

GROUNDTECH
CONSULTING

OLD MILL STREET, NEW ISLINGTON

REMEDIAL SPECIFICATION

ZERUM

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Plan Reference	*Revision*	*Title*
GRO-24102-P01	-	*Project Location Plan*
GRO-24102-P03	-	*Exploratory Hole Location Plan*
GRO-24102-P05	-	*Soil Contamination Plan*
2450-GHA-ZZ-ZZ-DR-A-(05)012	-	*Site Block Plan - Proposed*

1.0 INTRODUCTION

1.1 Background

This Remedial Specification has been produced on behalf of Zerum and relates to the remediation of a site at Old Mill Street in Manchester.

The site formerly formed part of a machine works with a rectory and housing also present in the north and east of the site. Following this, the buildings on site were shown to be part of Mill Street Textile Engineering Works, later relabelled as works. Since this, the site has been utilised as a car park. A summary of the findings of the investigations is outlined in *Section 2.0*.

1.2 Proposed Works

Remediation will be undertaken at the site to prepare it for development of the residential development as shown on the proposed site plan on Drawing *2450-GHA-ZZ-ZZ-DR-A-(05)012*. It is proposed to construct a six-storey structure comprising of 40 No. apartments. A commercial space is proposed at ground floor level and associated features such as soft landscaping, cycle parking and supporting infrastructure is proposed on the site.

One Heritage PLC have submitted a planning application which is currently under consideration by Manchester City Council. This Remedial Specification has been commissioned to facilitate the discharge of any pre-commencement planning conditions that are likely to be enforced with regard to land contamination.

1.3 Objectives

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

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

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

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:

- *Wardell Armstrong Phase 1 Desk Study referenced GM12676-002-V2.0, dated November 2023*
- *Groundtech Consulting Geo-Environmental Appraisal referenced GRO-24102-5182, dated June 2024*
- *Groundtech Consulting Permanent Ground Gas Risk Assessment referenced GRO-24102-5578, dated July 2024*

2.0 CONCEPTUAL SITE MODEL

2.1 Site Details

The site is rectangular in shape and approximately 0.06 hectare in area. The topography of the site is consistently flat as it has been previously levelled for use as a car park, consisting of thirty two car parking spaces. The surfacing of the site comprises crushed tarmac and limestone gravel. Black hoarding bounds the north, west and eastern perimeters of the site. The south east of the site is unbounded for access to the site. Four concrete boulders are present along the southern boundary. A circa 0.5m high wooden fence is located down the centre of the site running north to south.

2.2 Site History

Earliest historical records from 1848 indicate the site was undeveloped. In 1891, a machine works was shown on the south of the site, a rectory was present in the north west and terrace housing were indicated on the eastern boundary. Maps from 1931/32 show the buildings on site and immediately south of the site as Mill Street Textile Engineering Works and was then relabelled as works in 1965.

Significant industrial development is shown in the surrounding area including a brickfield, coal yard, mills, foundry, iron works and brewery.

2.3 Consultations

The following environmental information was identified through the Wardell Armstrong Phase 1 Desk Study:

- *The site is not within an area requiring radon protective measures.*
- *There are 5 licensed pollutant releases within 500m of the site, the closest being 249m north east at Phoenix Mill for Di-isocyanate processes.*
- *Several historical waste sites within 500m of the site relating to Wastepaper Works and Scrapyards, the closest being c.74m south east of the site.*
- *Several waste exemptions within 500m of the site, Ancoats Dental Practice for sorting and denaturing of controlled drugs for disposal 9m north east.*
- *Several licensed discharge to controlled waters within 500m of the site, the closest being historic for Soho Works c.138m south west of the site relating to miscellaneous discharges to Ashton Canal.*
- *Several pollution incidents within 500m of site, the closest being 99m south east in 2002 which had a minor land impact from the pollution of commercial, construction and demolition waste.*
- *An electrical substation is located on site.*

2.4 Geology and Hydrogeology

Made Ground is not indicated to underly the site, however is likely to be present due to previous developments on the site.

The superficial deposits underlying the site are indicated to be Glacial Till - Devensian which is classified as a Secondary Undifferentiated Aquifer.

The solid geology underlying the site is indicated to be the Manchester Marls Formation comprising Mudstone which is classified as a Secondary B Aquifer. The Collyhurst Sandstone Formation encroaches onto the east of site.

The site is not indicated to lie within 500m of a Source Protection Zone and there are no groundwater abstraction wells within 500m of the site.

Hydrology
The nearest surface watercourse is the Ashton Canal running east to west and is located approximately 63m south east of the site.

2.5 Preliminary Conceptual Site Model

The following risks were identified by Wardell Armstrong:

Receptor	Risk	Discussion
Risk to Human Health	*Moderate*	*Made Ground is likely to be present on site associated with historic developments and their demolition which could be contaminated with a range of CoC. The risk to Human Health was considered to be Moderate.*
Risk to Controlled Waters	*Moderate to Low*	*Unknown nature of Made Ground on site may be a source of mobile contamination. The risk to controlled waters was considered to be Moderate to Low.*
Risk from Ground Gas	*Moderate to Low*	*Made Ground is likely present beneath the site which could be a source of ground gas. Also several sources identified in the surrounding area. The risk from ground gases was therefore considered to be Low to Moderate.*

2.6 Ground Model

The following scope of works was undertaken by Groundtech Consulting between the dates of 13th May and 22nd May 2025:

- *Six Windowless Sample boreholes (WS01 to WS06) were drilled to a maximum depth of 4.5m begl using a Dando Terrier windowless sampling rig*
- *Ten machine excavated trial pits (TP01 to TP10) were carried out to a maximum depth of 3.65m begl*
- *Two cable percussive boreholes (CP01 and CP02) were drilled to a maximum depth of 19.5m begl*
- *Two rotary coring follow on boreholes (CP01 and CP02) were drilled 5.0m into the bedrock to a maximum depth of 25.5m begl*

Surfacing and Made Ground
The site was entirely surfaced by angular to subangular fine to coarse gravel of crushed tarmac and limestone to a maximum depth of 0.25m begl. Made Ground was encountered in all exploratory hole locations to a maximum depth of between 1.0m and 2.0m begl. The Made Ground comprised of both granular and cohesive populations with minor constituents of brick, ash, sandstone and concrete. Locally, Black ashy fine to coarse sand was encountered in TP01 between 1.3m and 1.45m begl in the south west of the site and yellowish brown sandy angular to subangular fine to coarse gravel of brick and sandstone was encountered locally to TP02 at depths of between 1.25m and 1.35m begl in the west of the site.

