Working with materials which have the potential to contain asbestos and the risk of inhalation of asbestos fibres.*
- *Manual handling.*
- *The potential for fire.*
- *Working with electrical apparatus in the vicinity of mobile plant and the potential presence of water.*
- *Poor lighting.*
- *The potential for falling/slipping/tripping and sustaining injury.*
- *The possibility for biological agents to be present, including, but not limited to: psittacosis, leptospirosis (Weill's disease), tetanus, legionella, human waste.*
- *Working in the vicinity of voids and openings.*

The Contractor shall take all necessary safety precautions throughout the ground treatment operations and shall comply with the Health and Safety at Work Act 1974 or any subsequent re-enactment thereof.

The Contractor shall submit for approval all necessary method statements to the Client prior to commencing the works.

The Contractor shall provide details of emergency procedures. Emergency services shall be informed of the site operations prior to commencement.

All statutory records to be kept in the site manager's office and these may include (not an exhaustive list and note not all may be required):

- *HSE Notification F10.*
- *Construction Phase Health and Safety Plan.*
- *Method Statements and Risk Assessments; Environmental Permit deployment form and associated paperwork.*
- *Discharge Consents for disposal of groundwater.*
- *Competence records (including asbestos awareness training and face-fit test records).*
- *Utility records.*
- *Plant and machinery maintenance records.*
- *Duty of Care paperwork.*

In addition, it is recommended that:

- *Asbestos Awareness training/briefing to be given to all staff.*

#### **4. Site Establishment and Security**

Prior to the commencement of any works, the contractor, in conjunction with the Client and the Supervising Engineer, shall establish the boundaries of the site and working areas.

The Contractor shall make adequate provision to secure the site boundary and prevent unauthorised access onto the site during the course of the works.

Prior to the commencement of any works, the contractor, shall undertake a dilapidation survey of all adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. The survey is to be agreed with the Client or their representative prior to commencing any work on site.

The Contractor shall be responsible for all costs associated with rectification of damage to adjacent features/construction including but not limited to properties, boundary walls/ fences, adjacent footpath and road constructions etc. resulting from the demolition works.

The Contractor is to provide surveying capability as set out in this document facilitate the above. Prior to the completion of the works the Contractor is to discuss the continuation of the site security, including the fences, with the client and acceptable arrangements for continued security are to be agreed prior to the removal of the contractor's security provision.

#### **5. Traffic Safety and Management**

The Contractor shall comply in all respects with Chapter 8 of the Traffic Signs Manual for works on or affected the public highway and/or private roads forming the highway access to/from the site. The Enabling Works Contractor shall obtain all necessary consents from the Local Highway Authority for works on the public highway.

On-site access and haul routes should be provided and maintained by the Enabling Works Contractor in such a manner so as not to endanger either the user, those working in the vicinity of such accesses/haul routes and or the Works. Access to the site will be agreed with the Clients prior to commencement.

Suitable precautions shall be taken to prevent the spread of mud and debris on the public highways. Regular inspections of the public highway adjacent to the site shall be carried out. If deemed necessary by the Contractor, the Client or the Supervising Engineer, the highway shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site. If the Supervising Engineer considers that significant amounts of any detritus have been deposited on the public highway, then operations shall be temporarily suspended until appropriate cleaning operations have been undertaken.

The Contractor is to co-operate with other Contractors if they are present during the works. The proposed works will generate a number of vehicle movements associated with the removal of soils and delivery to site of materials. Consideration should be given to the route and the timing of these vehicle movements, to minimise risk and disturbance to sensitive locations (such as schools, residential areas).

Risks associated with the transport of soils that are potentially containing contaminated, such as dust emission, should be appropriately managed.

#### **6. Welfare Facilities**

Site cabins and welfare facilities will be established at a location to be agreed with the Supervising Engineer.

The Contractor is deemed to have made provision and arrangements for all temporary utilities associated with the welfare facilities.

#### **7. Working Hours**

Noisy operations such as the use of hydraulic breakers shall be restricted to operating times as specified by the Client and by the Planning Permission. It is understood that these are 8:30 am to 5:30 pm, or other hours agreed with the Local Authority, Monday to Friday and 9.00am to 1.00pm on Saturday. No working shall take place on Sunday or Bank Holidays.

