



**GROUNDTECH**  
CONSULTING

**Job title:** New Office Block, Bury

**Report type:** Remedial Specification

**Prepared for:** JD Sports

**Date:** April 2023

| Document Control Form                   |                                                                                      |
|-----------------------------------------|--------------------------------------------------------------------------------------|
| PROJECT                                 | NEW OFFICE BLOCK, BURY                                                               |
| REPORT NAME                             | REMEDIAL SPECIFICATION                                                               |
| REPORT REFERENCE                        | GRO-21438-4387                                                                       |
| STATUS                                  | FINAL                                                                                |
| ISSUE DATE                              | 14 APRIL 2023                                                                        |
| REVISION                                | 1.1 17 DECEMBER 2025                                                                 |
|                                         | 1.2 23 JANUARY 2026                                                                  |
|                                         |                                                                                      |
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| <i>GRO-21438-P01</i>             | -               | <i>Project Location Plan</i> |
| <i>11302-AEW-XX-SI—DR—A-0511</i> | <i>P03</i>      | <i>Proposed Masterplan</i>   |

## 1.0 INTRODUCTION

### 1.1 Background

This Remedial Specification has been produced on behalf of JD Sports and relates to the remediation of a site located off Pilsworth Road in Bury.

The site was most recently occupied by a large warehouse unit which has recently been demolished. 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 a gym and cafe with associated outside facilities including two covered paddle courts and a MUGA pitch as shown on the Proposed Site Plan Ref. 14579-AEW-XX-SI-DR-A-0502 P06.

### 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 commercial 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 commercial redevelopment.

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 is 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:

- *Groundtech Consulting Coal Mining Risk Assessment referenced GRO-21438-3119, dated 26 January 2021.*

- *Groundtech Consulting Preliminary Risk Assessment referenced GRO-21438-3118, dated 07 February 2022.*
- *Groundtech Consulting Geo-Environmental Appraisal referenced GRO-21438-3308, dated 31 March 2022.*
- *Groundtech Consulting Supplementary Geo-Environmental Appraisal referenced GRO-21438-3875, dated 20 September 2022.*

## 2.0 CONCEPTUAL SITE MODEL

### 2.1 Site Details

The site was most recently occupied by a large warehouse unit which has recently been demolished. The footprint of the former building is surfaced with uneven ground with grass and some light vegetation. The remainder of the site was surfaced predominantly with concrete and is generally featureless.

A gas main crosses the north east corner of the site.

A vegetated strip is present along the site's northern boundary with some semi-mature and mature trees present.

### 2.2 Site History and Consultations

The earliest historical records from 1848/51 indicate the site was formed by fields and was undeveloped. Six reservoirs were located between 80m and 150m south. The site remained undeveloped and formed by fields until the 1980s when a warehouse was constructed on the site which has been the only development on site until it was recently demolished.

The nearest named watercourse is Hollins Brook located 91m south of the site.

Environment Agency information indicates that the site is outside a flood risk zone and is not at risk of flooding. The Risk of flooding from rivers and the sea (RoFRaS) is low.

A historic landfill was located 156m north west relating to inert waste belonging to Park Pt Landfill Ltd.

### 2.3 Geology and Hydrogeology

Made Ground was not indicated to be present beneath the site, however Made Ground is thought to be present due to past development on the site.

The superficial deposits indicated to underly the site are Hummocky (moundy) Glacial Deposits which characteristically comprises clay, sand, and gravel and are classified as a Secondary A Aquifer.

The solid geology is indicated to be the Trencherbone Rock comprising Sandstone which is classified as a Secondary A Aquifer.

A coal seam is shown to subcrop on site striking north west to south east, dipping to the south west at an angle of 15°. The seam subcropping the site is not named on BGS geological maps.

### 2.4 Preliminary Conceptual Site Model

The following risks were identified by Groundtech Consulting Limited:

| Receptor           |     |       |      | Risk            | Discussion                                                                                                                                                                                                 |
|--------------------|-----|-------|------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site               | End | Users | from | Moderate to Low | <i>Made Ground is likely present associated with the previous demolished commercial building and may be contaminated with a range of CoC. Soft landscaping will be present as part of the development.</i> |
| Contaminated Soils |     |       |      |                 |                                                                                                                                                                                                            |

|                                              |                  |                                                                                                                                                                                     |
|----------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site End Users from<br>Inhalation of Vapours | Low              | Gross hydrocarbon contamination from former plant hire yard not anticipated.                                                                                                        |
| Potable Water Supply Pipe                    | Moderate to Low  | Former plant hire yard may be a source of organic contamination at installation depths.                                                                                             |
| Site End Users from<br>Inhalation of Gas     | Moderate to High | Deep Made Ground may be present associated with demolition of previous building on site. Numerous sources identified in vicinity of site including landfills, ponds and reservoirs. |
| Controlled Waters                            | Low              | Gross mobile contamination not anticipated and hardstanding across site will have restricted downward migration of contaminants.                                                    |

## 2.5 Coal Mining Risk Assessment

### *Recorded Coal Mining*

No risk was identified by the Coal Authority Report and no further action was recommended at the preliminary stage.

