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CONSULTING

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Plans

Plan Reference	*Revision*	*Title*
GRO-21400-P01	*-*	*Project Location Plan*
GRO-21400-P02	*-*	*Preliminary Development Constraints Plan*
J21A89-FEAS 02	*A*	*Feasibility 02*
GRO-21400-P05	*-*	*Development Constraints 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 Holbeach.

The site was most recently occupied by two rectangular shaped commercial buildings, one along the western boundary and the other in the eastern area. The south eastern part of the site is circa 0.13 hectares in area, roughly square in shape and surfaced entirely by topsoil. A large above ground storage tank (AST) is situated in this area.

1.2 Proposed Works

Remediation will be undertaken at the site to prepare it for the demolition of the existing buildings and construction of a new Aldi store.

The client has submitted a planning application which is currently under consideration by South Holland District 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 legislation 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:

- *Delta-Simmons Phase II Environmental Assessment referenced 19-2292.01.*
- *Groundtech Consulting Geo-Environmental Appraisal referenced GRO-21400-3186, dated 25 April 2022.*
- *Groundtech Consulting Permanent Ground Gas Risk Assessment referenced GRO-21400-4202, dated 31 January 2023.*

2.0 CONCEPTUAL SITE MODEL

2.1 Site Details

The site is roughly rectangular in shape and approximately 0.81 hectares in area. The topography is generally flat lying with no notable sloped/ramped areas.

The site is occupied by two rectangular shaped buildings, one along the western boundary of the site and one within the eastern area of the site. At time of the site investigation by Groundtech Consulting, buildings within the western area of the site were still active whereas the eastern building had been vacant for some time.

2.2 Site History and Consultations

History
Historical maps date back as far as 1888 where the site was occupied by a building located in the central northern area of the site and a pond overlaps the south eastern area.

The site was initially part of a field with a building in the northern area and a pond in the south eastern area and was later utilised as a sewage works. A drain was present at the site between 1904 and 1977. The current buildings on site were constructed between 1969 and 1977.

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 not lie in a Coal Mining Reporting area.*
- *There is one recorded landfill/waste site within 250m and two further sites within 500m.*
- *There are no pollution incidents or discharge consents within 250m of site.*
- *The site is not within a flood risk zone.*

2.3 Geology and Hydrogeology

Geology
Made Ground is indicated to underlie the entirety of the site on the available geological plans. The superficial deposits are indicated to be Tidal Flat deposits which characteristically comprises Clay and Silt. The bedrock is indicated to be underlain by the West Walton Formation which typically consists of Mudstone and Siltstone.

Hydrogeology
The superficial and bedrock deposits in this area are classified by the Environment Agency as Unproductive Aquifers.

The site is not indicated to lie within 500m of a Source Protection Zone or 2000m of a groundwater/potable water abstraction licence.

2.4 Hydrology

No named watercourses are present in the vicinity of the site. The nearest unnamed watercourse is an inland river located 128m south east of the site, this is defined as an Old River (Drain).

Environment Agency information indicates that the site is within a Flood Zone 2 and 3. The Risk of Flooding from Rivers or Seas is classified as being Low.

One surface water abstraction is located 798m west of the site and is associated with spray irrigation at P & L Hayes Farm.

2.5 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 to Moderate*
Permanent Ground Gas	*High*

2.6 Scope of Works

The following scope of works was undertaken by Groundtech Consulting between the 24th January and 28th January 2022:

- *Three Cable Percussive Boreholes (CP1 to CP3) were drilled to 25.0m bgl using a Dando 3000 cable percussive drilling rig.*
- *Fifteen Windowless Samples Boreholes (WS01 to WS15) were drilled to 4.45m bgl using a Dando Terrier Windowless Sampling Rig. An exception to this was WS12 which was terminated at 0.5m bgl due to a concrete obstruction.*
- *Three Soil Percolation Tests (SuDS1, SuDS2 and SuDS2a) were excavated at depths of between 1.8m to 2.7m bgl using a JCB 3CX where soil percolation testing was undertaken.*

2.7 Ground Model

Surfacing populations encountered at the site consisted of tarmac within the central and western areas, very gravelly sand within the north eastern area and very gravelly sandy topsoil within the south eastern area.