Prior to commencement the Contractor is to make contact with the Local Authority to establish if any further restrictions apply.

## 8. Mobile Plant

Mobile plant shall be operated by suitably trained and qualified operators experienced for each item of plant. When not in use all plant shall be locked to prevent all plant shall be locked to prevent unauthorised operation.

All traffic entering or working on site shall comply with a maximum 10mph speed limit.

Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with the requirements of the Pollution Prevention Guidelines PPG2. Specifically, any storage tanks used should:

- *Be sited within an oil-tight secondary containment system such as an impermeable bund.*
- *The secondary containment must provide storage for at least 110% of the tank's maximum capacity.*
- *Be located within a secure area.*
- *All taps and valves should be fitted with a lock and kept locked shut when not in use. Maintenance of mobile plant should be undertaken in a designated area, unless absolutely necessary.*

Waste oil, hydraulic fluid etc. should not be tipped directly or discharged on to site. Such materials shall be stored separately, in a secure bunded area, for off-site disposal. Waste oil may be a special waste and disposal shall be undertaken by a registered carrier in accordance with the Duty of Care Regulations.

A spill kit shall be kept on site in an accessible place adjacent to the designated refuelling area.

## 9. Surveying

The Contractor shall provide full time surveying personnel and equipment to undertake the following activities and any other requirement for topographical information relating to the project that arises through the duration of the enabling works contract. The survey personnel and equipment should be capable of providing accurate levels and co-ordinates in relation to the national grid and topographical survey provided within 1 day of request.

The following key activities are covered by the requirements for surveying:

- *Confirmation of topographical survey on possession of the site and setting out of the site boundary.*
- *Confirmation of positions of existing utilities and site features.*
- *Surveying the base and extent of all excavations and remaining obstructions prior to backfilling.*
- *All setting out and levelling relating to delivery of the enabling works.*
- *The location of sub-structures removed.*
- *Interim surveys to be undertaken during the infilling works to provide information on issues such as depth of excavation, progress of earthwork, quantities of materials, testing depths and locations etc.*
- *The location and elevation of test samples and locations.*
- *As built survey information.*

The Contractor is required to undertake all necessary topographical survey works to verify these levels before the commencement of the contract. Should the Contractor find any discrepancies on the drawings they are to refer the matter to the Engineer for verification before proceeding with the part of the works affected.

The Contractor shall undertake a topographical survey following completion of the enabling works.

All topographical surveys shall include levels at maximum 10m spacing and details of any features, changes in slope, structures, services and any other features of interest.

All of the above features shall be surveyed for line and level at the site boundary and marked on a plan. Levels shall be to Ordnance Datum and locations to National Grid. The survey shall be calibrated against existing site surveys and benchmarks in the vicinity of the site.

## 10. Testing

The Contractor shall be responsible for undertaking all testing necessary to satisfy the Supervising Engineer that the works have been carried out in accordance with and comply with this Remedial Specification and the Earthworks specification.

All soils and geo-environmental testing shall be carried out by a UKAS and MCERTS accredited laboratory, with accreditation for the specific analysis, to the approval of the Supervising Engineer.

The Enabling works Contractor is to make available on site at all times a file containing all test certificates in addition to the testing summary, for inspection by the Consultant.

Test results are to be summarised in a single master spreadsheet (which contains all data) and is to be in a format agreed with the Consultant. Data that does not meet the specification shall be highlighted and include details of what works were undertaken to address the non-compliance. The master spreadsheet, results of testing and drawings shall be maintained and kept up to date.

#### **11. Offsite Disposal**

Materials for offsite disposal shall be sampled and analysed, by the contractor, at rates sufficient to allow the material to be adequately classified by assessment.

WAC testing should be undertaken on material exported from site to landfill, or other appropriately licensed facility. Material shall be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991, Environmental Permitting (England and Wales) Regulations 2016 and where appropriate the Special Waste Regulations, 1996 and Hazardous Waste (England and Wales) Regulations 2005. A transfer note shall be completed, signed and retained by all parties involved. The transfer note shall state the volume of waste, the nature of the material and statement to the chemical composition. The waste transfer notes shall be kept by the Contractor for a period of at least 2 years.