Natural Strata
The natural strata encountered generally confirmed the published geological records. Two main natural stratification encountered during the investigation and are described below:

1. *Firm to stiff grey brown sandy gravelly Clay in all exploratory hole locations at minimum depths of between 1.0m and 1.8m to a maximum depth of 12.0m bgl.*

2. *Dense brown gravelly fine to coarse Sand with minor constituents of mudstone and chert was encountered underlying the clay in CP01 and CP02 between 12.0m and 17.4m bgl.*

Bedrock
Extremely weak red brown Mudstone residually weathered recovered as brown slightly clayey sandy angular to subangular gravel was encountered in CP01 and CP02 at 17.1m and 17.4m begl respectively.

Rotary coring was undertaken from depths of 19.5m in CP01 and 18.0m in CP02 to depths of 24.0m and 25.5m bgl respectively. Extremely weak red brown Mudstone partially weathered with very close to closely spaced discontinuities was encountered to the base of the boreholes. Recovery was generally good after the first 1.5m of coring to the base of the borehole.

Groundwater
Groundwater was not encountered during the Ground Investigation.

Watching Brief
A watching brief was maintained during the Ground Investigation for any visual or olfactory evidence of contamination.

Ash was observed in the Made Ground of CP01, CP02, WS02, WS03, WS05, TP01, TP06 and TP07. Potential olfactory evidence of contamination was noted in TP02 between 1.35m and 1.5m begl where a sulphur odour was noted.

Obstructions
Evidence of a historic basement/foundation was encountered in TP03 in the north west of the site in the area of the former rectory, a brick wall was observed from ground level to 2.0m begl along the southern face of the trial pit.

Cobbles of brick and concrete were also encountered within the Made Ground across the site.

2.7 Geo-Environmental Testing Results

The following Geo-Environmental testing was scheduled for the site based on the observations made during the Ground Investigation and compared against residential (without plant uptake) screening values:

- *9 No. metals suites*
- *9 No. speciated Polycyclic Aromatic Hydrocarbons (PAHs)*
- *2 No. Total Petroleum Hydrocarbons (TPH CWG)*
- *9 No. asbestos screens*
- *3 No. asbestos quantifications*
- *2 No. Volatile Organic Compounds (VOCs)*
- *1 No. Semi-Volatile Organic Compounds (SVOCs)*

Metals
Elevated concentrations of Lead were recorded in TP07 to TP09 and WS05. A single elevated concentration of arsenic was recorded in WS05 at 0.3m begl and a single elevated level of Mercury was recorded in TP07 at 0.5m begl also within the Made Ground. The elevated concentrations of heavy metals are likely associated with the sites previous use as a textile and machine works.

Elemental mercury is considered volatile above the screening value of 1.2mg/kg and further testing is recommended potentially including speciated mercury testing to determine if there is a risk as the elevated concentration was recorded at 2.6mg/kg.

Speciated Polycyclic Aromatic Hydrocarbons (PAHs)
Elevated concentrations of Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene and Benzo(a)pyrene were recorded in the Made Ground of TP07, TP09 and WS03.

Some of the elevated concentrations are significant and are likely associated with the sites former use as a textile works, and also general Made Ground including ash deposited.

Total Petroleum Hydrocarbons (TPH CWG)
No elevated speciated hydrocarbons were recorded above residential without plant uptake screening values. All lighter range hydrocarbons were also recorded below the laboratory limit of detection. No sources of fuel derived hydrocarbons were identified by the Preliminary Risk Assessment.

Volatiles
VOCs and SVOCs were tested for in TP02 at 1.35m bgl due to the visual and olfactory evidence of contamination at this location. All VOCs were recorded under the laboratory limit of detection. All SVOCs were also recorded below the laboratory limit of detection with the exception of the speciated PAHs discussed above. This confirmed no significant impaction from the historic textile works.

PolyChlorinated Biphenyls (PCBs) may have been used in the electrical substation as a cooling agent situated on the north eastern corner of the site. It is still active and not possible to investigate the soils, due to the small scale any impact would be minimal and highly localised.

Asbestos
Asbestos was detected in TP07 at 0.5m, TP09 at 0.35m and TP10 at 0.4m bgl with a mass concentration of <0.001 mass%. No asbestos was identified in any of the other samples screened through laboratory testing. Therefore trace asbestos should be assumed to be present in the Made Ground beneath the site.

All elevated Contaminants of Concern (CoC) are presented on Groundtech Plan *GRO-24102-P05*.

Other Contaminants
Evidence of hydrated lime was recorded in the Made Ground of TP02 in the east of the site. The amount of oxidisable sulphates in TP02 at 1.35m begl is indicated to be 0.441%, therefore pyritic ground is indicated to be present within the Made Ground at this depth. No other evidence of this soil population was observed. To avoid increasing the concrete and sulphate classification, it is recommended this material is removed as part of the enabling works.

2.8 Ground Gas

Concentrations of methane were recorded in the standpipes to a maximum concentration of 8.4%v/v, the steady state and peak states were recorded at similar levels. Carbon dioxide (CO_2) concentrations were recorded within the standpipes at a maximum concentration of 13.4%v/v.

The site was classified as Characteristic Situation 2 (CS2) based on the typical maximum concentrations of both carbon dioxide and methane were recorded above the respective thresholds of 1.0%v/v for methane and 5%v/v for carbon dioxide and gas protection measures will be required in the proposed development.

2.9 Remedial Strategy

The following remedial strategy was outlined by Groundtech Consulting for the proposed development.

Soils
Due to the elevated concentrations of heavy metals and PAHs recorded in the Made Ground, and the asbestos fibres identified - a cover system comprising 600mm of suitable clean material inclusive of 150mm topsoil is required to mitigate against the risk. A 100mm hard dig layer or demarcation membrane should be placed below the cover system.

The hydrated lime should be removed during the enabling works and replaced with suitably clean material to prevent the concrete and sulphate classification being increased. The material should be stockpiled separately on a visqueen bunded area prior to removal. The validation can be undertaken visually due to its white putty like appearance.

Vapours
Further mercury testing is recommended, potentially including speciated mercury testing to determine the concentrations of elemental and methyl mercury to quantify the vapour risk. The risk is currently considered to be low, remedial action will depend on the findings of the additional testing.

Controlled Waters
No mobile contamination was noted during the Ground Investigation and remediation in relation to controlled waters is not required.