### *Unrecorded Coal Mining*

A potential risk from unrecorded shallow mine working was identified by the Coal Mining Risk Assessment undertaken by Groundtech Consulting. This was based on the coal outcrop beneath the southern area of the site and the uncertainty of depth to bedrock.

Sandstone bedrock has been encountered at locations BH01 and BH04 from depths between 23.5m and 27.3m bgl respectively. The Sandstone bedrock was present to the base of both boreholes at 45.0m bgl and no coal or evidence of coal mine workings was encountered.

The risk of unrecorded workings was within either the Blenfire Coal seam or Trencherbone Coal seam which had recorded thicknesses of 0.7m and 1.83m respectively.

The depth of superficial deposits and presence of groundwater indicates the presence of unrecorded mine entries or workings is highly unlikely. In addition, the depth of rock cover proves in excess of ten times the thickness of the coal seams in accordance with CIRIA C758, therefore the risk to the stability of the surface of the site is *Very Low* and no further action is required.

## 2.6 Ground Model

The following scope of works was completed between the dates of 24<sup>th</sup> January and 4<sup>th</sup> February 2022:

- 4 No. cable percussive boreholes (BH01 to BH04) were drilled to depths between 15m and 20m bgl.
- Follow on Rotary open hole drilling was carried out from the base of cable percussive boreholes (BH01 and BH04) to a final depth of 45.0m bgl.
- 5 No. plate load tests were carried out at depths between 0.5m and 0.7m bgl.
- 3 No. trial pits (TP01 to TP03) were carried out to a maximum depth of 3.0m bgl.
- 1 No. soil percolation test (SuDS01) was carried out at a depth of 1.5m bgl.

The following scope of works was completed by Groundtech Consulting between 18th July and 19th July 2022:

- 3 No. trial pits (TP101 to TP103) were excavated to a depth of 1.0m bgl using a JCB 3CX excavator.

- 5 No. soil percolation tests (SuDS101 to SuDS105) were undertaken at depths between 1.1m and 2.3m bgl.

#### *Made Ground*

Made Ground was encountered across the site to a maximum depth of 1.8m bgl and the surface of the site was almost entirely covered with concrete to a maximum depth of 0.3m bgl encountered at location SuDS1, TP01, TP02, TP03 and BH04.

Where the previously existing building had been demolished, the surface consisted of backfill material. In the east of the site. Where BH03 was drilled, there was tarmac surfacing to a depth of 0.15m bgl.

Three main Made Ground populations were encountered during the investigation and are described below:

1. *Dark brown to black sandy gravel in SuDS1, TP01, TP03, BH03, and BH04 underlying the hardstanding from a minimum depth of 0.3m bgl to a maximum depth of 1.3m bgl.*
2. *Dark brown clayey gravelly sand in TP02, BH01, and BH02 from a minimum depth at ground level to a maximum depth of 0.9m bgl.*
3. *Orange brown sandy gravel in BH03 between depths of 0.4m and 1.8m bgl.*

As part of the supplementary works, Made Ground was encountered in all locations to depths between 0.66m and 1.35m bgl and comprised the following two main populations:

1. *Sandy gravelly cobbles of concrete and brick were in all locations from ground level to a maximum depth of 0.6m bgl.*
2. *Firm brown sandy gravelly clay was in all exploratory locations underlying the granular Made Ground to depths between 0.66m and 1.35m bgl.*

#### *Natural Ground*

The natural strata typically comprised orange brown and red brown slightly gravelly occasionally clayey Sand which was encountered underlying the Made Ground to depths between 4.0m and 6.0m bgl.

This was in turn generally underlain by interbedded soft to firm sandy Clay and silty clayey Sand to depths between 15.5m and 17.0m bgl where firm to stiff sandy slightly gravelly Clay was encountered to the base of the Cable Percussive boreholes.

#### *Bedrock*

Bedrock was encountered within BH01 and BH04 at 23.5m and 27.3m bgl respectively and consisted of Sandstone to the maximum investigation depth of 45.0m bgl where the boreholes were terminated.

#### *Groundwater*

Groundwater strikes were observed at locations TP01 to TP03, BH02 and BH03 at depths between 1.6m and 4.0m bgl and were observed within the natural Sand deposits.