#### **12. Contamination**

Contractors should be made aware of the possibility of encountering contaminants within soils or groundwater at the site (including heavy metals) through 'toolbox' talks.

Safe working procedures should be implemented in accordance with CIRIA 132 and good standards of personal hygiene should be observed and appropriate levels of PPE provided and utilised.

Eating, drinking and smoking should be strictly prohibited in the development site other than in designated mess areas.

#### **13. The Control of Noise, Vibration and Dust Nuisance**

The Contractor shall comply with the recommendations for practical measures to reduce noise and vibration set out in BS5228-1:2009 and BS5228-2:2009 and with any specific Principal Contractor requirements.

The Contractor shall take all reasonable measures to prevent dust nuisance from being generated by construction traffic, etc.

If necessary, working methods will be altered in order to ensure that the level of noise generated from the works is within published tolerable limits.

The requirements of the LPA are to be sought and undertaken.

##### *General*

No fires shall be permitted on site.

##### *Dust Mitigation*

Appropriate measures shall be implemented at all times during the demolition and enabling works to minimise any dust emissions.

Any main temporary haul roads shall, where practical to do so, be constructed of crushed hardcore products. The haul roads shall be maintained for the duration of their use to minimise any build-up of loose spoil etc.

Traffic both entering and working on site shall obey a maximum speed limit of 10mph. Wagons that are to be used for the haulage of any contaminated material from site shall be appropriately sealed or sheeted to prevent the release of fugitive dust.

Mobile water bowzers and sprayers shall be available on site at all times to water unpaved haul roads and working areas. The water spray may include chemical dust suppressants or wetting agents to improve dust control. An adequate supply of water shall be maintained on site at all times to allow for dust suppression activities to be carried out at short notice.

Where mobile water bowzers are not effective in suppressing dust then vapour masts shall be used. Such vapour masts shall be deployed at 20m centres on the downwind side of haul roads or excavations giving rise to significant dust or emissions of odour.

Air quality and dust monitoring stations will be set up and monitored by the Contractor to record the dust concentrations during the works.

With regards to stockpiles:

- *Stockpiles should be kept to a minimum to reduce 'wind whip' causing potentially hazardous material to be blown from the pile.*
- *Stockpiles should be placed on a suitable polythene membrane in a bunded area to prevent any cross contamination and care should be taken not to pierce the sheeting when placing the bulky elements of the material.*
- *Stockpiles should be dampened down or covered to prevent dust, whilst the final choice should be made by the Contractor based on site constraints, but the options include covering with plastic/polythene membrane, or by a layer of clean soil material.*
- *The drop distance from excavator bucket to stockpile will be kept as short as reasonably practicable to reduce dust.*

#### *Odour*

In general terms the excavation works are not considered likely to give rise to any significant odour problems. However, possible 'hotspots' of hydrocarbon contamination cannot be discounted and it is advised that odours are assessed by twice daily inspections of all Site boundaries.

If highly odorous materials are encountered, which may give rise to nuisance to neighbouring properties, appropriate vapour masts shall be deployed to provide suitable odour control. Any odorous materials shall be covered at the end of each working day and any stockpiles will be located away from any sensitive areas.

Plant and machinery shall be serviced regularly to ensure that exhaust fumes are compliant with best practice and relevant regulations.

#### *Noise*

The requirements of the Local Planning Authority and BS 5228: 1997 'Noise and vibration control on construction sites' shall be adhered to at all times.

All machinery shall be fitted with effective silencers and shall be serviced at regular intervals. No items of plant shall be operated with engine covers raised.

The location of any crushing plant shall take into consideration the location of neighbouring properties and other noise sensitive receptors and shall be located away from these areas and located adjacent to proposed stockpile locations where possible.

### **14. Water Quality Controls**

The Contractor shall provide for such measures as may be necessary to ensure that water, whether groundwater, from precipitation or any other source does not accumulate in excavations or on sub-grades.