Ground Gas
The ground gas risk assessment has indicated that CS2 conditions prevail and gas precautions will be required as part of the proposed development. The recommended precaution measures are described below:

- *Gas Membrane*
- *Structural Barrier (Reinforced Floor Slab)*

The above precautions measures will provide 3.5 points which is the equivalent to CS3/4 protection measures and mitigate the risk from ground gas concentrations. The use of passive ventilation is also an option.

The site is not in an area where radon precautions are required.

2.10 Geotechnical

The most suitable foundations for the proposed development are considered to be pile foundations, the length of the piles will be dependent on the proposed loadings of the structure. A concrete structure was originally proposed, however a steel farmed structure may also be an option. If the latter is the case, there is the potential for oversize pads of Vibro Stone Columns (VSCs) to be utilised.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-2 and sulphate class DS-2 conditions prevail. In the area of TP02 in the east of the site, potential pyritic ground has been recorded in the Made Ground at 1.35m begl. It is recommended the hydrated lime is removed during the enabling works.

A suspended floor slab is required as greater than 600mm of Made Ground is present.

Where natural cohesive soils are encountered at the formation levels, CBR values of 2% to 3% are likely to be achieved in undisturbed natural soils for pavement design purposes. Untreated Made Ground should be assumed to have a CBR value of <2.5%, unless proven otherwise.

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
Site End Users (Soils)	*Moderate*	*Elevated levels of heavy metals and PAHs have been recorded in the Made Ground along with asbestos fibres at trace concentrations of <0.001 mass%.*
Site End Users (Ground Gas)	*Moderate to High*	*Ground gas monitoring results place the site in CS2 and gas protection measures are required.*

3.2 Controlled Waters

Receptor	Level of Risk	Comments
Groundwater	*Low*	*Groundwater is not considered to be a sensitive source and a significant thickness of impermeable Clay present.*
Surface water features	*Low*	*No significant contamination across site and significant attenuation distance present.*

3.3 Groundworkers

Receptor	Level of Risk	Comments
Contractors	*Low*	*Appropriate risk assessment and PPE to be used.*

4.0 REMEDIATION PROPOSALS AND APPRAISAL

Remediation will be undertaken to ensure the site is suitable for its proposed residential end use which comprises the construction of 6 storey apartment block comprising of 40 No. apartments. A commercial space is proposed at ground floor level and associated features such as soft landscaping, cycle parking and supporting infrastructure is proposed on the site.

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. ***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.*

3. ***Cover System Validation Report*** *which will validate the suitability and depth of cover system in soft landscaping areas.*

4. ***Ground Gas Validation Report*** *which will validate the suitability and installation of ground gas protective measures installed.*

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.

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, 2nd Edition', where relevant.

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

- *Site clearance including any vegetation clearance*
- *Break out of all hardsurfacing and below ground obstructions and processing for reuse*
- *Removal of hydrated lime material*
- *Further elemental mercury testing*
- *Reuse of appropriate soils and materials management of soils*

- *Asbestos control measures to contractors satisfaction*
- *Watching brief*
- *Offsite disposal of unsuitable or excess material*
- *Installation of pile mat*
- *Excavations for foundations*
- *Excavations for service runs and drainage*
- *Installation of correct level potable water supply pipe*
- *Placement of clean validated subsoil/topsoil in areas of gardens and soft landscaping*
- *Installation of approved ground gas protection measures within the building foundations*

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.

A verification report completed by the supervising consultant will be required to be submitted to the regulators for approval on completion.

4.2 Project Setup and Management

Prior to commencement of site activities, 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.

It is the responsibility of the contractors to have read and understood the requirements of the Remedial Specification. Any queries should be clarified prior to the activity being undertaken.

5.0 IMPLEMENTATION OF SITE REMEDIATION PROCESSES

5.1 General

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

5.2 Implementation

Activity 1 - Pre-Start and Site Clearance

The 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.

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

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

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

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

Activity 2 - Break out of Hardstanding and Below Ground Obstructions and Processing for Reuse

The site is currently surfaced by compacted crushed tarmac and limestone gravel which may require to be broken up during the enabling works. The Made Ground encountered across the site also included cobbles of brick and concrete. A historic brick wall was encountered in TP03 in the north west of the site to 2.0m bgl in the area of the former rectory. There is also likely to be other substructure beneath the site due to the previous developments.

The 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. High specification plant may also be required to break out the dense Made Ground encountered on the site.

Due to the small site, all substructure should be removed from site following excavation to a suitably licenced waste facility.

During excavations, the contractor will undertake additional visual inspection, with any additional plausible source-pathway receptor linkages identified 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 contractor shall state his methodology for ensuring this requirement.

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

Activity 3 - Removal of Hydrated Lime

Olfactory evidence of contamination was recorded in TP02 between 1.35m and 1.5m begl in the form of a sulphur odour. This material also comprised Made Ground of yellowish brown sandy angular to subangular fine to coarse Gravel which was not encountered anywhere else across the site and was considered to be hydrated lime.

Geo-Environmental and geotechnical testing of the material confirmed that the amount of oxidisable sulphates in this material is indicated to be 0.441% and pyritic ground is present, to avoid having to increase the concrete classification across the site, the hydrated lime material is required to be removed.

The material should be removed and stockpiled separately on a visqueen bunded area, prior to removal from site. The removal of the material should be validated through visual inspection due to its clear white putty appearance in order to confirm that all of the population of material has been removed from the ground.

Records of the removal should be provided to Groundtech Consulting for inclusion in the validation report.

Activity 4 - Further Mercury Testing

During the Ground Investigation, a single elevated concentration of mercury was recorded in the granular Made Ground in TP07 at 0.5m begl with a concentration of 2.6mg/kg compared to a screening value of 1.2mg/kg. Elemental mercury is considered to be volatile above the screening value of 1.2mg/kg.

Further testing is required to be carried out on the Made Ground through speciated mercury testing in order to confirm if elemental mercury is present at the site and determine if there is a volatile risk.

Activity 5 - Reuse of Soils and Placement of Soils

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

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

Activity 6 - Asbestos Control Measures

Asbestos fibres have been identified in three of the samples screened through laboratory testing at trace concentrations of <0.001 mass%.

Earthworks in the asbestos impacted Made Ground will fall under the requirement of the Control of Asbestos Regulations 2012 (CAR 2012). Under these regulations a plan of work and asbestos risk assessment must be prepared prior to work commencing.

The asbestos risk assessment will determine whether the earthworks constitute 'licensable work' (LW) or 'non-licensable work' (NLW). It is anticipated that the earthworks will be classified as NLW. The Health and Safety Executive (HSE) should be notified where required in accordance with CAR 2012.

