GROUNDTECH
CONSULTING

AFAN WAY, PROT TALBOT

REMEDIAL SPECIFICATION

ALDI STORES LIMITED

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Plan Reference	*Revision*	*Title*
GRO-21252-P01	-	*Project Location Plan*
GRO-21252-P02	-	*Development Constraints Plan*
GRO-21252-P04	-	*Olfactory evidence of Contamination Plan*
GRO-21252-P06	-	*Laboratory Testing Contamination Plan*

1.0 INTRODUCTION

1.1 Background

This Remedial Specification has been produced on behalf of Aldi Stores Limited and relates to the remediation of a site at Afan Way, Port Talbot.

The site is currently unoccupied and formed by large areas of scrub and grassland with light vegetation with hardstanding in several small locations. 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 the construction of a new Aldi store illustrated on drawing AL(90)02.

The client has submitted a planning application which is currently under consideration by Neath Port Talbot 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 commercial development, it can be demonstrated that the ground and groundwater conditions at the site are appropriate for its intended use and risks to identified receptors have been reduced to an acceptable level.

The following Remedial Specification includes the protection measures required during the enabling works phase and to be installed in the construction phase of the redevelopment for a 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 current LCRM risk assessment guidance and is as follows:

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

1.5 Sources of Information

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

- *Groundtech Consulting Geo-Environmental Appraisal, dated 8th December 2021 (Ref. GRO-21252-3003).*
- *Groundtech Consulting Permanent Ground Gas Risk Assessment, dated 22nd April 2022 (Ref. GRO-21252-3237).*
- *Quantum Geotechnical Supplementary Phase II Ground Investigation – Interpretive Report dated June 2016 (Ref. G762/IR).*
- *Arcadis Remedial Options Appraisal and Remedial Strategy dated December 2016 (Ref. 01-UA007442-15-UP32-01).*
- *Arcadis Ground investigation Report dated April 2018 (Ref. 10013618-AFS-GLR-G001).*
- *Arcadis Revised Remedial Strategy dated May 2018 (Ref. 10013618-ARC-XX-XX-DR-YY-0002-Z1-PDF).*

1.6 Local Authority Comments

Neath Port Talbot Council have confirmed that due to the sites extensive industrial history and considerable evidence of contamination a Remedial Specification is required as part of the pre-commencement conditions.

2.0 CONCEPTUAL SITE MODEL

2.1 Site Details

The site is roughly triangular in shape covering an area of approximately 1.12 hectares, site elevations fall slightly from west to east. The site is currently occupied largely by scrubland. Hardsurfacing is present at the site entrance but is in poor condition. Remanence of concrete footings from former onsite buildings are present in western and south western areas. There is an electricity substation situated in the southern corner of site.

2.2 Site History and Consultations

History

Historical maps date back as far as 1881 where the site was occupied by Burrows Tin Plate Works with numerous other buildings. The maps may show a pond being present in the western area of site that was infilled by 1900 and covered with railway lines. A tank was evident on the site by 1939 and was positioned centrally. In 1950 the site was developed with Talbot works Bakery Engineering with additional tanks and chimneys being added to the existing tin plate works. Residential dwellings and a well were constructed in the northern area. Between 1957 and 1962 a mortuary was developed east of the residential homes. In 1664 the bakery engineering works was redeveloped into sign post works. Between 1971 and 1993 all the buildings on site were assumed to be demolished as they were no longer shown on historical maps.

Environmental Information

The following environmental information was identified:

- *No radon protection is indicated to be required within the proposed development at the site.*
- *The site does lie in a Coal Mining Reporting area.*
- *There are three recorded landfill/waste sites within 250m.*
- *There are 21 pollution incidents or discharge consents within 250m of site.*
- *The site is within a flood risk zone.*

2.3 Geology and Hydrogeology

Geology
The site is indicated to be underlain by Estuarine Alluvium Deposits which characteristically comprises Clay, Silt and Sand. The solid geology beneath the site is indicated to be of the South Wales Middle Coal Measures Formation comprising Mudstone, Siltstone, Sandstone and Coal seams.

Hydrogeology
The superficial Estuarine Alluvium Deposits in this area are classified by the Environment Agency as a Secondary Undifferentiated Aquifer. The South Wales Middle Coal Measures Formation bedrock is classified as Secondary A Aquifer.

The site is not within 500m of a Source Protection Zone and there are no groundwater or potable water abstractions within 2000m of the site.

2.4 Hydrology

The nearest named watercourse is the River Afan which is circa 86m south.

Environment Agency information indicates that the site lies within land that is naturally vulnerable to surface water ponding or flooding. A 1 in 30-year event is likely to result in 0.1m to 0.3m flooding.

The nearest active surface water abstraction is circa 107m south east relating to process water for usage by Tata Steel UK Ltd.

2.5 Coal Authority Consultations

The site is not in an area affected by past or present underground coal mining. There are no mine entries on site.

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

2.6 Preliminary Conceptual Site Model

The following risks were determined by Groundtech Consulting:

Receptor	Level of Risk
Aquifers	*Low*
Surface Waters	*Low*
Site End Users	*Low*
Permanent Ground Gas	*Moderate to High*

2.7 Scope of Works

The following scope of works was undertaken by Groundtech Consulting between the dates of 29th of September and 4th of October 2021:

- *4 No. cable percussive boreholes (CP01 to CP04) to a maximum depth of 7.0m bgl.*
- *6 No. windowless sample boreholes (WS01 to WS06) to 4.0m bgl.*
- *15 No. machine dug trial pits (TP01 to TP15) were excavated to a maximum depth of 3.4m bgl.*
- *6 No. plate load tests were carried out at proposed formation level.*

The following scope of works was undertaken by Arcadis between the dates of the 4th December and 12th December 2017:

- *4 No. Boreholes drilled to a target depth of 10.0m bgl.*
- *6 No. Machine excavated trial pits within the waste material and soil mounds on site to a target depth of 3.0m bgl.*
- *12 No. Machine excavated trial pits to a target depth of 3.0m bgl.*
- *20 No. inspection pits and laser induced fluorescence to a target depth of 1.2m to identify underground services.*

The following scope of works was carried out by Quantum Geotechnical between 2nd December and 14th December 2015:

- *6 No. light cable percussive boreholes.*
- *19 No. windowless sample boreholes.*
- *22 No. machine excavated trial pits.*
- *4 No. machine excavated trial trenches.*
- *11 No. in-situ California Bearing Ratio tests.*
- *Photo-Ionisation Detector (PID) readings of selected soil samples for Total Volatile Organic Compounds (VOCs).*

2.8 Ground Model

During the various phases of Ground Investigations on the site, Made Ground was encountered to a maximum depth of 3.1m bgl and comprised both cohesive and granular strata. The Made Ground minor constituents comprised sandstone, mudstone, limestone, brick, concrete, slag, metal, plastic, glass and concrete. This was underlain by cohesive alluvium deposits comprising sandy gravelly Silt, sandy Clay and silty Clay to a maximum observed depth of 6.6m bgl. The cohesive deposits are underlain by sandy Gravel or very gravelly Sand interpreted as fluvial glacial deposits down to a maximum observed depth of 10.0m bgl. Bedrock has not been encountered in any of the investigations conducted to date.