#### *Watching Brief*

A watching brief was maintained during the ground investigation for visual and olfactory evidence of contamination. Ash was encountered within the Made Ground in BH03 between the depths of 0.4m and 1.8m bgl. No other evidence of potential contamination was noted during the investigation.

## 2.7 Geo-Environmental Testing Results

A summary of the soil testing results is provided below.

No elevated concentrations of metals, speciated Polycyclic Aromatic Hydrocarbons (PAHs) or hydrocarbons have been recorded by the laboratory testing based on the site having a commercial end use. Furthermore, TPH concentrations were almost entirely recorded at levels below the laboratory limits of detection.

At the time a creche was to be included in the proposed development, this has now been removed from the development proposals. Young children are a more sensitive receptor, therefore the samples tested were also screened against more stringent screening values of residential without plant uptake. No elevated concentrations of metals, speciated Polycyclic Aromatic Hydrocarbons (PAHs) or hydrocarbons were identified based on using more stringent CoC screening values.

### *Asbestos*

Amosite loose fibres were detected at a trace concentration of <0.001 mass% in TP01 at a depth of 0.7m bgl in the west of the site. Chrysotile loose fibrous debris was detected at a concentration of 0.005 mass% in TP03 at a depth of 0.55m bgl in the south east of the site.

The asbestos was associated with black brown sandy gravel with fragments of brick and tarmac present at both locations. The source of the asbestos is likely to be the previously demolished commercial building. No other asbestos has been identified within the samples screened through laboratory testing however, it should be assumed to be widespread as the Made Ground is similar in nature.

## 2.8 Ground Gas

The Made Ground across the site is generally present to a depth of less than 1.0m bgl comprising granular inert material. Gas monitoring undertaken to date has indicated the site should be classified as CS1.

The forensic analysis testing demonstrates that very little degradable or organic material is present in the Made Ground soils. TOC testing has generally placed the site in CS1 based on the CL:AIRE RB17 Research Bulletin.

Based on the numerous lines of evidence detailed above, the site has been classified as CS1 and no gas protection measures are considered necessary within the proposed commercial development.

The site is located in an area where no Radon precautions are required in the proposed development.

## 2.9 Remedial Strategy

### *Soils*

Made Ground was encountered beneath the entire site to a maximum depth of 1.8m bgl. No elevated concentrations of CoC above commercial screening values were detected by the laboratory testing. Asbestos was detected locally at concentrations between <0.001 mass% and 0.005 mass%.

The majority of the site will be covered with hardsurfacing which will break the pollution linkage to the Made Ground containing asbestos fibres. Where soft landscaped areas are proposed, it was recommended that 600mm of suitably clean cover consisting of Topsoil (minimum 150mm) and Subsoil is placed including a demarcation layer or a 100mm thick hard dig layer to mitigate the risk of asbestos fibres in the Made Ground.

### *Controlled Waters*

No specific remedial measures are required with respect to controlled waters.

#### *Permanent Ground Gasses*

The site has been classified as being in CS1 and gas protection measures are not required at the site.

#### *Watching Brief and Regulatory Compliance*

A watching brief is recommended during future ground works for any previously unseen contamination. If identified, work should cease in that area and advice sought from Groundtech Consulting Limited.

### **2.10 Geotechnical**

The most suitable foundations for the proposed development are considered to be piles transferring loads to the underlying medium dense to dense Sands. Suspended floor slabs should be adopted at the site due to the compatibility with the proposed pile foundation solution and depth of Made Ground.

Three soil percolation tests were undertaken at a single location and the use of SuDS drainage is considered feasible within the natural Sand deposits where good soil infiltration rates have been calculated.

Five plate load tests have been undertaken across the site and CBR values for the underlying Clay ranged between 1.6% and 5.4%. Proof rolling of the subgrade will be required as a minimum.

#### *Constraints*

A high-pressure gas main is present in the north east of the site which has been located by slit trenches carried out in a previous investigation by RoC Consulting. An easement will be required around the gas main.

### 3.0 POLLUTION LINKAGE ASSESSMENT REVIEW

The following section summarises the revised pollution linkage assessment undertaken in the Groundtech Consulting Geo-Environmental Appraisal.