Four main Made Ground populations were identified during the investigation and are described below:

- *Pale brown sandy gravel in all exploratory holes excluding WS12, WS13 and WS15 between depths of 0.05m and 0.7m bgl.*
- *Black ashy gravel in WS8 and WS12 between 0.05m and 0.35m bgl.*
- *Very soft gravelly clay was in CP2 between 0.3m to 2.5m bgl.*
- *Demolition material inclusive of bricks, roof tiles and suspected asbestos sheeting was encountered within SuDS2, which was coated in a black hydrocarbon odorous liquid between depths of 0.5m to 1.3m bgl.*

A number of stockpiles of demolition material was identified during the Ground Investigation within the central area of the site. This comprised of brick and cinder block rubble assumed to be associated with the internal walls of the former gym on site as well as house hold wates including mattress.

Three main natural stratification encountered during the investigation and are described below:

- *Very soft to soft gravelly Clay in all of the exploratory holes from a minimum depth of 0.4m to a maximum depth of 9.0m bgl.*

- *Loose to medium dense very clayey very silty Sand in CP1 to CP3 between depths of 5.0m and 16.0m bgl.*

- *Firm to stiff gravelly Clay in CP1 to CP3 between depths of 13.0m and 19.7m bgl.*

Bedrock was encountered in CP1 to CP3 from depths of between 18.2m and 19.7m bgl and comprised extremely weak Mudstone residually weathered recovered as stiff gravelly silty Clay.

Groundwater
Shallow groundwater strikes were observed beneath the site between depths of 0.8m and 1.5m bgl, this was encountered within all locations within the Tidal Flat deposits.

A second groundwater strike was observed within CP1 at 9.0m and CP3 at 9.5m bgl within clayey silty Sand.

2.8 Geo-Environmental Testing Results

A summary of the soil testing results is provided below:

Metals
Based on the site being developed commercially, no elevated concentrations of metals have been recorded during either investigation carried out at the site.

Speciated Polycyclic Aromatic Hydrocarbons (PAHs)
One elevated concentration of speciated PAHs was detected through the laboratory testing in relation to a commercial end use. This comprised an elevated concentration of Dibenzo(ah)anthracene within WS01 at 0.2m bgl. This borehole is located within the most southern part of the site and contamination is presumed to be associated with tarmac surfacing in this area.

During the previous investigation undertaken by Delta Simons, three elevated concentrations of Dibenzo(ah)anthracene were recorded at locations DS104, DS107 and DS110 in the vicinity of the AST and in the central area of the site. The concentrations recorded were between 3.8mg/kg and 11.0mg/kg which are above commercial screening values.

Two elevated concentrations of Chrysene were also recorded at locations DS107 and DS110 with values of 41.0mg/kg and 68.0mg/kg recorded respectively.

The elevated speciated PAHs recorded during the previous investigation are all associated with the tarmac surfacing above the subbase material tested.

Total Petroleum Hydrocarbons (TPH CWG)
Eight samples were tested for TPH CWG, the results for these samples were all generally below the relevant screening values for commercial land use, this is inclusive of locations CP1, CP2, CP3, WS12 and WS14 which are within the vicinity of the AST which indicates this has not impacted the soils in this area. Although, no elevated TPH concentrations were detected by the previous investigation when compared to commercial screening values. The highest concentrations were recorded at locations DS104, DS107 and DS110 these are in the vicinity of the

former tank and in the central area of the site. It is likely that this is associated with spillages from the tank however, this was not encountered during the investigation.

High concentrations of heavy end hydrocarbon fractions have been recorded in WS02 and WS08 where the observed visual contamination at this site was noted. This relates to the ashy material encountered and is considered to be the source of this contamination.

Moderate hydrocarbon concentrations recorded at location SuDS2 within the mid to heavy end fractions and also BTEX detected above laboratory detection limits at this location only. This is likely to be associated with free phase hydrocarbons observed in the former pond/landfill. As this exceeded the screening levels, as a minimum this should be removed from the site.

Polychlorinated Biphenyl (PCBs)
Testing was undertaken on one sample from WS10 at 0.3m bgl. This location was directly adjacent to the electricity substation located on site and was therefore in the area of most concern from PCB contamination. A concentration of less than 0.01mg/kg was recorded which is below laboratory limits of detection.