Visual and olfactory evidence of contamination was noted within the soils across the site by Quantum Geotechnical. Strong to very strong hydrocarbon odours within both the sandy clay and gravel at depths ranging between 0.9m and 4.3m bgl. Sheens were also noted within the Gravel at depths between 3.5m and 4.3m bgl.

As part of the Groundtech Consulting investigation, Made Ground was encountered to depths of between 1.0m and 2.9m bgl and comprised four main populations as described below:

1. *Sandy gravelly topsoil was encountered in WS03 to WS05, TP01 and TP06 from ground level to 0.25m bgl.*

2. *Sandy gravel with a moderate cobble content was encountered in the majority of exploratory holes from ground level to 2.2m bgl.*

3. *Black sandy gravel and gravelly sand was encountered in WS01 to WS06, TP03, TP05, TP13 and TP15 from 0.2m to 2.2m bgl.*

4. *Silty clayey gravelly sand was encountered in some of the exploratory holes from 0.75m to a maximum observed depth of 2.0m bgl.*

Concrete hardsurfacing was present from ground level within TP02, TP03 and TP05 to a maximum depth of 0.15m bgl – these locations were in the southern and eastern areas. The concrete was underlain by tarmac within TP02 to a depth of 0.2m bgl.

The natural strata encountered generally confirmed the published geological records. Three Made Ground populations were recorded by Groundtech as described below:

1. *Soft to firm occasionally stiff grey variably sandy Clay was encountered from 1.35m to a maximum depth of 4.0m bgl.*

2. *Soft grey variably brown silty Clay was encountered from 1.2m bgl to a maximum depth of 5.3m bgl.*

3. *Dense brown fine to medium Sand and Gravel of mixed lithologies was encountered from 1.9m bgl to a maximum observed depth of 7.5m bgl.*

Groundwater
During the various phases of Ground Investigations at the site, groundwater strikes were observed beneath the site between 1.0m bgl and 5.3m bgl. Groundwater is generally perched in the natural Clay at the base of the Made Ground.

2.9 Geo-Environmental Testing Results - Soils

A summary of the soil testing results undertaken by Groundtech Consulting is provided below:

Metals
Testing undertaken across the site indicated that all metal contamination encountered was below the screening value for a commercial end use development.

Previous reports also recorded no exceedances of metal within the Made Ground.

Polycyclic Aromatic Hydrocarbon (PAHs)
Groundtech Consulting recorded a single minor elevated level of Dibenzo(ah)anthracene was detected in TP02 at a depth of 0.2m bgl. This is likely derived from the incomplete combustion of fuels in engines through the coal coking process used in the steel production process, or associated with the railway that ran through the site.

Quantum investigation identified one exceedance in a sample when compared to the screening value for commercial developments. Arcadis recorded no elevated concentrations of speciated PAHs.

Total Petroleum Hydrocarbons (TPH CWG)
There were no exceedances recorded by Groundtech Consulting, Quantum or Arcadis when compared to commercial screening values.

Polychlorinated Biphenyl (PCBs)
Testing was undertaken on samples located close to the substation on site, no elevated results were recorded in this area.

Pesticides and Herbicides
Testing was undertaken on three samples of Made Ground (WS06 at 0.4m, WS08 at 0.8m and WS11 at 0.1m bgl) to assess whether pesticides and herbicides are present within the Made Ground from the previous uses as

railway land and an allotment. All samples screened for these contaminants indicated concentrations of less than laboratory detection limit and indicates that the site has not been impacted by pesticides or herbicides.

Volatile Organic Compounds (VOCs) and Semi Volatile Organic Compounds (SVOCs)
Six samples have been screened for Volatile Organic Compounds and Semi Volatile Organic Compounds and all concentrations have been identified below the commercial screening values.

Asbestos
A mixture of Chrysotile, Amosite and Crocidolite asbestos fibres were detected in TP02, TP06, TP07 and TP10 within the granular Made Ground soils at concentrations of between <0.001 and 0.04 mass %. Spatially, the asbestos was identified in the central, southern and north western areas of the site.

The previous investigations undertaken by Quantum and Arcadis found out of a combined total of 64 samples that were screened, 41 were found to contain asbestos. The asbestos contamination is considered widespread.

The locations of the contamination present within the soils is represented spatially on the Groundtech Contamination Plan *GRO-21252-P06.*

2.10 Geo-Environmental Testing Results – Groundwater

Groundwater testing was undertaken by Groundtech Consulting and Arcadis. Groundtech tested four samples of the groundwater. Arcadis undertook testing on 21 samples of groundwater from beneath the site.

One of the sample of the deeper groundwater strikes collected by Groundtech Consulting returned elevated levels of chromium within the groundwater when compared to the EQS with a maximum concentration of 5.2ug/l. There are no elevated concentrations of speciated PAHs or TPH within the water samples tested by Groundtech.

Of the 21 samples collected and tested by Arcadis, 13 returned elevated CoCs including, copper, manganese and zinc. In some cases, the recorded values for copper and manganese were twice that of the EQS values. Zinc was recorded at up to eight times the EQS. This was considered to be as a result of leaching of contamination from the Made Ground on site.

No elevated results for TPH or speciated PAHs were recorded by Arcadis.

The Groundtech Consulting investigation indicates that Made Ground strata is present beneath the site to depths up to 2.9m bgl which overlies natural cohesive ground. During the investigation groundwater strikes were observed at depths between 2.8m and 5.3m bgl within the Aquifer in the natural Sand and Gravel. Localised perched groundwater was encountered within the Made Ground from 1.0m to 1.3m bgl.

The Estuarine Alluvium Deposits are classified as a Secondary Undifferentiated Aquifer and the solid geology is classified as a Secondary A Aquifer. There are no groundwater or potable water abstraction licenses within 2000m of site and the site is not located within 500m of a groundwater Source Protection Zone. The River Afan is located approximately 86m to the south of the site and is therefore the receptor considered to be at risk.

The water bearing dense Sand and Gravel are overlain by impermeable Clay that is considered an aquitard, and the laboratory testing by Groundtech has confirmed the confined aquifer has not been significantly impacted by overlying Made Ground soils. The perched water encountered is not considered to be a concern as it is localised and not in continuity with the underlying Secondary Undifferentiated Aquifer or River Afan.

An important consideration is the proposed development will be a form of betterment as the hardsurfacing and new drainage system will effectively seal off CoC in the Made Ground and perched groundwater will be significantly reduced.

2.11 Geo-Environmental Testing Results – Vapour

Groundtech Consulting has concluded that vapour protection measures are not required based on the PID results. However, there are likely to be local pockets of free phase within shallow Made Ground soils, which may release harmful vapours, a vapour resistant membrane or remedial action is recommended in the vicinity of the former petrol filling station.