#### 3.1 Human Health

| Receptor                         | Level of Risk   | Comments                                                      |
|----------------------------------|-----------------|---------------------------------------------------------------|
| <i>Site End Users</i>            | <i>Low</i>      | <i>No elevated concentrations of CoC recorded.</i>            |
| <i>Site End Users (Asbestos)</i> | <i>Moderate</i> | <i>Does not fall under CAR2012 but some measures required</i> |

#### 3.2 Controlled Waters

| Receptor                       | Level of Risk   | Comments                                   |
|--------------------------------|-----------------|--------------------------------------------|
| <i>Secondary A Aquifer</i>     | <i>Low</i>      | <i>Mobile contamination not identified</i> |
| <i>Hollins Brook 91m south</i> | <i>Very Low</i> | <i>Mobile contamination not identified</i> |

#### 3.3 Groundworkers

The following risks were revised by Groundtech Consulting:

| Receptor           | Level of Risk          | Comments                         |
|--------------------|------------------------|----------------------------------|
| <i>Contractors</i> | <i>Moderate to Low</i> | <i>During construction phase</i> |

## 4.0 REMEDIATION PROPOSALS AND APPRAISAL

Remediation will be undertaken to ensure the site is suitable for its proposed commercial end use which comprises the construction of a new office building and MUGA pitch.

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 commercial end use and adhere with the General Requirements set out in *Appendix 2*.

Remediation works will need to be completed in accordance with the 'CL:AIRE Definition of Waste Development Industry Code of Practice, 2<sup>nd</sup> Edition', where relevant. The contractor will need to write an appropriate materials management plan (MMP) and provide a 'Qualified Person' (QP) declaration where relevant. The remediation works will aim to maximise the reuse of soils on site and minimise offsite disposal.

The following phased remediation works will be undertaken to deliver the site suitable for the defined commercial 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*:

- *Installation of a cover system together with a demarcation barrier or a hard dig layer in areas of soft landscaping.*
- *Disposal of excess or unsuitable soils.*
- *Materials management comprising excavation, screening and reuse of suitable material.*

- *Management of asbestos fibres in soils*
- *Hand picking of Asbestos Containing Materials (ACMs), if observed.*

#### **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.*
- *Watching brief for any asbestos containing materials (ACM).*
- *Appropriate mitigation measures (by suitably trained operatives) during excavation, processing, screening and placement of Made Ground soils to remove any identifiable ACM and mitigate the risks of asbestos fibres becoming airborne.*
- *Placement of piling mat.*
- *Offsite disposal of unsuitable or excess material.*
- *Validation during the enabling works.*
- *Reuse of appropriate soils and materials management of soils.*

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.*
- *Placement of piling mat.*
- *Placement of clean validated subsoil/topsoil over a demarcation membrane/hard dig layer in areas of 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.

#### **4.5 Phasing of Works**

Phasing of the works will be discussed and agreed between the contractors, supervising consultant and the client. The contractor is to liaise with the client to ensure the details of each phase are clearly understood. The activities attributed to each phase are discussed in the following section.

## 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 commercial 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). Particular attention should be paid to the gas main in the north east of the site and the required easement should be set out.

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. Any surface vegetation shall be stripped from all areas prior to trafficking with heavy plant and the surface vegetation is to be chipped and stockpiled.

Any topsoil should be stripped and stockpiled.

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/browsers 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 Re-use*

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, etc. The gas main that crosses the north east of the site should not be disturbed and the required easement should be implemented.

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.

The enabling works contractor shall inform the consultant after each area is exposed so that they may attend and witness the excavation. The enabling works contractor shall survey to Ordnance Survey Grid the base and sides of all excavations and will provide a composite base of excavation drawing for reference during the works, and as built records.

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

The 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 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.

#### *Activity E3 - Asbestos Mitigation*

Asbestos fibres are present within the Made Ground and the enabling works contractor shall assume asbestos may be found in all Made Ground soils.

The Principal Contractor must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement. All work is to be undertaken in accordance with the site-specific asbestos management plan.

The enabling works contractor shall have in place at the start of the contract, work procedures designed to ensure the contractor is working in full compliance of all Health and Safety requirements (including, but not exclusively CAR 2012) and that control measures in place are sufficiently robust to prevent release of airborne asbestos fibres into the surrounding environment.

Appropriate mitigation measures (by suitably trained operatives) will need to be designed and put in place by the contractors during excavation, processing, screening and placement of Made Ground soils to remove identifiable ACM and mitigate the risks of asbestos fibres becoming airborne.

The remediation works are designed to break the pollution linkage with regards to contaminants within the soil. Whilst appropriate measures are required for all contaminants present, the enabling works contractor shall note the additional details provided in *Appendix 2 'General Requirements'* with regards to asbestos in soils.

Task specific risk assessments and method statements shall be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and if required RPE shall be provided and utilised.