Adequate drainage sumps will be installed during works and cut off trenches/dewatering measures will be used as required to manage surface water run-off, to prevent any water from entering watercourses, either directly as surface water run-off, or indirectly via the surface water drainage systems. If materials escape, the Contractor is to undertake (at their cost) appropriate remedial action as soon as possible.

## **15. Utilities**

Utility records are to be provided by the Client for information purposes within the enabling works documentation. However, the Contractor shall be responsible for liaison with the statutory utility providers to ensure all service records are current and correct. The Contractor is also responsible for the safe disconnection of existing utilities entering the site, except those which are to remain operational.

Prior to site work commencing, the position of all utilities indicated as on site or offsite but close to the site boundary shall be determined and clearly identified where on site. The locations should be confirmed on site by appropriate investigation, observations and survey. Any discrepancies between the anticipated positions and confirmed locations are to be reported to the Supervising Engineer.

All retained manholes should be located and clearly identified on site to prevent damage. The location, depth, diameter and invert level of each manhole and the size and depth of all stream connections shall be recorded. Where drains or sewers are to be grubbed up the downstream ends should be plugged prior to commencement to prevent offsite systems becoming blocked or contaminated.

Where existing drains or sewers are to remain, CCTV surveys are to be provided by the contractor. These surveys must be undertaken on commencement prior to any physical work and on completion to demonstrate no damage has occurred.

Where damage has occurred, any remedial work must be agreed with the Supervising Engineer and relevant authority/owner prior to repairs commencing. The repair costs will be borne by the contractor.

All utilities on site that are to be retained through the works are to be positively located on site, reliance shall not be placed on existing records. Utilities are to be visibly marked and protected for the duration of the works. Appropriate methods are to be put in place to ensure all site staff working in the vicinity of retained utilities are fully briefed.

The Contractor is responsible for ensuring that all hydrant covers, stop tap boxes manhole covers and the like are raised or lowered to suit the finished levels associated with the proposed enabling works plateaus and future construction thicknesses.

Following the completion of the works, a survey plan of the location of terminated services is to be provided.

## **16. Damage to Property**

All works are to be undertaken in accordance with the Party Wall etc Act 1996. The Contractor shall ensure that all precautions are taken in order to avoid any damage to existing property arising from the Works and shall be responsible for same in the event that any damage should arise from his failure to exercise due care.

Any adjacent structures, services and the like shall be inspected prior to commencement of the Works for evidence of existing defects and, if necessary, a dilapidation survey shall be carried out by the contractor, with the agreement of the Client and/or the Supervising Engineer, prior to works commencing on site. A re-inspection shall take place on completion of the Contract to verify that no damage or deterioration of the said structure, service or apparatus has occurred as a result of the Works. A schedule of the findings of this re-inspection shall be circulated to all parties concerned for their records.

The Contractor shall execute the works with care so as to avoid damage to existing structures and drains or other services to be retained.

All fences, trees, paths, shrubs, grassed areas and other surfaces required to be retained shall be protected by the Contractor from spillage and damage caused by site operations and upon completion of the works they shall be handed over in an undamaged and proper state to the satisfaction of the Engineer.

Refer to landscape architect drawings and specifications that define the areas that require protection. The Contractor shall not raise or lower the ground level beneath the spread of the branches of any tree to be retained without the approval of the Engineer.

### **17. Drawings and Supplied Information**

Whilst efforts have been made to ensure that the information provided to the Contractor is correct and current, the Contractor is responsible for corroborating the existing information with the benefit of their site presence and to report any discrepancies encountered or anticipated to the Supervising Engineer immediately.

Where cutting and filling operations are to be carried out the Contractor is to undertake comparative assessments with the benefit of existing information, additional survey and their anticipated sequence of work to ensure sufficient and suitable material is available to undertake the works as proposed. Any anticipated shortfall or surplus is to be report immediately.

### **18. Photographs**

A detailed dilapidation survey shall be undertaken of the site and adjacent properties including joint site boundaries, in conjunction with adjacent landowners. Such survey shall include roads, footpaths, street lighting and road signs. A copy of the survey, including record photographs shall be provided to the Client within seven days of commencement of site works.