2.12 Ground Gas

During the monitoring period, concentrations of methane (CH_4) have been recorded within the standpipes up to a maximum level of 4.0% v/v in WS06. No methane was present in the remaining standpipes. Detectable levels of carbon dioxide (CO2) were recorded up to a maximum concentration of 4.2% v/v together with associated depleted oxygen (O_2) concentrations (minimum 3.2% v/v). No positive gas flow rates were recorded during the gas monitoring programme.

The proposed Aldi store is to be constructed in the western part of the site away from the former PFS in the east where the methane was recorded in WS06. The GSVs for carbon dioxide and methane place the site in CS1 and in accordance with CIRIA C665, no special gas protection measures are required.

Methane exceeded the typical maximum concentrations of 1% v/v for CS1 conditions on three of four monitoring visits in the area around the former PFS. Given the location of WS06 in the former PFS, the methane concentrations are likely to be associated with hydrocarbons in this area.

It is recommended that the former PFS area of the site is increased to CS2 and a vapour resistant membrane is installed under any buildings in this area.

The site is in an area which does not require radon protection measures.

2.13 Outline Remedial Strategy

The following remedial measures were recommended by Groundtech Consulting Ltd.

Soils
The site will predominantly be covered with hard surfacing which will effectively act as a cover system.

Where any soft landscaping is to be present, a cover system of 600mm of suitably clean subsoil and topsoil including a contamination demarcation barrier or a 100mm hard dig layer will be required. The imported soils used within the cover system should be tested to ensure that they are suitably clean for use. In addition, the thickness of the cover system should be validated.

The risk to groundworkers was considered by Groundtech Consulting to be moderate as Made Ground soils are present across the site, it was recommended that site personnel should wear gloves when handling Made Ground and avoid hand to mouth activities. Welfare facilities should be available to for hand washing. The contractor should communicate the above with site personnel through notice boards and site inductions.

Based on the Joint Industry Working Group (JIWG) assessment, the work at the site will be non-licenced, the following will be required during construction work. It is the responsibility of the contractor to put control measures in place to their satisfaction:

- *RPE – EN140 with P3 filter half mask*
- *Localised mechanical dust suppression*
- *Localised and enhanced personal decontamination facilities*

Where possible, it is advised that any Made Ground soils containing asbestos are left in the ground undisturbed. Where soils will be disturbed as part of the ground works, in accordance with the Joint Industry Working Group (JIWG) decision support tool for CAR2012 work categories, the combined hazard and exposure ranking is medium.

Groundwater

The results from the groundwater testing indicate that the groundwater beneath the site has not been significantly impacted, and high concentrations of metals are indicative of the wider area, and remedial action is not required. A piling risk assessment is required to confirm no preferential pathway is created. Free phase is observed during enabling and groundworks, this should be removed offsite to an appropriately licenced waste disposal features.

The installing of a new drainage system across the site as part of the development which will reduce infiltration and reduce the risk from perched groundwater to an acceptable level.

A piling risk assessment was also recommended by Groundtech Consulting to determine to risk to the underlying aquifer from the contaminated groundwater during the installation of piled foundations.

Ground gas

The Permanent Ground Gas Risk Assessment has placed the location of the proposed Aldi Store within CS1 conditions. Therefore, no gas protection measures are required within the Aldi Store.

Pre Construction ground gas results place the area of the site around the former PFS within CS2 conditions due to the GSV recorded and the high methane concentrations. Buildings in this area will require one to two gas protection measures. CIRIA C665 details the following for commercial buildings that fall into CS2:

a) *Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM[2].*

b) *Beam and block or pre cast concrete slab and minimum 2000 g DPM/reinforced gas membrane.*

c) *Possibly underfloor venting or pressurisation in combination with a) and b) depending on use*

All joints and penetrations sealed.

Based upon the information from the previous investigations and the potential for vapour emissions within isolated pockets of hydrocarbon free phase in the shallow soils, a vapour resistant membrane in the vicinity of the former PFS and USTs should be installed.

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

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

The above recommendations are based on the investigation carried out to date.

2.14 Ground Engineering

The most suitable foundation solution was considered to be driven piles transferring loads through the Made Ground and Clay to end bear in the underlying very dense Gravel which has been encountered at depths between 3.9m and 5.3m bgl. A reinforced ring beam should be constructed to span between each pile cap and support loadings from the walls of the proposed store.

Obstructions have been encountered in the ground and they should be grubbed up prior to the construction phase.

3.0 POLLUTION LINKAGE ASSESSMENT REVIEW

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

3.1 Human Health

Receptor	Level of Risk	Comments
Site End Users	*Low*	*Hardsurfacing of proposed development will break the pathway.*
Site End Users (Asbestos)	*Low*	*Hardsurfacing of proposed development will break the pathway.*
Site End Users (Vapour)	*Moderate*	*Volatile contamination was identified by the previous investigations.*
Site End Users (Potable Water Supply)	*Moderate*	*Made Ground present at installation depth.*
Site End Users (Ground Gas)	*Low to Moderate*	*Gas monitoring results place majority of site in CS1 with former PFS as CS2.*
Site End Users (Radon Gas)	*Low*	*No measures required*
Adjacent Residents	*Low*	*All the contaminative sources identified on site are indictive of the surrounding area.*

3.2 Controlled Waters

Receptor	Level of Risk	Comments
Secondary A Aquifer	*Low*	*Proposed development will be completely covered with hardsurfacing and a new drainage system installed.*
River Afan	*Low*	*No mobile contamination identified.*

3.3 Groundworkers

Receptor	Level of Risk	Comments
Contractors	*Moderate*	*Standard PPE, hand and boot washing facilities, dust suppression and wheel cleaning equipment*

4.0 REMEDIATION PROPOSALS AND APPRAISAL

Remediation will be undertaken to ensure the site is suitable for its proposed commercial end use which comprises the construction of a new Aldi store and car park.

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. ***Interim Validation Report*** which will provide a record of the remediation activities undertaken up to completion of the development area and finished site levels to support compliance with remediation objectives. The report will also contain descriptions of the works including photographic evidence and details of any unexpected conditions encountered during the remedial works.

3. ***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.*

4. ***Piling Risk Assessment*** *which will assess the risk of migration of contaminated groundwater into the underlying aquifer as a result of installing deep piled foundations. This will be a dynamic document which may be updated after the findings of the groundwater testing report.*

5. ***Gas and Vapour Precautions Validation Report*** *will validate the suitability of the installation gas precaution measures and vapour membranes.*

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

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

4.1 Outline Remediation Proposals

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

Remediation works will need to be completed in accordance with the 'CL:AIRE Definition of Waste Development Industry Code of Practice, 2nd Edition', where relevant. The contractor will need to write an appropriate materials

management plan (MMP) and provide a 'Qualified Person' (QP) declaration. The remediation works will aim to maximise the reuse of soils on site and minimise off-site disposal.