With regards to the excavation of soils and as far as reasonably practicable, the removal of gross ACM is required. It should be noted that:

- *In accordance with CAR 2012 (Regulation 16) there remains a duty of the Contractor to 'prevent or reduce the spread of asbestos anywhere where work is being carried out under their control'. Where complete prevention is not reasonably practicable (this would constitute such a case), the regulation requires the Contractor to reduce to the lowest level reasonably practicable the spread/potential for fibre release of asbestos from any place where work under the Contractor control is carried out.*
- *CAR 2012 notes that the Contractor should select and use work methods that will reduce the disturbance and release of asbestos fragments and fibres to minimise the risk of spread, e.g. by removing items intact or whole and by using dust suppression techniques. ACM must never be left loose or in a state where they can be trampled on or spread. All asbestos waste should be bagged or wrapped promptly after removal and the waste should be removed from the work area regularly.*
- *Where enclosures cannot be used, the Contractors risk assessment should establish what will be required to make sure that, as far as is reasonably practicable:*
  - *Spread of asbestos is prevented (airborne fibres and asbestos in soils).*
  - *People not involved in the work are excluded from the area.*
  - *Work area is totally cleaned after work is completed.*
- *For the proposed activities, release fibres could occur through excavation of soils containing gross ACM and placement of soils containing gross ACM. It is reasonably practicable for visible 'gross'/highly fibrous materials to be handpicked and doubled bagged at the point of excavation. As this material has then been removed and the potential to liberate fibres on the second activity (placement) has therefore been alleviated or reduced to as low a level as reasonably practicable.*
- *Hand picking of gross ACM is required during excavation and placement activities to ensure that as far as reasonably practicable all visible gross ACM has been removed.*

It is recommended that all staff undertaking the hand picking must be suitably qualified to handle licenced ACM. The Contractor is to confirm the qualifications and the suitability of staff prior to commencement. Asbestos Awareness is not an appropriate level of competency to pick licenced ACM.

The working method, including task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing.

Appropriate monitoring, PPE and RPE should be provided and utilised. The working method shall be provided to Groundtech Consulting and the client for comment two weeks prior to commencement on site.

All ACM shall be placed in a dedicated covered and lockable skip prior to off-site disposal to a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified contractors and in accordance with CAR 2012.

Air monitoring for asbestos is required on an ongoing basis during the enabling works as set out in the asbestos management plan, and the results shall be compared with acceptable maximum standards set by the HSE. These air monitoring procedures and limits are given in HSG 248 entitled 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and CAR 2012. The monitoring should be undertaken by a UKAS accredited laboratory. The limit used is governed by the levels stated in the above guidance documents and the accuracy of the testing used. The most stringent limit set by the HSE should be adopted. Air monitoring results are acceptable only if they fall below this limit and are as low as reasonably practicable. Exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

#### *Activity E4 - Reuse of Soils and Placement of Soils*

Excavation and reuse of soils will be minimised by using displacement piles for foundations.

Reuse of soils will need to be undertaken in accordance with the Contaminated Land: Applications In Real Environments (CL:AIRE) document: 'The Definition of Waste: Development Industry Code of Practice' (Version 2) (CoP), dated March 2011.

The supervising consultant or enabling works contractor is responsible for producing a MMP signed off by a QP where required. For further details with regards to materials management, please refer to Section 8.0.

If the material is not suitable for use, the enabling works contractor is to remove and dispose of it in accordance with the Remedial Specification.

#### *Activity E5 - 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 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 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 their 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 verification report.

#### *Activity E6- Validation Criteria During Enabling Works*

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

### **Testing**

Soils across the site have been tested during the Groundtech Consulting investigation. 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 enabling works 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'.

All testing should be undertaken at a laboratory which holds UKAS and MCERTS accreditation for the specific tests.

### General Reuse

For soils proposed for general reuse - no free phase contamination, deleterious material or ACMs should be present. The visual requirements are to be confirmed by the watching brief by a suitably qualified geo-environmental engineer.

#### *Activity E7 - Enabling Works Contractor's Records*

The enabling works contractor shall maintain a daily written and photographic record of the works undertaken.

All reports provided by the enabling works contractor shall be available to the Client and Groundtech Consulting for comment along with all geo-environmental data.

### 5.3 Construction Phase Implementation

The construction phase of works will be undertaken by a separate Contractor, referred to as the ground works contractor.

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.*
- *Placement of clean validated subsoil/topsoil over a demarcation membrane/hard dig layer in areas of soft landscaping.*

#### *Activity C1 - 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. Depending on the findings of the enabling works phase remediation, asbestos air monitoring may be required during groundworks to ensure fibre release is below relevant limits.

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.

Reuse of soils excavated by the contractor will need to be undertaken in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice.