The Contractor is to provide on-site a digital camera and e-mail facilities to enable electronic transfer of site photographs and other information for the full duration of the contract. Progress photographs are to be taken at least weekly across all parts of the site for inclusion within the contractor's report. Photographs are to be made available to the Engineer/Client in electronic format should they be requested during the contract. Record photographs should be provided as part of the validation information.



## APPENDIX 3 - Remediation Options Appraisal

## Introduction

This Options Appraisal has been undertaken in accordance with appropriate guidance. There are four main stages to this appraisal:

1. *Identifying Key Risk Drivers.*
2. *Identifying viable remediation options for each relevant pollutant linkage.*
3. *Carrying out a detailed evaluation of viable remediation options to identify the most appropriate option for each pollution linkage.*
4. *Producing a remediation strategy that reduces all relevant pollutant linkages to an acceptable level.*

## Key Risk Drivers for Remedial Action

Groundtech Consulting's Site Investigation Report and Supplementary Report have identified that the key risk drivers requiring remediation are:

- *Asbestos fibres within the Made Ground.*
- *Contaminated Made Ground.*
- *Installation of correct water supply pipes.*

The following sections of this report are intended to identify suitable and practical remedial techniques which can be applied in order to achieve a site which is suitable for the proposed residential development.

Potable water pipelines are not discussed in the Remediation Options Assessment as they are mitigated by measures outlined British Standards and by good practice.

## Remediation Options and Evaluation of Feasibility

### *Preliminary Assessment of Remediation Options*

Investigation and risk assessment has concluded that the requires remediation to reduce the risk to receptors to an acceptable level.

The objectives of the remediation are to remove one or more elements of each of the *source-pathway-receptor* linkages.

The initial screening process considers the available remedial techniques based on following key criteria:

- |                                    |   |                                                                                                                                                                                                                       |
|------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • <i>Effectiveness</i>             | - | <i>the strategy must work within the context of the site and be effective in the removal of contamination linkages.</i>                                                                                               |
| • <i>Practicality</i>              | - | <i>the strategy has to have been successfully used in similar situations on other sites and readily available within the UK market. Novel solutions or those still in the research stage are not considered here.</i> |
| • <i>Durability</i>                | - | <i>the strategy needs to be durable and not reliant on ongoing maintenance to continue being effective.</i>                                                                                                           |
| • <i>Relative Cost</i>             | - | <i>the strategy must not be excessive cost.</i>                                                                                                                                                                       |
| • <i>Relative Operational Time</i> | - | <i>the strategy should work in a feasible and realistic time scale.</i>                                                                                                                                               |
| • <i>Sustainability</i>            | - | <i>more sustainable options are preferred.</i>                                                                                                                                                                        |

The table below summarises all of the accepted remedial techniques readily available and assess each against the six key parameters listed above.

In the first instance, the feasibility of each of the listed remedial option is assessed in terms of effectiveness at treating the contamination, which is broken down into; effective (Y), partially effective (P) or ineffective (N).

The techniques are then assessed in terms of relative cost ranging from negligible cost (£) through moderately expensive (££) to prohibitively expensive (£££+).

The timescale the remedial technique is operational has been generally assessed in units of weeks, months, years and decades. The longevity of the technique should be for the duration of the development to be effective.

The main reasons for rejection of a remedial option are generally the ongoing operational constraints, the cost and the ineffectiveness to mitigate the risk from all contaminants present. In some situations, several treatment options may be applicable and will therefore be considered as part of the appraisal.

### Viable Remedial Options

As described above, certain technologies were rejected based on the above reasons. The short-list of options presented below represents those technologies which were not rejected at the pre-screening process and as such, are taken forward to the options appraisal process:

- *Installation of a cover system in garden areas and POS.*
- *Materials management comprising excavation, screening, and reuse of suitable material.*
- *Disposal of surplus or unsuitable soils.*

#### *Cover System*

A cover system is a proven technology for mitigating the risk from numerous contaminants. The process comprises the placement of a cover system to form a barrier between the contaminated Made Ground and site users breaking the pollution linkage.

This option is technically simple and represents a low-cost strategy that can be implemented rapidly, subject to favourable site levels to accommodate the cover system.

The timescale for installing a barrier is relatively quick allowing for rapid completion of the remediation objectives and this remediation solution could be designed and implemented within a matter of weeks/months.