The risk assessment should predict the expected exposure to asbestos caused by the working method and based on this detail the requirement for personal protective equipment (PPE), respiratory protective equipment (RPE), control measures, decontamination procedures, on-site facilities and air monitoring as required.

The Contractors staff undertaking the earthworks should be suitably trained for NLW, asbestos awareness training alone is not sufficient.

The contractor should undertake earthworks in the asbestos impacted Made Ground in accordance with their asbestos plan of work including fencing off the area to prevent unauthorised access and the appropriate warning notices displayed.

The asbestos detected in the Made Ground is fibres, where a mechanical excavator is being used in the asbestos impacted soils, appropriate controls and precautions should be adopted. The Made Ground should be sprayed and dampened down during the excavation works using water along with a surfactant.

In the event that ACMs are encountered during the earthworks, the work should cease in that area and investigated further including testing, the risk assessment and plan of work should be updated based on the results of the investigation/testing.

The asbestos containing soil should be documented in accordance with CAR 2012 to prevent inadvertent exposure to asbestos during subsequent planned disturbance of soils. The asbestos impacted soil should be documented in an asbestos management plan and supplied to other parties in the event of future construction or maintenance work.

The asbestos control measures should be to the satisfaction of the contractor.

Activity 7 - Off-Site Disposal of Unsuitable or Surplus Material

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material (i.e. the contractor) to form their own view on whether or not it is waste. This includes determining when waste has been treated in some way it can cease to be classed as waste for a particular purpose. Any soils to be removed from site are to be removed to a licensed waste management facility. The waste is to be taken by a registered waste carrier in accordance with applicable Waste Management Regulations.

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

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

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

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

Activity 8 - Installation of Pile Mat

Piles are to be installed for the proposed development due to the high loadings of the superstructure. A piling mat is required to be designed and placed prior to installation of the deep foundations.

Material for use in the piling mat will likely be imported to site and either left in-situ or can be constructed at a higher level and recovered is this is considered to be logistically possible.

Alternatively, it may be an option to stabilise site won material for use as a piling mat which will help with volumes of import and export.

The use of a geogrid within the working platform will also help reduce the thickness required.

Activity 9 - Watching Brief

A watching brief should be maintained for the duration of the works for visual or olfactory evidence of contamination. If identified, work should cease in that area and Groundtech Consulting consulted for advice and to revise the Remedial Specification, if required.

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.

Activity 10 - Validation Criteria During Works

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

Testing

All testing during the enabling works shall be undertaken by the contractor and all sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2020 'Code of Practice for Site Investigations' and BS 10175:2011+A1:2013 'Investigation of Potentially Contaminated Sites – Code of Practice'.

General Reuse

Soils proposed for general reuse should meet the following guidelines:

- *No visual contamination (oil staining etc.)*
- *Minimal deleterious material (organics, wood, metal etc.)*
- *No visible Asbestos Containing material (ACM)*

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

Activity 11 - Installation of Correct level of Potable Water Supply Pipe

The correct potable water pipework is to be installed by the contractor in accordance with local water company risk assessment. The works are to be validated by the contractor, who is to provide to Groundtech Consulting:

- *Provision of delivery tickets showing correct potable supply pipework has been delivered to site*
- *Photographic proof that the correct potable supply pipework (or similar) has been installed*

Activity 12 - Appropriate Materials Handling

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.

Activity 13 - Importation of Material

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.

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. Imported material 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.*

If the material is not from a supplier, it is recommended that testing is undertaken at the source to determine if the materials are likely to be suitable prior to import. 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.

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

Activity 14 - Installation of the Cover System in areas of Soft Landscaping

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

1. *Undertake geo-environmental testing and assessment of all imported soils (cohesive and granular) to establish they are suitable for use. Groundtech Consulting should be provided with the testing certificates prior to import and additional testing may be required.*
2. *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 arboriculturalist.*
3. *Install house drainage and other services and storing excavated clean soils appropriately for re-use in gardens.*
4. *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 Landscaping	*600mm of inert growing medium inclusive of a minimum of 150mm topsoil overlying a demarcation membrane.*

Physical Requirements of Cover System Soils

The imported topsoil and subsoil for the cover system should be as agreed with the client and where possible should conform to BS 3882:2015 and BS 8601:2013. It should be noted that clay soils are not recommended as they are likely to become waterlogged during handling and placement.

Testing of the imported material should be undertaken in accordance with the below in line with Manchester City Council guidance.

Type	Number of samples	Testing schedule
Virgin Quarried Material	*1 or 2 depending on the type of stone utilised*	*Standard metals/metalloids As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)*
Crushed Hardcore stone/brick	*Minimum 1 per 1000m^3*	*Standard metals/metalloids (As above) speciated PAH, Asbestos*
Greenfield Manufactured Soils	*Minimum of 3 or 1 per 200m^3 (whichever is greater)*	*Standard metals/metalloids (As above), speciated PAH, Asbestos*
Brownfield Screened Soils	*Minimum 6 or 1 per 150m^3 (whichever is greater)*	*Standard metals/ metalloids (As above), speciated PAH, TPH (CWG) Asbestos. Any additional analysis dependant on the history of the donor site*

Activity 15 - Ground Gas Protection Measures

The Groundtech Consulting Ground Investigation classified the site as CS2 and ground gas protective measures will be required in the proposed development.

As the site is to be developed with residential apartments, the building type is B and 2.5 points of protection are required. The 2.5 points can be achieved by a combination of two or more of the following three types of protection measures to achieve the required score:

Protection Measure	Details	Points of Protection
Structural Barrier/Floor Slab	Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetration	1.5
Ventilation Protection Measures	Passive sub floor dispersal layer of good performance	1.5
Gas resistant Membrane	Gas resistant membrane (including methane) meeting the criteria outlined in Table 7 of BS 8485:2020	2.0

It is recommended a membrane is installed and the floor slab will be a structural barrier, this will provide 3.5 points which is the equivalent to CS3/4 and will mitigate gas concentrations. The gas protection details are to be detailed by the architect or the Structural Engineer.

Gas protection is to be installed by the works contractor (or specialist contractor on their behalf). The ground gas protection should be installed with all due regard to best practice and guidance. Validation and verification will be undertaken by Groundtech Consulting to the required to the scope agreed with Manchester City Council.

6.0 SUPERVISION, VERIFICATION AND REPORTING

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

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

6.1 Site Supervision

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

6.2 Collection of Samples

All sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2020 'Code of Practice for Site Investigations' and BS 10175:2011+A2:2017 'Investigation of Potentially Contaminated Sites – Code of Practice'.