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

1. *Enabling Works Phase.*
2. *Construction Phase.*

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

- *Materials management comprising excavation, screening and reuse of suitable material.*
- *Installation of a cover system in areas of soft landscaping.*
- *Disposal of excess or unsuitable soils.*
- *Ground gas and vapours*
- *Free phase removal if encountered*
- *watching brief for unidentified contamination*

4.2 Enabling Works Phase

The following works are considered necessary:

- *Demolition of existing structures.*
- *Turnover to remove obstructions*
- *Construction of suitable working platform for piling rig.*
- *Vegetation clearance and topsoil strip.*
- *Reuse of appropriate soils.*
- *Offsite disposal of unsuitable or excess material.*
- *Free phase removal if present*
- *Asbestos control measures to contractors satisfaction*

All works need to be undertaken in accordance with the Remedial Specification. A final verification report completed by the supervising consultant will be required to be submitted to the regulators for approval.

4.3 Construction Phase

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

- *Installation of piles in accordance with piling risk assessment.*
- *Excavations for service runs and drainage.*
- *Installation of the correct potable water supply pipes.*
- *Installation of Gas Precaution measures, with vapour membrane where required.*
- *Placement of clean validated subsoil/topsoil in areas of soft landscaping.*

All works need to be undertaken in accordance with the Remedial Specification.

4.4 Project Setup and Management

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

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

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

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

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 Enabling Phase Implementation

Activity E1 – Pre-Start and Site Clearance

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

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

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

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

The enabling works contractor shall investigate the features of the structures, ascertain if shock or vibration could damage surrounding property or equipment therein or buried utilities, CFA piles are proposed to reduce vibration to neighbouring properties. The contractor should also check the existence of toxic or flammable substances, flammable substances could potentially be present in the vicinity of the former PFS.

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

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

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

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

All movement of materials shall be recorded, and records shall be kept detailing the nature and quantity of materials, haulier details, final destination and any other relevant information.
Water or liquids shall not be pumped or emptied into the existing sewers/drainage system without the appropriate treatment and written permission of the relevant authority. If mobile tankers/bowsers are to be used, then disposal shall be at suitably licensed facilities in accordance with current legislation.

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

Activity E2 - Break out of Hardstanding and Below Ground Obstructions and Processing for Re-use

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

All broken up materials shall be segregated and stockpiled within the approved working area of the site. Material shall be stockpiled at locations to be agreed with the Client and after submission of the detailed method statements. The material will be crushed to an agreed chemical and geotechnical specification for reuse.

The enabling works contractor shall inform Groundtech Consulting where large excavations have been undertaken or there is evidence of contamination so that they may attend and witness the excavation, and obtain validation samples. The enabling works contractor shall survey to Ordnance Survey Grid the base and sides of all excavations and will provide a composite base of excavation drawing for reference during the works, and as built records.

During the turnover and excavation of substructure/obstructions, the enabling works contractor will undertake additional visual investigation (watching brief).

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

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

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

Activity E3 – Vapour Intrusion Assessment

Groundtech recorded low PID results throughout their investigation. High methane concentrations have been recorded by the gas monitoring and they are likely to be related to the former Petrol Filling Station (PFS).

At this stage there is a potential risk from vapours to the site end users in building located near the former PFS, an investigation and vapour intrusion assessment could be undertaken to determine the requirement for a vapour resistant membrane.

Activity E4 – Contaminated Made Ground/Watching Brief

Made Ground was encountered beneath the site, geo-environmental testing has recorded elevated levels of speciated PAHs within the Made Ground populations. Free phase hydrocarbons were noted by previous investigations within the Made Ground.

A watching brief should be kept during the works and if evidence of contamination is noted, Groundtech Consulting should be contacted, these materials should be stockpiled separately for testing prior to reuse if suitable.

As a minimum free phase product in soils and perched groundwater will require removal if identified during the enabling works.

Activity E6 - Asbestos Mitigation

Asbestos fibres are present within the Made Ground and the enabling works contractor shall assume asbestos is present in all Made Ground.

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

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

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

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

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

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

Activity E7 - Reuse of Soils and Placement of Soils

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

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

Activity E8 - Offsite Disposal of Unsuitable or Surplus Material

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

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

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

Activity E9 - Validation Criteria During Enabling Works

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

Testing

All testing during the enabling works shall be undertaken in accordance with BS 5930:2020 'Code of Practice for Site Investigations' and BS 10175:2017 'Investigation of Potentially Contaminated Sites – Code of Practice'.

The laboratory should hold UKAS and MCERTS accreditation for the specific tests. Where it is not possible to obtain the testing of a material for a specific property to a UKAS or MCERTS accredited method.

General Reuse

The soils should be inspected for the following criteria prior to reuse:

- *No visual contamination (oil staining etc.).*
- *limited deleterious material (organics, wood, metal etc.), in accordance with this Specification.*
- *No visible asbestos containing material (ACM).*

Activity E10 - Contractors Validation Reports

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

All reports provided by the enabling works contractor shall be available to the Client and Groundtech Consulting for comment.

5.3 Construction Phase Implementation

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

The correct potable water pipework is to be installed by the ground works contractor in accordance with local water company risk assessment. The works are to be validated by the ground works 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 correct potable supply pipework (or similar) has been installed.*

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

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

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

Reuse of soils excavated by the contractor will need to be undertaken in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice, i.e. in accordance with an MMP approved by a QP.

Activity C3: 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 undertaken after importation to confirm the suitability of the soils.*
2. *Install drainage and other services and storing excavated clean soils appropriately for re-use in soft landscaping areas.*
3. *Place cover system to agreed specification.*
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 area	*450mm comprising a minimum of 150mm of clean topsoil with 450mm clean subsoil with hard dig layer.*

Physical Requirements of Cover System Soils and General Fill

Imported material should be as agreed with the client, Subsoil and Topsoil should conform to BS 3882:2015 and BS 8601:2013.

The imported material is to be confirmed by visual inspection of the material by the consultant and if necessary, by laboratory Particle Size Distribution assessment.

Imported material should be free from the following:

- *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.*

Geo-Environmental Requirements of Cover System Soils and General Fill

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

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

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

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

If the source of the material is not natural, geo-environmental testing should be undertaken at a rate of one test per 100m^3, with a minimum of five tests to be undertaken on any individual source material.

With regards to imported soils, the results of geo-environmental testing are to be compared with the criteria presented in *Appendix 4*. If any of these thresholds are exceeded the material shall be considered to be unsuitable unless treatment, further testing and risk assessment shows it to be satisfactory. Testing should be carried out for the following general suite of contaminants:

- *Arsenic, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc, pH, asbestos fibres, speciated Polycyclic Aromatic Hydrocarbons and organic matter.*
- *Speciated TPH (TPHCWG), if required.*
- *Asbestos screening.*

Activity C4 - Installation of the correct level of Gas Protection Measures

The proposed Aldi Store lies within an area classified as CS1 conditions and no gas protection measures are required.

High methane concentrations have been recorded within the area of the former PFS which are likely associated with hydrocarbons within the Made Ground.

The proposed commercial development in this area is classified as a Building Type C in accordance with BS 8485:2017 and the site has been classified as CS2. In accordance with Table 2 of BS 8485:2017, 3 points of protection are required for the proposed commercial development to mitigate against ground gas for CS2 conditions.