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)
Five samples have been screened for Volatile Organic Compounds (WS03 at 0.3m, WS04 at 0.35m, WS09 at 0.5m, WS12 at 0.5m, WS13 at 0.1m) and all concentrations have been recorded at less than laboratory detection limits.

Asbestos
No asbestos was detected in the samples of Made Ground that were screened during the Groundtech Consulting investigation. However, asbestos was detected in the previous investigation by Delta Simmons in DS107 at 0.3-0.4m bgl and DS110 at 0.15-0.20m bgl, both identified as being Chrysotile quantified as <0.001mass % (i.e. trace).

Further Investigation
The above results are based on the investigation works carried out to date. Further investigation of the previously inaccessible areas currently occupied by buildings will be required.

2.9 Ground Gas

During the monitoring period, carbon dioxide concentrations recorded are typically less than 3.5% v/v. However, carbon dioxide concentrations have reached 32.2% v/v at a single location (WS14) and is likely associated with the former infilled pond/landfill which was identified as a potential ground gas source that is located immediately south of WS14.

High methane concentrations, up to a maximum concentration of 67.3%v/v, have been recorded across the development area and are likely to be associated with the natural organic Tidal Flat Deposits encountered beneath the site or the infilled pond/landfill, drain feature or sewage works.

When considering the results, in accordance with CIRIA C665 (Section A Development and Table 8.5 – Modified Wilson and Card Classification) it can be seen that the GSV values for methane and carbon dioxide correspond with CS1 criteria (GSV of less than 0.07 l/hr). However, significantly high concentrations of methane and carbon

dioxide have consistently been recorded above the respective threshold values of 1.0% v/v for methane and 5.0% v/v for carbon dioxide and the classification of the site has been increased to CS3 based on the levels recorded.

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

2.10 Remedial Strategy

Soils
The site will be covered with hardsurfacing which is effectively act as a cover system and remedial measures are not required.

As a minimum, free phase contamination will require removal offsite and should be disposed of at a suitably licensed waste facility. The free phase in SuDS2 is likely present offsite if associated with the former pond situated in this area.

In areas of proposed soft landscaping, a cover system should be placed. It is recommended that a minimum 300mm of "clean" topsoil/subsoil be placed.

Stockpiles identified on the site require removing to a suitably licensed waste disposal facility.

Vapours
Hydrocarbons in the volatile range have been detected at location SuDS2 in the south east of the site where free product was observed during the investigation. Hydrocarbon concentrations have been detected above the vapour saturation limit at this location which is close to or within the footprint of the proposed Aldi store depending on the finalised development layout. Excavation and removal of all free product and hydrocarbon impacted soils in the vicinity of SuDS2 should be carried out and will effectively remove the vapour source. If remediation can be undertaken successfully by excavation and removal, then no further measures will be required with respect to vapour. Alternatively, a vapour resistant membrane may be required.

Controlled Waters
Localised mobile contamination has been encountered in the vicinity of SuDS2 and any free phase hydrocarbon contamination should be excavated and removed off site as a minimum.

Ground Gases
Based on the results of ground gas monitoring, the site has been placed in CS3 and gas protection measures are required.

Watching Brief
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.

2.11 Ground Engineering

The most suitable solution for the proposed development is considered to be driven pile foundations transferring loads through the underlying Made Ground and Tidal Flat Deposits to the natural high to extremely high strength Clay encountered from depths between 18.2m and 19.7m bgl.

Preliminary foundation design has been undertaken by calculation, for a single square 300mm pile end bearing in the high strength Clay at 20.0m bgl, a vertical allowable load of 150kN has been calculated. If greater loads are required, the diameter of the piles should be increased and/or the piles installed in groups. This should be considered once the loadings are confirmed.

A suspended floor slab is recommended for the proposed development due to the compatibility with the proposed pile foundation solution and also due to the presence of cohesive deposits underlying the site which may be affected by the influence of existing, proposed or recently removed trees.

SuDS drainage is not considered to be feasible at the site due to the poor soil infiltration rates observed in the natural cohesive deposits which are present across the site and the high groundwater table.