#### *Activity C2 - Installation of the Cover System in areas of Soft Landscaping*

A clean cover system is required in areas of soft landscaping 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 (cohesive and granular) to establish they are suitable for use.
2. In areas where trees are planned as part of the landscaping the cover system should be increased to allow for the root ball. The dimensions of the tree pit (if required) are to be specified by a qualified arboriculturist in general accordance with the standard depths of 450mm for grass, 600mm for shrubs and 900mm for trees. Consideration should be given to ensure that the cover system or the health of the trees/shrubs are not compromised during the design.
3. Validation 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                                                                                                                                                                                                                                                                         |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soft landscaped areas | 600mm of inert growing medium consisting of Topsoil and Subsoil (inclusive of between 150mm and 300mm of topsoil in accordance with BS 3882:2015 overlying Subsoil at a thickness that makes up a total of 600mm) above a contamination demarcation barrier or 100mm hard dig layer. |

### Sourcing of Material for the Cover System

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.

### Physical Requirements of Cover System Soils

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.

The imported material is to be confirmed by visual inspection of the material by the consultant. Topsoil and subsoil should 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.

Imported subsoil should generally comply with the requirements of BS 8601.

### Geo-Environmental Requirements of Cover System Soils

Geo-environmental testing will also be required once the material arrives at site to confirm the soils imported are the same as those sampled at the donor site.

1. *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.*
2. *If the source of the material is not natural, geo-environmental testing should be undertaken at a rate of one test per 100m<sup>3</sup>, with a minimum of six tests to be undertaken on any individual source material.*

With regards to imported granular soils (Type 1/6F2 etc.), the results of geo-environmental testing are to be compared with the following text. 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.

With regards to imported soils proposed for use as part of the cover system, the results of geo-environmental testing are to be compared with the criteria presented in *Appendix 4*. Based on the site being developed with a gym, café and outdoor MUGA pitch and paddle courts, residential without plant uptake screening values have been used. 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 of Concern:

- *Arsenic, Cadmium, Chromium (total and hexavalent), Copper, Mercury, Nickel, Lead, Selenium, Zinc, and pH.*
- *Speciated Polycyclic Aromatic Hydrocarbons and organic matter.*
- *Asbestos screening.*

## **6.0 EARTHWORKS**

### **6.1 General**

The topography of the site generally level and an earthworks programme in the form of cut and fill is unlikely to be required.

### **6.2 Site Won Material and Suitability Testing**

If required, to inform the earthworks design, the materials generated should be classified using the Specification for Highways works.

### **6.3 Validation Testing**

At each layer testing should be carried out to confirm the properties of the filled soils including whether specified maximum dry density has been achieved. Testing should include sand replacement tests and plate load testing. These tests should be carried out varying depths as the fill materials are placed to ensure they have been compacted sufficiently.

A comprehensive surveying programme should be in place during the earthworks so levels of tests and finished levels are accurate.

## 7.0 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 and Environment Agency 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.

### 7.1 Site Supervision

The enabling works 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.

### 7.2 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.

All samples shall be scheduled on chain of custody forms prior to being dispatched to the UKAS accredited laboratory for analysis.

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

### 7.3 Verification Report

On receipt of the records from the contractor, to demonstrate that all of the works have been undertaken in accordance with the Remedial Specification, Groundtech Consulting will provide a Verification Report. This shall specifically include supporting information as summarised below:

- *Details of methodology and programme.*
- *Decision records covering agreements with regulators.*
- *Records of works undertaken and associated validation/monitoring records obtained from the contractor as detailed above.*
- *Records of any ACM encountered during the works (type location and action).*
- *Approximate quantities for all materials removed from the site.*
- *Waste classification and management documentation, including copies of all consignment notes, in particular those relating to the hazardous waste regulations, details of waste facilities where materials were disposed of.*
- *As built drawings.*
- *Final status of remediation and confirmation of remedial objectives to satisfy the planning conditions.*

#### 7.4 Cover System

Verification of 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 the requirements set out in Activity C3.*
- *Confirmation that the geo-environmental test results pass when compared to the appended RTVs.*

Cover system validation will be undertaken in general accordance with YALPAG guidance.

## 8.0 REUSE OF SOILS AND MATERIALS MANAGEMENT

### 8.1 Waste Management Background

The contractors are responsible for writing and ensuring all works are undertaken in accordance with current legislation.

### 8.2 Certainty of Use and Quantity of Material

There will be an opportunity to reuse soils at the site following excavation, any excess or unsuitable soils will be disposed of.