#### *Materials Management (Excavation, Screening, and Reuse of Suitable) – with a Cover System*

This method involves the excavation of soils, determining their suitability (both chemically and geotechnically) and replacement as part of an earthworks programme. A cover system is placed to form a barrier between the contaminants and site users, breaking the pollution linkage.

This option is technically simple and represents a low-cost strategy that can be implemented rapidly. There is a main advantage with this option which is long term liabilities are not addressed because the contaminants present in the soils are potentially not removed, there remains a risk of future site users exposing the contaminants and this should be considered in the design.

The timescales fit with the programme of the development allowing for completion of the remediation objectives and this solution can be designed and implemented within a matter of months.

*Disposal of Excess or Unsuitable Soils*

Disposal involves the removal of contaminated soils and disposal at an appropriately licensed waste management facility or surplus material potentially to a recycling facility. The benefits of excavation and disposal are short term implementation and the soils can be removed with a high degree of certainty by meeting proposed RTVs.

The cost of the method however can be significant depending on the classification and end disposal route, particularly in comparison to a cover system. The option will also take up valuable landfill space and present a significant carbon footprint in terms of vehicle movements.

#### Applicability of Remediation Options and Initial Assessment – Soils

| Remedial Activity                         | Effective on Asbestos | Effective on Metals | Effective on PAHs | Relative Cost | Relative Operational Time | Comments (Practicality/Sustainability/Durability)                                                                                                                                                          | Feasibility                                          |
|-------------------------------------------|-----------------------|---------------------|-------------------|---------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <i>Containment - Cover System</i>         | Y                     | Y                   | Y                 | £             | Weeks                     | <i>Will break the pollution linkage between future site users and contaminants in the Made Ground.</i>                                                                                                     | <i>Y – in conjunction with materials management.</i> |
| <i>Excavation and Disposal</i>            | Y                     | Y                   | Y                 | ££            | Weeks to months           | <i>Removal of unsuitable material and risk.</i>                                                                                                                                                            | <i>Y – in conjunction with materials management.</i> |
| <i>Containment - hydraulic barriers</i>   | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |
| <i>Containment - in ground barriers</i>   | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |
| <i>Soil flushing</i>                      | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |
| <i>Surface amendments</i>                 | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |
| <i>Soil washing</i>                       | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |
| <i>Hydraulic binders (such as cement)</i> | Y                     | Y                   | Y                 | ££            | Weeks to months           | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N                                                    |

| Remedial Activity         | Effective on Asbestos | Effective on Metals | Effective on PAHs | Relative Cost | Relative Operational Time | Comments (Practicality/Sustainability/Durability)                                                                                                                                                          | Feasibility |
|---------------------------|-----------------------|---------------------|-------------------|---------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <i>Vitrification</i>      | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N           |
| <i>Incineration</i>       | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N           |
| <i>Thermal desorption</i> | Y                     | Y                   | Y                 | £££           | Months                    | <i>Not applicable – cost and timescales not suitable for the size of residential end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.</i> | N           |