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

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

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

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

6.3 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 validation report.

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

This shall be based upon LCRM, and specifically will 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*
- *As built drawings*
- *Final status of remediation and confirmation of remedial objectives to satisfy the planning conditions*
- *Additional risk assessments/reactive works undertaken.*

The appropriate documentation will be forwarded to the client, for forwarding to the Local Authority.

6.4 Construction Phase Works Verification

Potable Water Supply Pipe Installation
It is the responsibility of the contractor to record photographic evidence of the installation of pipework. This photographic evidence is to be provided to Groundtech Consulting for inclusion in the Verification Report

Ground Gas Verification
Ground gas mitigation measures shall be installed by the works contractor in accordance with CIRIA 665 and BS:8485. Validation of ground gas membranes will be undertaken in accordance with CIRIA 735. The ground gas membrane validation sheet is provided in *Appendix 5*.

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 Section*
- *Confirmation that the geo-environmental test results pass when compared to the appended RTVs*

7.0 REUSE OF SOILS AND MATERIALS MANAGEMENT

7.1 Waste Management Background

For the enabling works, the works contractor is responsible for ensuring all works are undertaken in accordance with current guidance.

7.2 Certainty of Use and Quantity of Material

There is not likely to be an opportunity to reuse soils at the site following excavation due to the limited space. Any excess or unsuitable soils will be disposed of.

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 reused 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.

7.3 On Site Material Management

Stockpiles
There is very limited space on site and any material excavated will likely be removed from site straight away. Prior to removal the material should be stockpiled appropriately on site.

Confirmatory Testing for Material for On Site Reuse - Excavated Material
Any soils proposed for reuse have already been tested during the Ground Investigation.

Materials found to be out of specification should be disposed to a suitably licenced waste disposal facility.

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 material off site 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 validation report.

Confirmatory Testing for Imported Material
Imported soil will be tested to determine it is suitable for use in accordance with this specification.

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. Once the soils are present on site, additional testing will be undertaken.

8.0 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.

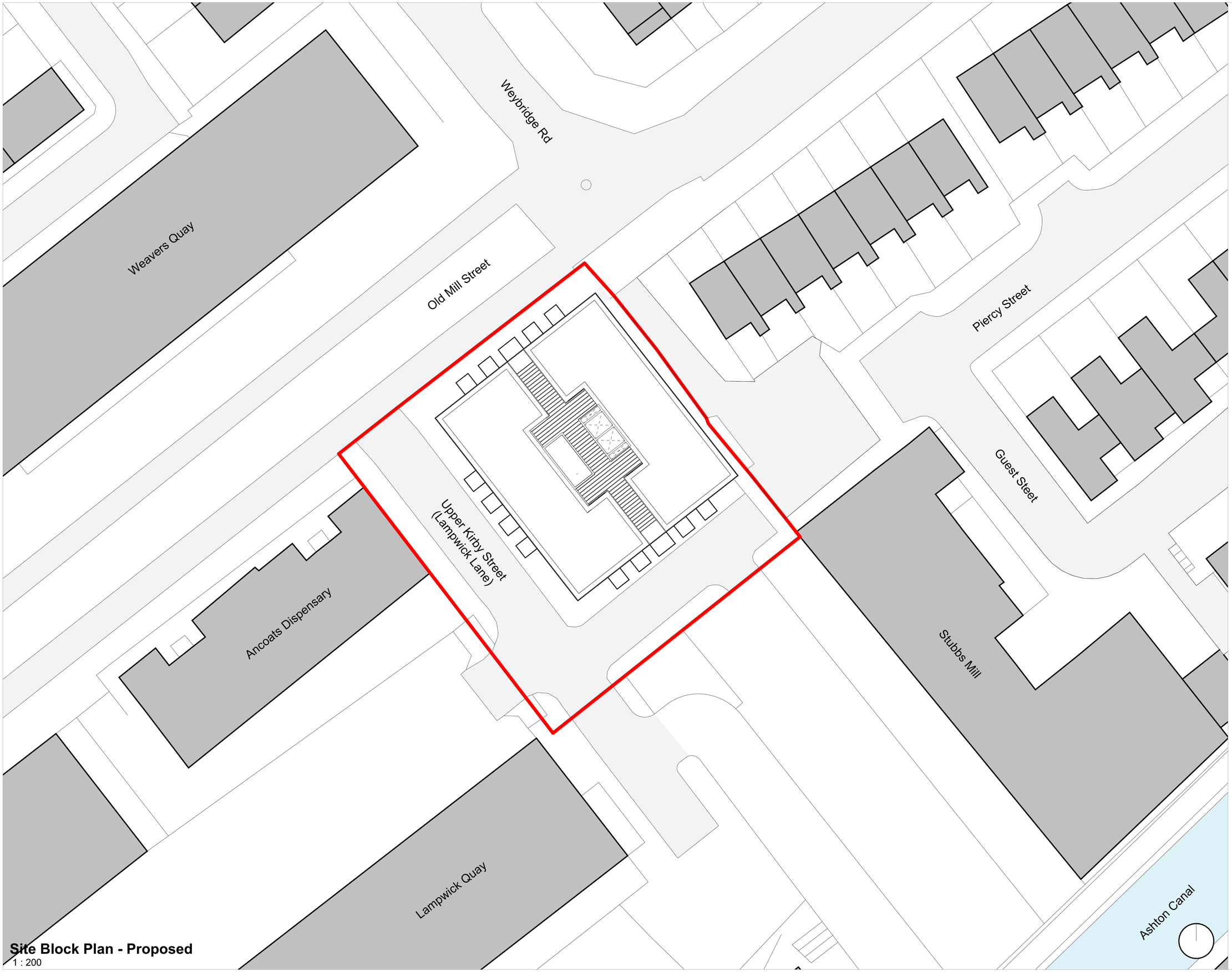
Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the requirement to report this to the client and Groundtech Consulting.

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.

As it is proposed to excavate, screen, sort, treat and where appropriate reuse the soils on site during a separate enabling works phase, the strategy will be less relevant to the construction phase of works.

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

APPENDIX 1 - Plans



Site Block Plan - Proposed
1 : 200

Notes & Key

DIMENSIONS NOT TO BE SCALED FROM THIS DRAWING. CONTRACTORS TO NOTIFY ARCHITECTS OF SITE VARIATIONS AFFECTING INFORMATION ON THIS DRAWING. THIS DRAWING IS COPYRIGHT OF GLENN HOWELLS ARCHITECTS.