The following excavation and placement are proposed during the construction works:

- *Excavation of foundations.*
- *Excavation of drainage runs.*
- *Placement of piling mat.*
- *Placement of clean natural soils for use as Subsoil and Topsoil in soft landscaped areas.*

Only materials deemed suitable for use by an appropriately qualified person will be utilised on site. Any out of specification material (geo-environmental and geotechnical) obtained from the site, which is not deemed suitable for use, will be classified as waste and will be disposed of or recovered in accordance with waste legislation.

Material re-used or imported to site will be subject to the necessary testing/review and comparison to this Remedial Specification prior to delivery to site to minimise the risk of the importation of unsuitable material. Any material deemed unsuitable upon arrival at the site will be rejected.

Only sufficient material required on site for the purposes of raising levels in accordance with the pre-determined proposals (planning conditions and drainage strategy) will be imported or reused on site. Any surplus material or material which does not meet the required specification will be disposed of offsite. It is the responsibility of the contractor at each stage of the works to have checked all volume calculations and have allowed for disposal of unsuitable or excess materials.

### 8.3 On Site Material Management

#### *Stockpiles*

Site won material for potential reuse will be stored on site in stockpiles. The stockpiles are to be managed by the contractors during the relevant phases of work and will be subject to operational constraints at the time of stockpiling.

Stockpile locations will be clearly marked and documented on working drawings maintained in the site office.

The contractor for each phase of works is to take appropriate mitigation measures and environmental precautions as considered necessary at storage locations. However, as a minimum, stockpiles should be compacted to prevent dust and they should be kept wet in periods of dry weather.

Stockpiles of contaminated material or suspected contaminated material should be placed on an impermeable membrane and covered to prevent cross-contamination and leaching of contaminants.

*Confirmatory Testing for Material for Offsite Disposal*

Any material requiring disposal during any phase of works shall be disposed of by the contractor. They shall ensure adequate and appropriate disposal, including testing to satisfy the proposed waste facility.

Records of the removal of stockpiles offsite should be maintained by the contractor including details of the disposal or treatment site to which they have been taken. These details are to be passed to Groundtech Consulting to form part of the verification report.

Appropriate precautions should be taken by the contractor to ensure that the stockpiled material does not result in risks to neighbouring land users.

*Confirmatory Testing for Imported Material*

Imported soil will be tested to determine it is suitable for use.

The contractor importing the material is to provide laboratory testing results to Groundtech Consulting to prove the suitability of the material to be brought on to site in line with the requirements specified in this Remedial Specification. When the soils are present on site, additional testing will be undertaken.

## 9.0 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.

A report will be prepared by Groundtech Consulting and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.

If additional materials are identified, these materials will be subject to the procedures stated in this Remedial Specification

## APPENDIX 1 - Plans



|                                                  |                        |               |      |         |             |                                                                              |
|--------------------------------------------------|------------------------|---------------|------|---------|-------------|------------------------------------------------------------------------------|
| <div>GROUNDTECH<br/>CONSULTING</div> <div></div> | CLIENT                 | DATE          |      |         | Status      | <div>Notes</div> <div><div><div></div></div><div>- Site Location</div></div> |
|                                                  | JD SPORTS              | JANUARY 2022  |      |         | Preliminary |                                                                              |
|                                                  | PROJECT TITLE          | SCALE         |      |         | Draft       |                                                                              |
|                                                  | NEW OFFICE BLOCK, BURY | NTS           |      |         | Issued      |                                                                              |
|                                                  | PLAN TITLE             | PLAN NUMBER   |      |         | For Comment |                                                                              |
|                                                  | PROJECT LOCATION PLAN  | GRO-21438-P01 | Rev. | Details | Date        | Approved                                                                     |



## 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.

### 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):

- *ASB NNLW1 – Notification of non-licensed asbestos work if the work is deemed not be requiring a licence (if required).*
- *Appropriate licence with regards to CAR 1012 if the work is deemed to require a licence.*
- *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.*
- *Background and ongoing air dust monitoring to be undertaken to check for presence of asbestos fibres during the works.*
- *Licensed asbestos contractors are employed to manage the licensed asbestos-controlled areas, all other operatives involved in the operations must have appropriate training to satisfy the requirements of the Control of Asbestos Regulations 2012.*

#### **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 9.00 am 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 10 mph 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. Unexploded Ordnance (UXO)

The site is not in an area which is considered to be a risk with regards to UXO.

## 10. 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.

## 11. 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.

## **12. 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.

## **13. Contamination**

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

Safe working procedures should be implemented in accordance with CIRIA132 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.

## **14. 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 10 mph. 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 bowsters 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 bowsters 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.

## 15. Asbestos in Soils

The Contractor must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement.