Gas precautionary measures outlined in BS 8485:2017 include the following to reach the required number of protection points, a minimum of two should be adopted:

Structural Barrier / Floor Slab

- *Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations – 1.5 points.*

Ventilation Protection Measures

- *Passive sub floor dispersal layer of good performance – 1.5 points.*

Gas Resistant Membrane

- *Gas resistant membrane (including methane) meeting the criteria outlined in Table 7 of BS 8485:2017 – 2 points.*

Radon measures are not required for the proposed development. A vapour membrane is required within the proposed developments around the former PFS. The Aldi store does not require a vapour membrane.

The gas protection details are to be detailed by the architect or the Structural Engineer.

Gas protection is to be installed by the ground works contractor (or specialist contractor on their behalf) and the installer should be qualified and experienced installer (minimum one operative to hold a NVQ Level 2 in gas protection installation). The ground gas protection should be installed with all due regard to best practice and guidance.

The ground gas protection measures are to be validated upon installation in accordance with CIRIA C735.

6.0 SUPERVISION, VERIFICATION AND REPORTING

Necessary changes to the agreed Implementation Plan, arising during the course of the works, are to be agreed in writing with the Local Authority and Natural Resources Wales 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

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

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

6.2 Collection of Samples

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

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

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

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

6.3 Verification Report

On receipt of the records from the contractor, to demonstrate that all of the works have been undertaken in accordance with the Remediation Specification and Materials Management Plan, Groundtech Consulting will provide a verification report.

This 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.*
- *Specialist contractor's validation reports for particular elements of work.*
- *As built drawings (provided by contractor).*
- *Final status of remediation and confirmation of remedial objectives to satisfy the planning conditions.*
- *Additional risk assessments/reactive works undertaken.*
- *Site stripping and clearance activities undertaken during remediation.*
- *Records of excavations.*

- *Records of laboratory analytical and in-situ field test results, including:*
  - *Laboratory results and location plan for each analytical test.*
  - *Laboratory measurements of accuracy and precision.*
  - *Calibration data for field measurement equipment in accord with manufacturers guidance.*
  - *Copies of the certificates for geo-environmental testing.*
- *Waste classification and management documentation, including copies of all consignment notes, in particular those relating to the hazardous waste regulations, details of waste facilities where materials were disposed of.*

Additional records of material movements, sources and donor sites will be required for the MMP Verification Report.

6.4 Ground Gas Verification

Ground gas mitigation measures shall be installed by the ground works contractor. Installation and validation of ground gas membranes will be undertaken in accordance with CIRIA C735.

6.5 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 and in accordance with YALPAG.

The cover system validation report will include:

- *Confirmation of the source of imported material.*
- *Confirmation of the physical suitability of the material.*
- *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

As the site is brownfield, any material excavated on site will be classified as waste as soon as it is excavated, unless there is a clear plan in place for the reuse of soils at the site. This should be achieved as set out in the Contaminated Land: Applications In Real Environments (CL:AIRE) document: 'The Definition of Waste: Development Industry Code of Practice' (Version 2) (CoP), dated March 2011.

The handling, reuse or disposal of waste is regulated by the Environment Agency. The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste.

If materials are dealt with in accordance with the CoP, the Environment Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. This is because the materials were never discarded in the first place, or because they have been submitted to a recovery operation and have been completely recovered so that they have ceased to be waste.

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

7.2 Certainty of Use and Quantity of Material

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

The following excavation, treatment and placement is proposed during the enabling works:

- *Excavate hardsurfacing/subsurface obstructions and crush demolition arising to create a Class 6F2 material for re-use in the works.*
- *Placement of soils as set out in this Remedial Specification.*

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

- *Excavation of foundations.*
- *Excavation of drainage runs.*
- *Placement of clean soils for use as cover layer in areas of soft landscaping.*
- *Placement of 6F2 in road and pavements/working platforms.*

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

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

Only sufficient material required on site for the purposes of raising levels in accordance with the pre-determined proposals (planning conditions and drainage strategy) will be imported or reused on site. Any surplus material or material which does not meet the required specification will be disposed of off-site. 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

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

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

The contractor for each phase of works is to take appropriate mitigation measures and environmental precautions as considered necessary at storage locations. However, as a minimum, stockpiles should be compacted to prevent dust and they should be kept wet in periods of dry weather. Suspected contaminated material should be stored on an impermeable membrane and covered to prevent leaving of potential contaminants.

During the remediation works, materials will be excavated and consolidated into designated stockpiles, with the different soil types stockpiled in different clearly marked stockpiles. A record of the excavated quantities and reuse locations will also be maintained on site. A copy of all tracking forms and delivery tickets used for transportation of soils to site will be held at the site office.

Confirmatory Testing for Material for Onsite Reuse – Excavated Material

Any soils proposed for reuse have already been tested during the Groundtech Consulting Ground Investigation.

Materials found to be out of specification are to remain on site in segregated stockpiles until such time that they can be disposed to a suitably licenced waste disposal facility.

At each phase of works, a record should be maintained by the contractor of the movement of the stockpiled material and the area within the excavation into which it is placed.