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*	*Hardstanding cover of proposed development will act as a cover layer.*
Site End Users (Asbestos)	*Very Low*	*No sources identified by Groundtech Consulting. Delta Simmons identified 2 samples with trace asbestos.*
Site End Users (Potable Water Supply)	*Low to Moderate*	*Made Ground present at installation depth.*
Site End Users (Ground Gas)	*Moderate to High*	*Gas monitoring results place site in CS3.*
Site End Users (Radon Gas)	*Low*	*No measures required.*
Adjacent Residents	*Low*	*Mobile contamination not identified and contaminative sources identified onsite are indicative of the surrounding area*

3.2 Controlled Waters

Receptor	Level of Risk	Comments
Unproductive Aquifer	*Low*	*Proposed development will be hardsurfaced and a new drainage system installed.*
Mill Lease Stream	*Low*	*Sufficient attenuation distance is considered to exist.*

3.3 Groundworkers

Receptor	Level of Risk	Comments
Contractors	*Low*	*Standard PPE*

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. ***Verification Report*** *which will provide a complete record of the remediation activities undertaken during the enabling phase as part of the verification plan to support compliance with remediation objectives and criteria. The report will also contain descriptions of the works including photographic evidence and details of any unexpected conditions encountered during the remedial works and how they were dealt with.*

3. ***Gas Precautions Validation Report*** *will validate the suitability of the installation gas precaution measures.*

4. ***Cover System Validation Report*** *will validate the suitability and depth of cover system in garden and Public Open Space 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 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:

- *Enabling Works Phase.*
- *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.*
- *Installation of ground gas precautions.*
- *Disposal of excess or unsuitable soils.*

4.2 Enabling Works Phase

The following works are considered necessary:

- *Demolition of existing structures.*
- *Additional Ground Investigation post demolition in building footprint.*
- *Vegetation clearance and topsoil strip.*
- *Removal of stockpiles.*
- *Picking of Asbestos Containing Materials (ACMs) where observed.*
- *Former Pond/Landfill as well as any Free Phase Contamination and removal from site.*
- *Decommissioning and removal of the AST.*
- *Reuse of appropriate soils.*
- *Offsite disposal of unsuitable or excess material.*
- *Watching Brief during enabling exercise.*

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.

Additional Ground Investigation
Further investigation of the area of the inaccessible building will need to be undertaken as part of the enabling works, post demolition of the existing buildings onsite. This is due to the historic uses including the railway track that covered the site, and garages which may have backfilled inspection pits. Potentially deep Made Ground could be present that is contaminated with various CoC including metals, herbicides, hydrocarbons, VOCs, fuels/ oils and asbestos could be present.

4.3 Construction Phase

The construction phase of works will comprise the following:

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

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

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

The above ground storage tank located in the south east of the site should be decommissioned, emptied and removed offsite by an approved contractor.

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

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

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

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

Stockpiled and tipped waste currently present across the site will require removal to a suitably licenced waste disposal facility.

The 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.

The high groundwater table at the site may be an issue during development when excavating soils for removal from site. Dewatering of excavations is anticipated to be necessary. The risk from groundwater flooding at the site is considered to be negligible.

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

The 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. During the Ground Investigation concrete obstructions were encountered in CP2 at 2.5m bgl ad WS12 at 0.5m bgl and will require grubbing up for the proposed piling of the development.

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 contractor shall survey to Ordnance Survey Grid the base and sides of all excavations and will provide a composite base of excavation drawing for reference during the works, and as built records.

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

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

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

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

Activity E3 – Additional Investigation

Further investigation of the area of the inaccessible building will need to be undertaken as part of the enabling works, post demolition of the existing buildings on the site. This is due to the historic uses including the railway track that covered the site, and garages which may have backfilled inspection pits. Potentially deep Made Ground could be present that is contaminated with various Contaminants of Concern (CoC) including metals, herbicides, hydrocarbons, Volatile Organic Compounds (VOCs), fuels/ oils and asbestos could be present.

Activity E4 – Excavation of Free Phase Contamination.

Free phase contamination was encountered in SuDS2 along the eastern site boundary within the area of material likely associated with the infilled pond. This material will require removal and segregation.

The material excavated will require excavating and bunded in a visqueen covered area to prevent further migration of contamination. Geoenvironmental testing should then be undertaken for waste disposal; purposes to allow the material to transported to a suitable waste facility.

Free Phase contamination is not anticipated to be present within the groundwater. If free phase contamination is encountered on the groundwater this will need to be absorbed or skimmed.