The remediation works are designed to break the pollution linkage with regards to contaminants within the soil. Whilst appropriate measures are required for all contaminants present, the Contractor should note the additional details provided below with regards to asbestos in the soils:

- *Asbestos is a hazard to Human Health when airborne fibres are inhaled. Asbestos containing material (ACM) that is in a bound form (such as asbestos cement tiles) is not hazardous where the asbestos fibres cannot become airborne. However, if lagging is present or the ACM is broken or crumbled in a dry condition the asbestos fibres could become airborne and could then be inhaled. When soil with asbestos is covered by hardstanding, buildings or a cover of clean soil or when the soil is kept damp, the asbestos fibres are less likely to become airborne and the risk is greatly reduced.*
- *The Health and Safety at Work Act 1974 forms the basis of health and safety legislation in the UK. In addition, the Control of Asbestos Regulations 2012 (CAR 2012) applies throughout the UK. CAR 2012 applies if land has significant asbestos content and is relevant to any work conducted on asbestos contaminated land.*
- *CAR 2012 defines a “control limit” of 0.1 fibres per cubic centimetre of air averaged over a continuous period of 4 hours. This limit is not risk based and may be much higher than the levels for control of environmental pollution.*
- *CAR 2012 applies even where exposure to asbestos of employees is sporadic and of low intensity and where exposure to asbestos of any employee will not exceed the control limit. The work must be of short non-continuous activities where non-friable materials are handled, or removal without deterioration of non-degraded materials in which asbestos fibres are firmly linked in a matrix.*
- *Lagging, broken fragments of asbestos and loose fibres have the potential to release airborne fibres in dry conditions. In addition, as the ACM and asbestos fibres have been contained in the soil for many years, the likelihood is that they would be degraded to some extent. However, the asbestos fibres detected at the site are within a soil matrix and if this is kept damp, this should assist in minimising the risk of the release of airborne fibres.*
- *The contractor should determine whether the works being undertaken would be exempt from CAR 2012 licensing requirements.*

It should be noted that information presented in this document is provided to assist in managing the soil at the site which contains asbestos. It is the responsibility of the contractor how the control measures associated with these risks are implemented and recommend that an appropriate asbestos specialist assist with both the preparation of documents and licences and site supervision.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and if required RPE should be provided and utilised.

Visible fragments of suspected asbestos containing materials on the site surface shall be handpicked. Hand picking needs to be undertaken in accordance with an Environmental Permit and ACM shall be placed in a dedicated covered and lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified contractors and in accordance with CAR 2012.

## **16. 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, appropriate the Contractor is to undertake (at their cost) appropriate remedial action as soon as possible.

## **17. 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. The gas main that crosses the north east of the site should be set out accurately as well as the required easement which should be maintained during the works.

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.

## **18. 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.

### **19. 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.

### **20. 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 general accordance with current risk assessment 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 Appraisal have identified that the key risk drivers requiring remediation are:

- *Asbestos fibres and possible ACM within the Made Ground.*

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.

Ground gas risks and potable water pipelines are not discussed in the Remediation Options Assessment as they are mitigated by measures outlined by 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 soft landscaped areas.*
- *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 Material)*

This method involves the excavation of soils, determining their suitability (both chemically and geotechnically) and replacement as part of an earthworks programme.

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.

To prevent the contaminants being exposed in the future, specific measures can be implemented. Planning the works to ensure any potential Contaminant of Concern are placed at depths where the risk of future contact is low and the locations are surveyed in and the located is clearly recorded. As long as the cover system is installed in accordance with current guidance, it will be robust and the site will not pose a risk to future site users.

As the exercise is predominantly earthworks, 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 is 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 | Relative Cost | Relative Operational Time | Comments (Practicality/Sustainability/Durability)                                                                                                                                                              | Feasibility (Y / N)                                                             |
|-------------------------------------|-----------------------|---------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <i>Cover System</i>                 | Y                     | £             | Weeks                     | <i>Will break pollution linkage between future site users and asbestos in Made Ground soils.</i>                                                                                                               | <i>Y – Any ACM present should be removed to allow compliance with CAR 2012.</i> |
| <i>Excavation and Disposal</i>      | Y                     | £££+          | Weeks                     | <i>Will effectively remove the source of the contamination.<br/>Not a sustainable option.<br/>Disposal to be minimised as much as possible by re-use of appropriate soils, disposal of hotspots an option.</i> | <i>Y – in conjunction with other technologies.</i>                              |
| <i>Materials Management (Reuse)</i> | Y                     | ££            | Weeks to months           | <i>Pollution linkage will be removed by placing beneath cover system.</i>                                                                                                                                      | <i>Y - Any ACM present should be removed to allow compliance with CAR 2012.</i> |

## 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.