## APPENDIX 4 - Remedial Target Values



## Remedial Target Values - Residential Without Plant Uptake

| Proposed End Use         | Unit               | Residential without Plant Uptake |                              |                           | Source                |
|--------------------------|--------------------|----------------------------------|------------------------------|---------------------------|-----------------------|
| SOM                      | %                  | 1                                | 2.5                          | 6                         |                       |
| Arsenic                  | mg/kg              | 40                               | 40                           | 40                        | SGVs                  |
| Beryllium                | mg/kg              | 1.7                              | 1.7                          | 1.7                       | LQM S4ULs             |
| Boron (water soluble)    | mg/kg              | 11000                            | 11000                        | 11000                     | LQM S4ULs             |
| Cadmium                  | mg/kg              | 85                               | 85                           | 85                        | SGVs                  |
| Chromium (Total)         | mg/kg              | 910                              | 910                          | 910                       | LQM S4ULs             |
| Chromium (VI)            | mg/kg              | 21                               | 21                           | 21                        | DEFRA C4SLs           |
| Copper                   | mg/kg              | 7100                             | 7100                         | 7100                      | LQM S4ULs             |
| Lead                     | mg/kg              | 310                              | 310                          | 310                       | DEFRA C4SLs           |
| Organic Mercury          | mg/kg              | 1.2                              | 1.2                          | 1.2                       | LQM S4ULs             |
| Nickel                   | mg/kg              | 180                              | 180                          | 180                       | LQM S4ULs             |
| Selenium                 | mg/kg              | 430                              | 430                          | 430                       | SGVs                  |
| Vanadium                 | mg/kg              | 1200                             | 1200                         | 1200                      | LQM S4ULs             |
| Zinc                     | mg/kg              | 40000                            | 40000                        | 40000                     | LQM S4ULs             |
| Aliphatic EC 5 - 6       | mg/kg              | 42                               | 78                           | 160                       | LQM S4ULs             |
| Aliphatic EC 6 - 8       | mg/kg              | 100                              | 230                          | 530                       | LQM S4ULs             |
| Aliphatic EC 8 - 10      | mg/kg              | 27                               | 65                           | 150                       | LQM S4ULs             |
| Aliphatic EC 10 - 12     | mg/kg              | 130 (48) <sup>vop</sup>          | 330 (118) <sup>vop</sup>     | 770 (283) <sup>vop</sup>  | LQM S4ULs             |
| Aliphatic EC 12 - 16     | mg/kg              | 1100 (24) <sup>sol</sup>         | 2400 (59) <sup>sol</sup>     | 4400 (142) <sup>sol</sup> | LQM S4ULs             |
| Aliphatic EC 16 - 35     | mg/kg              | 65000 (8.48) <sup>f, sol</sup>   | 92000 (21) <sup>f, sol</sup> | 110000 <sup>f</sup>       | LQM S4ULs             |
| Aliphatic EC 35 - 44     | mg/kg              | 65000                            | 92000 (21) <sup>f, sol</sup> | 110000 <sup>f</sup>       | LQM S4ULs             |
| Aromatic EC 5 - 7        | mg/kg              | 370                              | 690                          | 1400                      | LQM S4ULs             |
| Aromatic EC 7 - 8        | mg/kg              | 860                              | 1800                         | 3900                      | LQM S4ULs             |
| Aromatic EC 8 - 10       | mg/kg              | 47                               | 110                          | 270                       | LQM S4ULs             |
| Aromatic EC 10 - 12      | mg/kg              | 250                              | 590                          | 1200                      | LQM S4ULs             |
| Aromatic EC 12 - 16      | mg/kg              | 1800                             | 2300                         | 2500                      | LQM S4ULs             |
| Aromatic EC 16 - 21      | mg/kg              | 1900                             | 1900                         | 1900                      | LQM S4ULs             |
| Aromatic EC 21 - 35      | mg/kg              | 1900                             | 1900                         | 1900                      | LQM S4ULs             |
| Aromatic EC 35 - 44      | mg/kg              | 1900                             | 1900                         | 1900                      | LQM S4ULs             |
| Benzene                  | mg/kg              | 0.38                             | 0.7                          | 1.4                       | SGVs                  |
| Toluene                  | mg/kg              | 880                              | 1900                         | 3900                      | SGVs                  |
| Ethyl Benzene            | mg/kg              | 83                               | 190                          | 440                       | SGVs                  |
| Xylene - o               | mg/kg              | 88                               | 210                          | 480                       | SGVs                  |
| Xylene - m               | mg/kg              | 82                               | 190                          | 450                       | SGVs                  |
| Xylene - p               | mg/kg              | 79                               | 180                          | 430                       | SGVs                  |
| MTBE (methyl tert-butyl) | mg/kg              | 49                               | 84                           | 160                       | CL:AIRE 2010          |
| Acenaphthene             | mg/kg              | 3000                             | 4700                         | 6000                      | LQM S4ULs             |
| Acenaphthylene           | mg/kg              | 2900                             | 4600                         | 6000                      | LQM S4ULs             |
| Anthracene               | mg/kg              | 31000                            | 35000                        | 37000                     | LQM S4ULs             |
| Benz(a)anthracene        | mg/kg              | 11                               | 14                           | 15                        | LQM S4ULs             |
| Benzo(a)pyrene           | mg/kg              | 3.2                              | 3.2                          | 3.2                       | DEFRA C4SL*/LQM S4ULs |
| Benzo(b)fluoranthene     | mg/kg              | 3.9                              | 4                            | 4                         | LQM S4ULs             |
| Benzo(ghi)perylene       | mg/kg              | 360                              | 360                          | 360                       | LQM S4ULs             |
| Benzo(k)fluoranthene     | mg/kg              | 110                              | 110                          | 110                       | LQM S4ULs             |
| Chrysene                 | mg/kg              | 30                               | 31                           | 32                        | LQM S4ULs             |
| Dibenz(ah)anthracene     | mg/kg              | 0.31                             | 0.32                         | 0.32                      | LQM S4ULs             |
| Fluoranthene             | mg/kg              | 1500                             | 1600                         | 1600                      | LQM S4ULs             |
| Fluorene                 | mg/kg              | 2800                             | 3800                         | 4500                      | LQM S4ULs             |
| Indeno(123-cd)pyrene     | mg/kg              | 45                               | 46                           | 46                        | LQM S4ULs             |
| Naphthalene              | mg/kg              | 2.3                              | 5.6                          | 13                        | LQM S4ULs             |
| Phenanthrene             | mg/kg              | 1300                             | 1500                         | 1500                      | LQM S4ULs             |
| Pyrene                   | mg/kg              | 3700                             | 3800                         | 3800                      | LQM S4ULs             |
| Phenol                   | mg/kg              | 420                              | 420                          | 420                       | SGVs                  |
| Asbestos                 | No fibres detected |                                  |                              |                           |                       |