The excavation should be validated at a frequency of one sample per $10m^2$ to confirm the remaining material is suitably clean for commercial end use. The remedial target values are presented in *Appendix 4*. The excavation should then be backfilled using with suitably engineered fill. Evidence of the backfilled pond was not encountered in WS14 or WS15 and therefore it is not anticipated to extend beyond these locations to the north and west.

Free phase contamination will require removal offsite and should be disposed at a suitably licensed waste facility. The free phase in SuDS2 is likely present offsite if associated with the former pond located in this area. Therefore, an in-ground barrier along the site boundary is required to prevent offsite contamination migrating onto the site.

The historic drain running through the centre of the site was encountered in CP2 at 2.5m bgl and should be chased out and grubbed up as part of the enabling works.

Activity E5 – Contaminated Made Ground/Watching Brief

No elevated concentrations of any CoC have been recorded in excess of their respective GAC.

A watching brief should be kept during the works by an independent environmental Consultant and if impacted material is present during excavation, these materials should be stockpiled separately for testing prior to reuse if suitable.

Areas of concern include the following:

- *Historic pond/Landfill*
- *Drain*
- *Historic sewage works*
- *Above ground Storage Tank (AST)*

Activity E6 - Decommissioning and Removal of AST

The above ground storage tank located in the south east of the site should be decommissioned, emptied and removed offsite by an approved contractor.

The contractor carrying out the work to render the tank safe by whichever method should complete two copies of the decommissioning certificate. One copy should be left with the site operator and the other forwarded to the Licensing Authority.

The procedure for decommissioning and removal of the AST that will be undertaken at the subject site is outlined in the following section.

1. Removal of Residual Product

The fuel tank should be emptied, decommissioned, and removed off site by a specialist contractor.

2. Inerting – Water Fill Method

The following method of inerting the tank to remove the risk of explosion shall be adopted by the competent person and/or company carrying out the task.

In the case of multi-compartment tanks, all compartments and suction pipes should be disconnected and the tank connecting points effectively sealed. The tank should then be filled completely with water with care being taken to ensure that any water or residual product does not overflow from the fill point.

Surplus water or residual product should, if necessary, be removed from the fill pipe to avoid an outflow when the vent pipe is disconnected from the tank. Any surplus water or residual product should be disposed of safely.

Finally, the tank connection point and fill point should be effectively sealed.

The effectiveness of the water fill method as an inhibitor is dependent on the tank remaining full of water. It is therefore important that periodic checks are made to ensure that there is no reduction in the water level during the course of the work.

When the tank is ready for removal, the water should be drained and conveyed to a site authorised for the handling and disposal of contaminated waste.

Complications may occur with this method if the tank has holes causing flooding. If this occurs, the work should stop, the water pumped out of the tank and an alternative method used instead.

3. Inerting – Nitrogen Method

If the above method of inerting is unsuccessful then the following alternative method should be utilised.

Nitrogen gas is to be passed continuously into the tank at one point, while the air and petroleum vapour being purged leaves from another opening such as the flame trap outlet.

Nitrogen gas should be introduced directly from an industrial gas supplier's road tank vehicle that is fitted with the necessary reducing valves and measuring equipment.

The tank, and in the case of multi-compartment tanks, all compartments should be bottomed, and all openings sealed except those required for the inlet of Nitrogen and for the exhaust outlet to atmosphere (the exhaust outlet should be of sufficient size so as to prevent the build-up of pressure in the tank). The Nitrogen should then be introduced and the mixture leaving the tank should be vented to atmosphere so that the tank remains at atmospheric pressure throughout the entire operation. If approximately five tank volumes of nitrogen are used, the final oxygen level will be circa 1%.

Following completion of the purging, the openings should be sealed and the tank may then be removed.

During the removal, all holes found in the tank should be securely plugged with wooden plugs.

If removal takes place immediately after purging the tank, a small vent should be left in the tank to allow excess pressure to escape.

4. Transportation Offsite

The tank is to be transported offsite for dismantling upon removal. Prior to transportation, the following procedures will need to be undertaken:

- *All pipework connected to the tank should, as far as is reasonably practicable, be removed.*
- *All openings to the tank, including any pipework remaining attached to it should be sealed to prevent the escape of the inerting atmosphere or liquid.*
- *A suitable pressure relief valve should be fitted to the tank and individual compartments in the case of a compartmental tank.*
- *Any holes in the tank caused by corrosion or damage during removal should, so far as is reasonably practicable, be sealed to prevent the escape of the inerting atmosphere or liquid.*

The person responsible for the removal of the tank should ensure that the recipient of the tank is made aware of the tank's previous use, the toxic hazard within the tank and the need to take adequate precautions against fires and explosions when dealing with it.