Confirmatory Testing for Material for Offsite Disposal

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

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

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

Confirmatory Testing for Imported Material

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

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

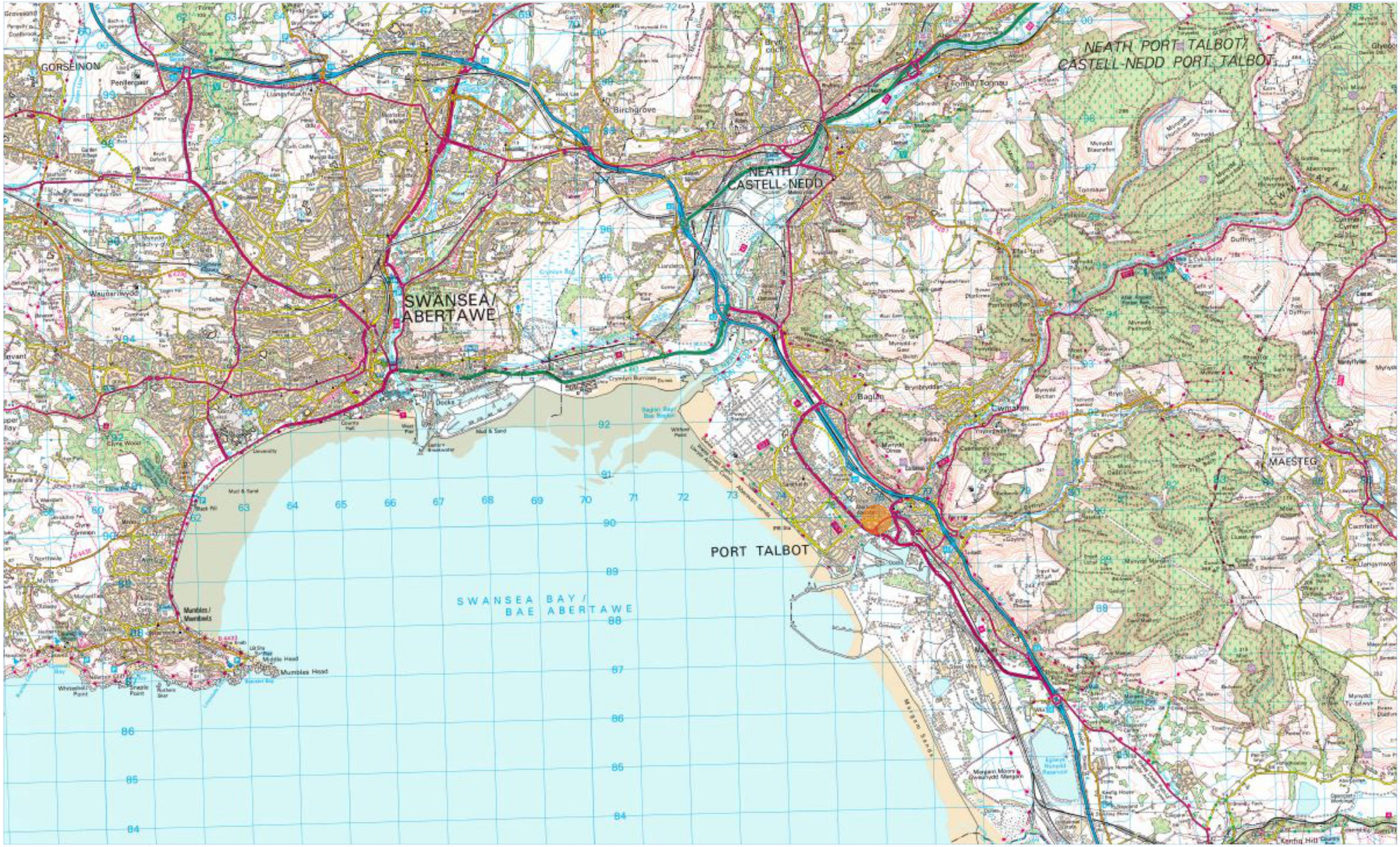
8.0 CONTINGENCY PLAN AND AREAS OF UNEXPECTED CONTAMINATION

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.

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

APPENDIX 1 - Plans



GROUNDTECH CONSULTING

CLIENT	DATE
ALDI STORES LTD	NOVEMBER 2021
PROJECT TITLE	**SCALE**
AFAN WAY, PORT TALBOT	NTS
PLAN TITLE	**PLAN NUMBER**
PROJECT LOCATION PLAN	GRO-21252-P01

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

SITE LOCATION

LEGEND

- Area of former tanks
- Area of various historical works
- Area of former Petrol Filling Station
- Area of former Pond
- Area of former Wells
- Former Tin Plate Works
- Former residential buildings
- Former Mortuary
- Substation
- Former Corporation Depot
- Historical Railway

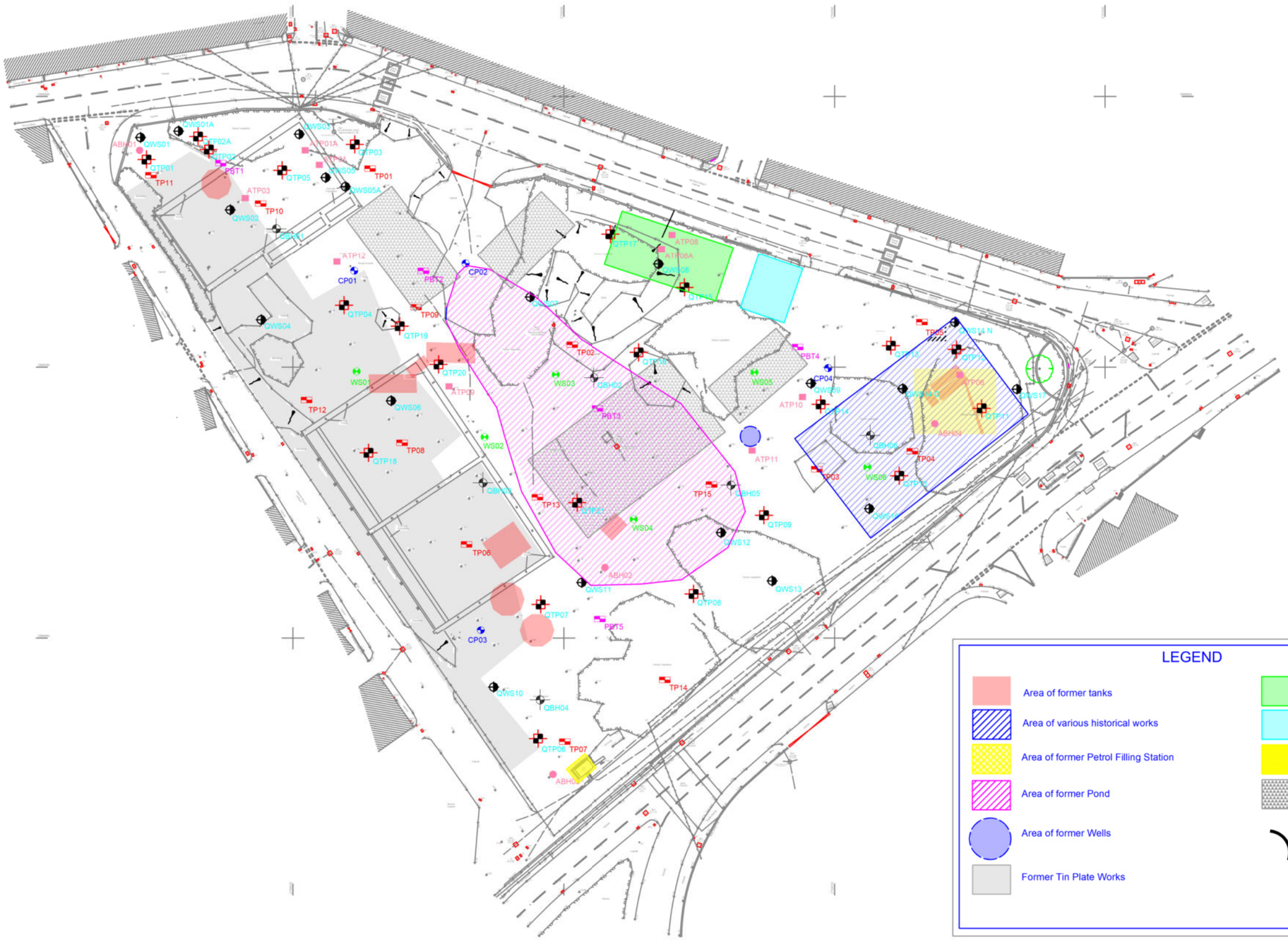
GROUNDTECH CONSULTING

CLIENT	ALDI STORES LIMITED
PROJECT TITLE	AFAN WAY, PORT TALBOT
PLAN TITLE	PRELIMINARY DEVELOPMENT CONSTRAINTS PLAN
DATE	DECEMBER 2021
SCALE	NTS
PLAN NUMBER	GRO-21252-P02