The information shown is for the purpose of planning only.

The redline boundary shown is based upon OS information and is therefore indicative. Its precise location and relationship to Land Registry, land title and or land ownership information is subject to confirmation from the client, and or landowner. Glenn Howells Architects take no responsibility for the precise location of legal boundaries indicated on this drawing and advise that a separate drawing is created by a specialist survey in order to establish such ownership and or legal boundaries.

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Revisions

Date	Rev	By	Description
24/10/23		JB	Planning Issue

Location Key



DRAFT PLANNING

Project: Old Mill Steet
GHA No.: 2450

Client: Urban Splash

Drawing Title: **Site Block Plan - Proposed**

Drawing No.: **2450-GHA-ZZ-ZZ-DR-A-(05)012**
Revision:

Scale: Scale - 1 : 200@A1
Date: -
Checked: -

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GROUNDTECH CONSULTING

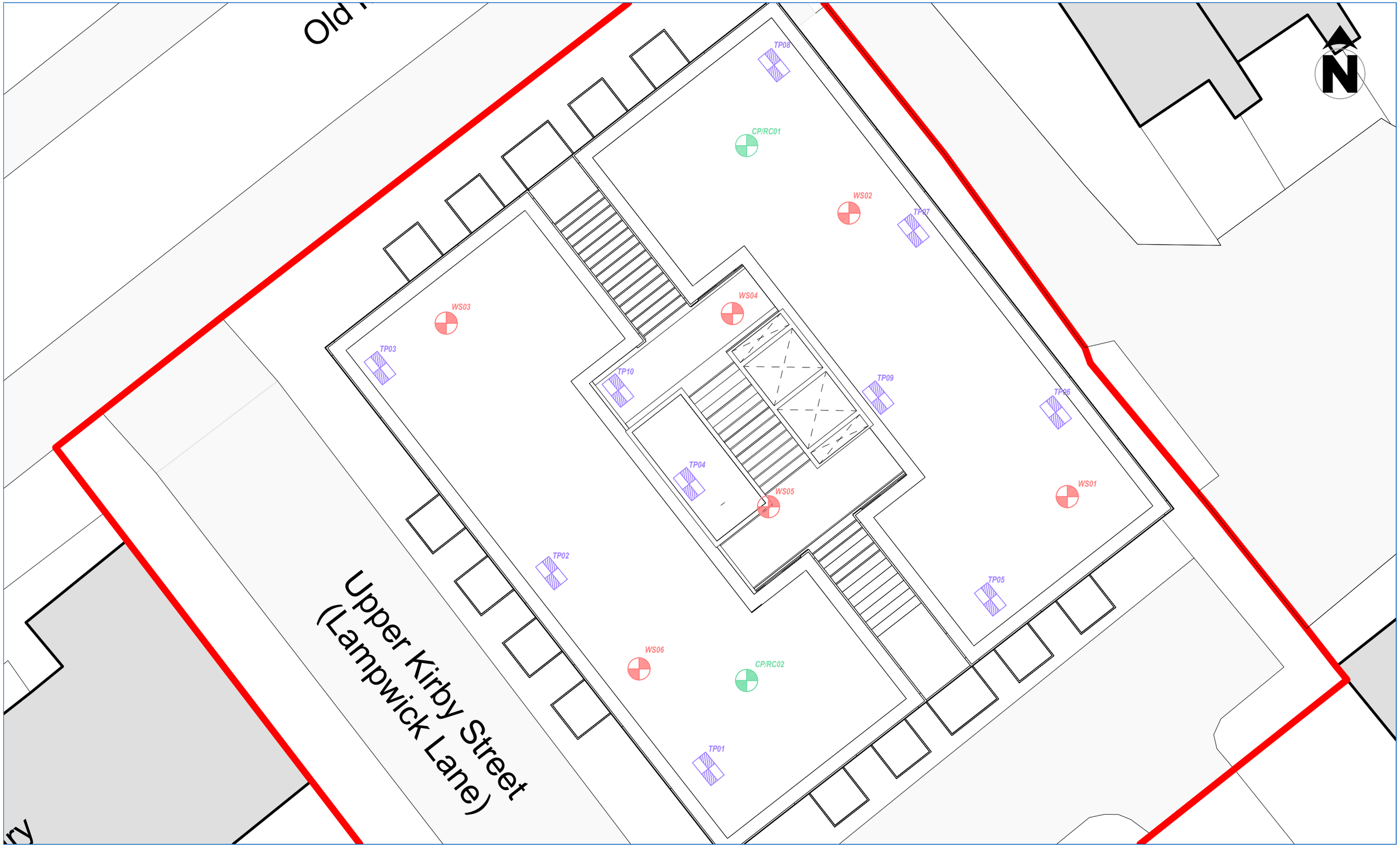
CLIENT	ONE HERITAGE LPC
PROJECT TITLE	OLD MILL STREET, NEW ISLINGTON
PLAN TITLE	PROJECT LOCATION PLAN
DATE	MAY 2024
SCALE	NTS
PLAN NUMBER	GRO-24102-P01

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

Site Location



GROUNDTECH CONSULTING

CLIENT	ONE HERITAGE GROUP PLC
PROJECT TITLE	OLD MILL STREET, NEW ISLINGTON
PLAN TITLE	EXPLORATORY HOLE LOCATION PLAN
DATE	MAY 2024
SCALE	NTS
PLAN NUMBER	GRO-24102-P03

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- Rotary Core/Cable Percussive Boreholes
- Window Sample Boreholes
- Trial Pit Locations



GROUNDTECH CONSULTING

CLIENT	ONE HERITAGE PLC
PROJECT TITLE	OLD MILL STREET, NEW ISLINGTON
PLAN TITLE	SOIL CONTAMINATION PLAN
DATE	JUNE 2024
SCALE	NTS
PLAN NUMBER	GRO-24102-P05

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- Rotary Core/Cable Percussive Boreholes
- Window Sample Boreholes
- Trial Pit Locations

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.

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), if required.*
- *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

Mobiles 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 tanks 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)

A preliminary UXO risk assessment carried out by Wardell Armstrong indicated that no further research was required for the site and there was no indication that the site was at risk from 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.

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.

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 bowsers 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 bowsers 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.

Trace asbestos fibres (<0.001 mass%) were recorded in three of the samples screened through laboratory testing.

A watching brief should be carried out during the enabling works for any evidence of ACMs.

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.