## APPENDIX 5 - Limitations

## Limitations

This report (Report) forms part of the Services and if applicable Additional Services undertaken by Groundtech Consulting Ltd pursuant to a written contract (Agreement) which contains detailed provisions including express limitations of the liability of Groundtech Consulting Ltd.

This Report was prepared using reasonable skill and care as stated in the Agreement for the purpose including intended end use stated by the Client (Purpose) and the liability of Groundtech Consulting Ltd in respect of the form and content of this Report is no greater than its liability under the Agreement. All records, measurements notes, or any other data (Data) obtained by or for the benefit of the Consultant were obtained at a specific point in time and it may not be assumed by the Client or any person relying on this Report that the Data will remain unaffected by the passage of time, the seasons, weather conditions, changes in the water table or the carrying out and completion of works at the Site.

Unless otherwise agreed this Report has been prepared exclusively for the use and reliance of the Client and may not be relied upon, by any other party except as provided for in the Agreement. A third party who relies on this Report, does so at their own and sole risk and Groundtech Consulting Ltd has no liability to such parties.

Groundtech Consulting Ltd that this Report is to be used for the Purpose. The Purpose was instrumental in determining the scope and of the Services provided. If the Purpose should change, the Client may not be able to rely on the Report without the separate agreement of Groundtech Consulting Ltd.

Since the Report was written, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change (see below) and should be investigated if there is any significant delay in acting on the findings of this Report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions in this Report should not be relied upon in the future without written confirmation from Groundtech Consulting Ltd that it is safe to do so.

The observations and conclusions outlined in this Report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting Ltd.

Groundtech Consulting Ltd is not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The Report is based upon Groundtech Consulting Ltd's observations of existing physical conditions at the Site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the Site. The findings and recommendations contained in this Report are based in part upon information provided by third parties, and Groundtech Consulting Ltd have relied upon such information assuming it to be correct.

Groundtech Consulting Ltd accepts no responsibility for errors or inaccuracies in third party information presented in this Report. Groundtech Consulting Ltd was not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services or Additional Services. Groundtech Consulting Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting Ltd and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions may also vary due to the ground's heterogeneous properties and because investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this Report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. If so stipulated in the Agreement, geo-environmental testing was carried out for a limited number of parameters based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

Any groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and groundwater levels may occur at other times of the year which are higher than were recorded during this investigation.

Any site drawings provided in this Report are preliminary and used to present the general relative locations of features on, and surrounding, the Site.