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes



LEGEND

- Area of former tanks
- Area of various historical works
- Area of former Petrol Filling Station
- Area of former Pond
- Area of former Wells
- Former Tin Plate Works
- Former residential buildings
- Former Mortuary
- Substation
- Former Corporation Depot
- Historical Railway

GROUNDTECH CONSULTING

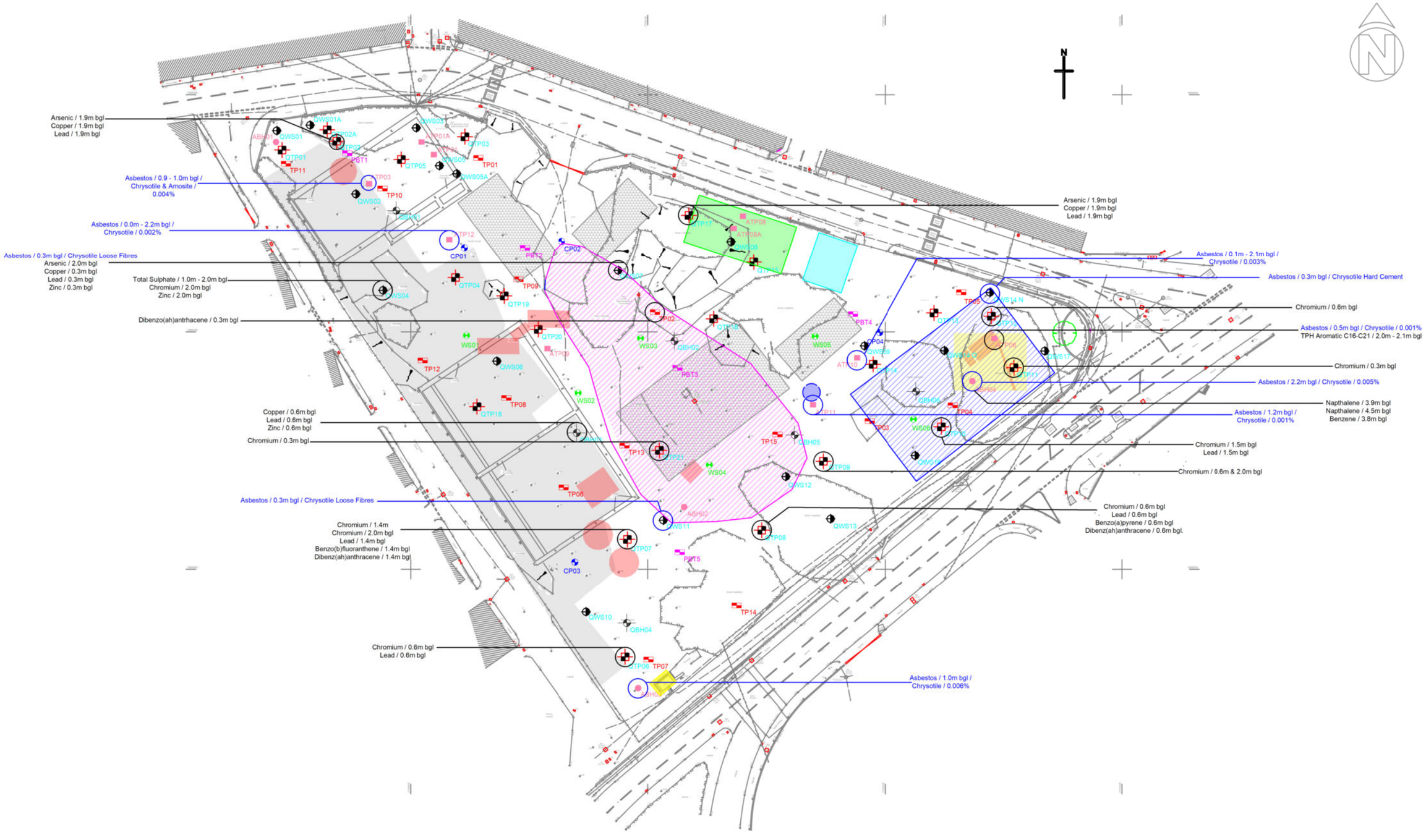
CLIENT	DATE
ALDI STORES LIMITED	DECEMBER 2021
PROJECT TITLE	**SCALE**
AFAN WAY, PORT TALBOT	NTS
PLAN TITLE	**PLAN NUMBER**
EXPLORATORY HOLE LOCATION PLAN	GRO-21252-P04

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- APPROXIMATE CABLE PERCUSSIVE BOREHOLE LOCATION
- APPROXIMATE WINDOWLESS SAMPLE BOREHOLE LOCATION
- APPROXIAMTE TRIAL PIT LOCATION
- APPROXIMATE PLATE LOAD TEST LOCATION
- ARCADIS TRIAL PIT LOCATION
- ARCADIS BOREHOLE LOCATION
- QUANTUM TRIAL PIT LOCATION
- QUANTUM WINDOWLESS SAMPLE LOCATION
- QUANTUM CABLE PERCUSSIVE BOREHOLE LOCATION



GROUNDTECH CONSULTING	CLIENT	DATE				Status	Notes
	ALDI STORES LIMITED	DECEMBER 2021				Preliminary	APPROXIMATE CABLE PERCUSSIVE BOREHOLE LOCATION
	PROJECT TITLE	SCALE				Draft	APPROXIMATE WINDOWLESS SAMPLE BOREHOLE LOCATION
	AFAN WAY, PORT TALBOT	NTS				Issued	APPROXIMATE TRIAL PIT LOCATION
	PLAN TITLE	PLAN NUMBER				For Comment	APPROXIMATE PLATE LOAD TEST LOCATION
	LABORATORY TESTING CONTAMINATION PLAN	GRO-21252-P06	Rev.	Details	Date	Approved	

APPENDIX 2 - General Requirements

1. Compliance with Legislation and Standards

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

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

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

2. Licences, Permits and Consents

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

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

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

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

3. Health and Safety Requirements

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

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

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

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

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

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

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

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

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

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

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

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

- *ASB NNLW1 – Notification of non-licensed asbestos work if the work is deemed not be requiring a licence (if required).*
- *Appropriate licence with regards to CAR 1012 if the work is deemed to require a licence.*
- *HSE Notification F10.*
- *Construction Phase Health and Safety Plan.*
- *Method Statements and Risk Assessments; Environmental Permit deployment form and associated paperwork.*
- *Discharge Consents for disposal of groundwater.*
- *Competence records (including asbestos awareness training and face-fit test records).*
- *Utility records.*
- *Plant and machinery maintenance records.*
- *Duty of Care paperwork.*

In addition, it is recommended that:

- *Asbestos Awareness training/briefing to be given to all staff.*
- *Background and ongoing air dust monitoring to be undertaken to check for presence of asbestos fibres during the works.*
- *Licensed asbestos contractors are employed to manage the licensed asbestos controlled areas, all other operatives involved in the operations must have appropriate training to satisfy the requirements of the Control of Asbestos Regulations 2012.*

4. Site Establishment and Security

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

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

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

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

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

5. Traffic Safety and Management

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

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

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

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

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

6. Welfare Facilities

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

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

7. Working Hours

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

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

8. Mobile Plant

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

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

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

- *Be sited within an oil-tight secondary containment system such as an impermeable bund.*
- *The secondary containment must provide storage for at least 110% of the 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)

The site is in an area which is considered to be at a low risk with regards to UXO. Mitigation measures will be required prior to and during breaking of ground in accordance with CIRIA C681.