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 land owners. 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 Options Appraisal of LCRM 'Model Procedures for Management of Land Contamination'. 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 have identified that the key risk drivers requiring remediation are:

- *Trace asbestos fibres identified in three of the samples screened*
- *Possible volatile risk due to elemental mercury*
- *Hydrated lime material requiring removal*
- *Ground Gas risk classified as CS2*

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 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:

- *Effectiveness* - *the strategy must work within the context of the site and be effective in the removal of contamination linkages.*
- *Practicality* - *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.*
- *Durability* - *the strategy needs to be durable and not reliant on ongoing maintenance to continue being effective.*
- *Relative Cost* - *the strategy must not be excessive cost.*
- *Relative Operational Time* - *the strategy should work in a feasible and realistic time scale.*
- *Sustainability* - *more sustainable options are preferred.*

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:

- *Watching brief during works*
- *Installation of a cover system in soft landscaping areas*
- *Materials management, comprising excavation, screening, and reuse of suitable material*
- *Disposal of 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

This process can be carried out a low cost ensuring contaminated soils are at a greater depth or beneath proposed hardsurfacing. For this site, most of the material will be disposed of as discussed below.

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.

The technique can be combined with other remedial options such as reuse of general Made Ground.

The watching brief will enable olfactory/visual contamination to be identified and can be effective, this method is combined with the disposal of unsuitable soils.

Applicability of Remediation Options and Initial Assessment – Soils

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Effective on TPH	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Containment - Cover System	*Y*	*Y*	*Y*	*n/a*	*£*	*Weeks*	*A 600mm in soft landscaping areas overlying a demarcation membrane to mitigate against trace asbestos fibres and elevated metals and PAHs recorded during the Ground Investigation.*	*Y – In conjunction with materials management.*
Excavation and Disposal	*Y*	*n/a*	*n/a*	*n/a*	*££*	*Weeks to months*	*Excavation and removal of any below ground obstructions.* *Removal of hydrated lime material to avoid increase in concrete classification.*	*Y – in conjunction with materials management and watching brief.*
Containment - hydraulic barriers	*Y*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Containment - in ground barriers	*Y*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Soil flushing	*N*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Surface amendments	*Y*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Soil washing	*N*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Effective on TPH	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Hydraulic binders (such as cement)	*Y*	*n/a*	*n/a*	*n/a*	*££*	*Weeks to months*	*Not Required and not cost beneficial.* *Site won material may be stabilised for use as a working platform to help with volumes on site.*	*n/a*
Vitrification	*N*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Incineration	*N*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*
Thermal desorption	*N*	*n/a*	*n/a*	*n/a*	*£££*	*Months*	*Not Required and not cost beneficial.*	*n/a*

APPENDIX 4 - Remedial Target Values

Generic Assessment Criteria (GAC)

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Proposed End Use	Unit	Residential with Plant Uptake			Residential without plant uptake			Source
SOM	%	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	37	37	37	40	46	40	LQM S4ULs
Beryllium	mg/kg	1.7	1.7	1.7	1.7	1.7	1.7	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	11000	11000	11000	LQM S4ULs
Cadmium	mg/kg	11	11	11	85	85	85	LQM S4ULs
Chromium (Total)	mg/kg	910	910	910	910	910	910	LQM S4ULs
Chromium (VI)	mg/kg	6	6	6	6	6	6	LQM S4ULs
Copper	mg/kg	2400	2400	2400	7100	7100	7100	LQM S4ULs
Lead	mg/kg	200	200	200	310	310	310	DEFRA C4SLs
Mercury	mg/kg	1.2	1.2	1.2	1.2	1.2	1.2	LQM S4ULs
Nickel	mg/kg	180	180	180	180	180	180	LQM S4ULs
Selenium	mg/kg	250	250	250	430	430	430	LQM S4ULs
Vanadium	mg/kg	410	410	410	1200	1200	1200	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	40000	40000	40000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	42	78	160	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	100	230	530	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	27	65	150	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) vap	330 (118) vap	760 (283) vap	130 (48) vap	330 (118) vap	770 (283) vap	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) sol	2400 (59) sol	4300 (142) sol	1100 (24) sol	2400 (59) sol	4400 (142) sol	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	65000 (8.48) f,sol	92000 (21) f,sol	110000 f	65000 (8.48) f,sol	92000 (21) f,sol	110000 f	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	65000 (8.48) f,sol	92000 (21) f,sol	110000 f	65000	92000 (21) f,sol	110000 f	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	370	690	1400	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	860	1800	3900	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	47	110	270	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	250	590	1200	LQM S4ULs
Aromatic EC 12 -16	mg/kg	140	330	660	1800	2300	2500	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 f	540 f	930 f	1900	1900	1900	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 f	1500 f	1700 f	1900	1900	1900	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 f	1500 f	1700 f	1900	1900	1900	LQM S4ULs
Benzene	mg/kg	0.087	0.17	0.37	0.38	0.7	1.4	LQM S4ULs
Toluene	mg/kg	130	290	660	880	1900	3900	LQM S4ULs
Ethyl Benzene	mg/kg	47	110	260	83	190	440	LQM S4ULs
Xylene - o	mg/kg	60	140	330	88	210	480	LQM S4ULs
Xylene - m	mg/kg	59	140	320	82	190	450	LQM S4ULs
Xylene - p	mg/kg	56	130	310	79	180	430	LQM S4ULs
MTBE (methyl tert-butyl ether)	mg/kg	49	84	160	-	-	-	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	3000	4700	6000	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	2900	4600	6000	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	31000	35000	37000	LQM S4ULs
Benzo(a)anthracene	mg/kg	7.2	11	13	11	14	15	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	3	3.2	3.2	3.2	LQM S4ULs
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	3.9	4	4	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	360	360	360	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	110	110	110	LQM S4ULs
Chrysene	mg/kg	15	22	27	30	31	32	LQM S4ULs
Dibenzo(ah)anthracene	mg/kg	0.24	0.28	0.3	0.31	0.32	0.32	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	1500	1600	1600	LQM S4ULs
Fluorene	mg/kg	170	400	860	2800	3800	4500	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	45	46	46	LQM S4ULs
Naphthalene	mg/kg	15	36	85	15	36	85	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	1300	1500	1500	LQM S4ULs
Pyrene	mg/kg	620	1200	2000	3700	3800	3800	LQM S4ULs

Generic Assessment Criteria (GAC)								
Proposed End Use	Unit	Residential with Plant Uptake			Residential without plant uptake			Source
SOM	%	1	2.5	6	1	2.5	6	
Phenols	*mg/kg*	*280*	*550*	*1100*	*750*	*1300*	*2300*	*LQM S4ULs*
Chlorophenols	*mg/kg*	*0.87* [g]	*2*	*4.5*	-			*LQM S4ULs*
Pentachlorophenol	*mg/kg*	*0.22*	*0.52*	*1.2*	-			*LQM S4ULs*
Carbon disulphide	*mg/kg*	*0.14*	*0.29*	*0.62*	-			*LQM S4ULs*
Hexachlorobutadiene	*mg/kg*	*0.29*	*0.7*	*1.6*	-			*LQM S4ULs*
1,1,1,2 Tetrachloroethane	*mg/kg*	*1.6*	*3.4*	*7.5*	-			*LQM S4ULs*
1,1,1 Trichloroethane	*mg/kg*	*8.8*	*18*	*39*	-			*LQM S4ULs*
Trichloroethene	*mg/kg*	*0.016*	*0.034*	*0.075*	-			*LQM S4ULs*
Tetrachoromethane (Carbon Tetrachloride)	*mg/kg*	*0.026*	*0.056*	*0.13*	-			*LQM S4ULs*
1,2-Dichloroethane	*mg/kg*	*0.0071*	*0.011*	*0.019*	-			*LQM S4ULs*
Chloroethene (Vinyl chloride)	*mg/kg*	*0.00064*	*0.00087*	*0.0014*	-			*LQM S4ULs*
Trichloromethane (Chloroform)	*mg/kg*	*0.91*	*1.7*	*3.4*	-			*LQM S4ULs*
Tetrachloroethene	*mg/kg*	*0.18*	*0.39*	*0.9*	-			*LQM S4ULs*
Hexachlorobenzene	*mg/kg*	*1.8 (0.2)* [vap]	*3.3 (0.5)* [vap]	*4.9*	-			*LQM S4ULs*
Pentachlorobenzene	*mg/kg*	*5.8*	*12*	*22*	-			*LQM S4ULs*
1,2,4,5-Tetrachlorobenzene	*mg/kg*	*0.33*	*0.77*	*1.6*	-			*LQM S4ULs*
1,2,3,5-Tetrachlorobenzene	*mg/kg*	*0.66*	*1.69*	*3.7*	-			*LQM S4ULs*
1,2,3,4-Tetrachlorobenzene	*mg/kg*	*15*	*36*	*78*	-			*LQM S4ULs*
1,3,5-Trichlorobenzene	*mg/kg*	*0.33*	*0.81*	*1.9*	-			*LQM S4ULs*
1,2,4-Trichlorobenzene	*mg/kg*	*2.6*	*6.4*	*15*	-			*LQM S4ULs*
1,2,3-Trichlorobenzene	*mg/kg*	*1.5*	*3.6*	*8.6*	-			*LQM S4ULs*
1,4-dichlorobenzene	*mg/kg*	*61* [f]	*150* [f]	*350* [f]	-			*LQM S4ULs*
1,3-dichlorobenzene	*mg/kg*	*0.4*	*1*	*2.3*	-			*LQM S4ULs*
1,2-Dichlorobenzene	*mg/kg*	*23*	*55*	*130*	-			*LQM S4ULs*
Chlorobenzene	*mg/kg*	*0.46*	*1*	*2.4*	-			*LQM S4ULs*
Gamma-Hexachlorocyclohexanes	*mg/kg*	*0.06*	*0.14*	*0.33*	-			*LQM S4ULs*
Beta-Hexachlorocyclohexane	*mg/kg*	*0.085*	*0.2*	*0.46*	-			*LQM S4ULs*
Alpaha - Hexachlorocyclohexane	*mg/kg*	*0.23*	*0.55*	*1.2*	-			*LQM S4ULs*
Beta -Endosulfan	*mg/kg*	*7*	*17*	*39*	-			*LQM S4ULs*
Alpha-Endosulfan	*mg/kg*	*7.4*	*18*	*41*	-			*LQM S4ULs*
Dichlorvos	*mg/kg*	*0.032*	*0.066*	*0.14*	-			*LQM S4ULs*
Atrazine	*mg/kg*	*3.3*	*7.6*	*17.4*	-			*LQM S4ULs*
Dieldrin	*mg/kg*	*0.97*	*2*	*3.5*	-			*LQM S4ULs*
Aldrin	*mg/kg*	*5.7*	*6.6*	*7.1*	-			*LQM S4ULs*
HMX	*mg/kg*	*5.7*	*13*	*26*	-			*LQM S4ULs*
2,4,6-Trinitrotoulene	*mg/kg*	*1.6*	*3.7*	*8.1*	-			*LQM S4ULs*
RDX	*mg/kg*	*120*	*250*	*540*	-			*LQM S4ULs*

[sol] S4UL exceeds the solubility saturation limit (which is presented in brackets)

[vap] S4ULS presented exceeds the vapour saturation limit, which is presented in brackets

[f] For naphthalene, the S4UL is based on a comparison of inhalation exposure with the TDI_{inhal} for localised affects

[f] S4UL based on comparison of inhalation exposure with inhalation TDI for localised effects

[dir] S4ULs based on a threshold protecive direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustation only

APPENDIX 5 - Ground Gas Membrane Validation Record Sheet

GROUNDTECH
CONSULTING

Gas Protection Validation Record

Job No: GRO-24102	
Client: ONE HERITAGE PLC	
Site Name: OLD MILL STREET	
Plot Number:	

Property Type												Gas Protection Type	Passive
Det		Semi		Town House		Apt							
Attached Garage				Commercial								Floor Type	Beam and Block

Ventilated Sub Floor	✓/×	Inspection Date	Inspected By:	Photos:	Notes	
Void Former					1	
Void Height					2	
Pipe Size & Spacing					3	
External Wall Air Bricks					4	
Internal Sleeper Wall Vents					5	
Subfloor Passed (If not, detail why and next steps)					6	

Gas Barrier	✓/×	Inspection Date	Inspected By:	Photos:	Notes	
Membrane Type					7	
Extent of Coverage					8	
Underside of membrane					9	
Slab/membrane condition					10	
Laps and joints					11	
Damp-proof course					12	
Service entries and seals					13	
Cavity inspection					14	
Repairs Undertaken (If required)					15	

This plot has		inspection	

APPENDIX 6 - Limitations

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

The report was written in 2025, 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 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 the written confirmation from Groundtech Consulting 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.

Groundtech Consulting are 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 services provided are based upon Groundtech Consulting 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 assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were 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. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting 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 can also be variable due to its heterogeneous properties and as 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. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The 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 higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