10. Surveying

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

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

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

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

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

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

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

11. Testing

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

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

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

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

12. Offsite Disposal

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

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

13. Contamination

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

Safe working procedures should be implemented in accordance with CIRIA132 and good standards of personal hygiene should be observed and appropriate levels of PPE provided and utilised.

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

14. The Control of Noise, Vibration and Dust Nuisance

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

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

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

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

General

No fires shall be permitted on site.

Dust Mitigation

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

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

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

Mobile water 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

Site wide asbestos contamination has been detected in the Made Ground soils that have been screened at the site.

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

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

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

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

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

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

16. Water Quality Controls

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

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

17. Utilities

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

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

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 to avoid damage to existing structures and drains or other services to be retained.

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

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

19. Drawings and Supplied Information

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

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

20. Photographs

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

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

APPENDIX 3 - Remediation Options Appraisal

Introduction

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

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

Key Risk Drivers for Remedial Action

Groundtech Consulting Site Investigation Report has identified that the key risk drivers requiring remediation are:

- *Contaminated Made Ground*
- *Asbestos in soils*
- *Free phase hydrocarbons*
- *Risk to groundwater and the River Afan*

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 site 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:

- *Installation of a cover system in soft landscaping areas*
- *Materials management, comprising excavation, screening, and reuse of suitable material.*
- *Disposal of surplus or unsuitable soils.*
- *Piling Risk Assessment*

Materials Management

This method involves the excavation of soils, determining their suitability and replacement as part of the enabling works. A cover system is placed to form a barrier between the contaminants and site users as discussed below.

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

To prevent the contaminants being exposed in the future, specific measures can be implemented. Planning the works (in accordance with the MMP) to ensure any potential Contaminant of Concern including soils with asbestos fibres present are placed at depths or beneath the proposed hardsurfacing where the risk of future contact is low. As long as the cover system is installed in in accordance with current guidance, it will be robust and the site will not pose a risk to future site users.

Asbestos contamination within the Made Ground soils is considered wider spread. These soils should be separated and kept on site where possible. They should be placed at depths or beneath the proposed hardsurfacing.

As the exercise is predominantly earthworks, the timescales fit with the programme of the development allowing for completion of the remediation objectives and this solution can be designed and implemented within a matter of months.

Disposal of excess or unsuitable soils

Disposal involves the removal of contaminated soils and disposal at an appropriately licensed waste management facility or surplus material potentially to a recycling facility. The benefits of excavation and disposal are 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 i.e. reuse and/or treatment of general Made Ground.

Where free phase is identified on site the material should be separated and removed from site to an appropriately licenced facility.

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.

Applicability of Remediation Options and Initial Assessment – Soils

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Containment - Cover System	*Y*	*Y*	*Y*	*£*	*Weeks*	*Will break the pollution linkage between future site users and contaminants in the Made Ground.*	*Y – in conjunction with materials management.*
Excavation and Disposal	*Y*	*Y*	*Y*	*££*	*Weeks to months*	*Removal of unsuitable material and risk. Removal of free phase material.*	*Y – in conjunction with materials management.*
Containment - hydraulic barriers	*Y*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.* *CSM has identified that groundwater has not been significantly impacted by Made Ground from the site and an aquitard exists between contaminated Made Ground and the aquifer.*	*N*
Containment - in ground barriers	*Y*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.* *CSM has identified that groundwater has not been significantly impacted by Made Ground from the site and an aquitard exists between contaminated Made Ground and the aquifer.*	*N*
Soil flushing	*Y*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*
Surface amendments	*Y*	*Y*	*Y*	*£££*	*Months*	*Development already proposed to be mostly hardsurfacing which will effectively act as a cover system.*	*N*

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Soil washing	*n/a*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*
Hydraulic binders (such as cement)	*n/a*	*Y*	*Y*	*££*	*Weeks to months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*
Vitrification	*n/a*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*
Incineration	*n/a*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*
Thermal desorption	*n/a*	*Y*	*Y*	*£££*	*Months*	*Not applicable – cost and timescales not suitable for the size of commercial end use development predominantly covered with hardsurfacing. Resulting in development not being economically viable.*	*N*

APPENDIX 4 - Remedial Target Values

Remedial Target Values

Proposed End Use	Unit	Residential with Plant Uptake			Source
SOM	%	1	2.5	6	
Arsenic	mg/kg	37	37	37	LQM S4ULs
Beryllium	mg/kg	1.7	1.7	1.7	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	LQM S4ULs
Cadmium	mg/kg	10	10	10	SGVs
Chromium (Total)	mg/kg	910	910	910	LQM S4ULs
Chromium (VI)	mg/kg	21	21	21	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	LQM S4ULs
Lead	mg/kg	200	200	200	DEFRA C4SLs
Organic Mercury	mg/kg	1.2	1.2	1.2	LQM S4ULs
Nickel	mg/kg	180	180	180	LQM S4ULs
Selenium	mg/kg	350	350	350	SGVs
Vanadium	mg/kg	410	410	410	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) [vap]	330 (118) [vap]	760 (283) [vap]	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) [sol]	2400 (59) [sol]	4300 (142) [sol]	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	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]	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	LQM S4ULs
Aromatic EC 12 -16	mg/kg	140	330	660	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 [f]	540 [f]	930 [f]	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 [f]	1500 [f]	1700 [f]	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 [f]	1500 [f]	1700 [f]	LQM S4ULs
Benzene	mg/kg	0.33	0.33	0.33	SGVs
Toluene	mg/kg	610	610	610	SGVs
Ethyl Benzene	mg/kg	350	350	350	SGVs
Xylene - o	mg/kg	250	250	250	SGVs
Xylene - m	mg/kg	240	240	240	SGVs
Xylene - p	mg/kg	230	230	230	SGVs
MTBE (methyl tert-butyl	mg/kg	49	84	160	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	LQM S4ULs
Benz(a)anthracene	mg/kg	7.2	11	13	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	5*	DEFRA C4SL*/LQM S4ULs
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	LQM S4ULs
Chrysene	mg/kg	15	22	27	LQM S4ULs
Dibenz(ah)anthracene	mg/kg	0.24	0.28	0.3	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	LQM S4ULs
Fluorene	mg/kg	170	400	860	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	LQM S4ULs
Naphthalene	mg/kg	2.3 f	5.6 f	13 f	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	LQM S4ULs
Pyrene	mg/kg	620	1200	2000	LQM S4ULs
Phenol	mg/kg	420	420	420	SGVs
Asbestos	No fibres detected				

APPENDIX 5 - Limitations

Limitations

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

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

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

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

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

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

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

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

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

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

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