Prior to transportation, the Licensing Authority should ascertain the destination of the tank(s) and should inform the relevant Petroleum Licensing Authority.

The removal of all tanks, pumps and associated infrastructure should be completed under supervision by Groundtech Consulting.

Activity E7 - Asbestos Mitigation

Asbestos has not been detected in the soil samples that have been screened. Asbestos was identified during the previous investigation undertaken by Delta Simons in two of the samples of Made Ground collected from DS107 at 0.3-0.4m bgl and DS110 at 0.15-0.20m bgl. Both detected Chrysotile which was quantified as <0.001mass % (i.e. trace concentrations).

As there is a low to very low risk from asbestos fibres based on the concentration recorded, the JIWG assessment recommends the following when groundworkers disturb the subbase materials as part of the enabling works. It is the responsibility of the contractor to implement control measures to their satisfaction.

- *RPE should be worn (EN140 with P3 filter half mask).*
- *Dust suppression should be carried out to reduce the potential for fibre release.*
- *Localised and enhanced personal decontamination facilities should be provided.*

During the enabling works a watching brief should be maintained for evidence of Asbestos Containing Materials (ACMs).

Possible ACMs were encountered in SuDS2wihtin the Made Ground between the depths of 0.3m bgl and 1.3m bgl. This will require removal in accordance with CAR2012.

Activity E8 - Reuse of Soils and Placement of Soils

Testing of soils prior to placement is required as set out in this Remedial Specification. Filling of the site should be undertaken in accordance with an approved earthworks specification.

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

Activity E9 - 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 contractor at the contractors cost.

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

Activity E10 - 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 by the contractor and all sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2015 'Code of Practice for Site Investigations' and BS 10175:2011+A1:2013 'Investigation of Potentially Contaminated Sites – Code of Practice'.

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

Additional testing will be undertaken as part of the further investigation in previously inaccessible areas.

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 E11 - Contractor's Validation REcords

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

All reports provided by the 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 contractor in accordance with local water company risk assessment. The works are to be validated by the contractor, who is to provide to Groundtech Consulting:

- *Provision of delivery tickets showing correct potable supply pipework has been delivered to site.*
- *Photographic proof that 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 areas of soft landscaping to reduce the risk to an acceptable level. The cover system installation by the ground works contractor should be undertaken in the following steps:

1. *Undertake geo-environmental testing and assessment of all imported soils (cohesive and granular) to establish they are suitable for use.*
2. *Install drainage and other services and storing excavated clean soils appropriately for re-use in soft landscaping areas.*
3. *In areas of proposed soft landscaping a cover system should be placed, comprising a minimum 300mm of "clean" topsoil/subsoil be placed.*
4. *Validation of the cover system to be undertaken by Groundtech Consulting.*

Activity C4: Importation of Cover System Materials and General Fill

Physical Requirements of Cover System Soils and General Fill

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

The imported material is to be confirmed by visual inspection of the material by the consultant and if necessary, by laboratory particle size distribution assessment. Topsoil and subsoil should be free from:

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

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, chemical 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 C5: Ground Gas Protection Measures

High methane concentrations have been recorded across the development area and are likely associated with the natural organic Tidal Flat Deposits encountered beneath the site or the infilled pond/landfill, drain feature or sewage works.

The proposed commercial development is classified as a Building Type C in accordance with BS 8485:2017 and the site has been classified as CS3. 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 CS3 conditions.

Gas precautionary measures outlined in BS 8485:2017 should include at least two of the following to reach the required number of protection points:

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.

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.

If it can be proved that remediation of the infilled pond has been undertaken to reduce the concentrations of hydrocarbons to an acceptable level a vapour resistant membrane will not be required.
The ground gas protection measures are to be validated post installation.

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 Environment Agency prior to being undertaken on site.

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

6.1 Site Supervision

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

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

Groundtech Consulting will need to be present to supervise the additional investigation in previously inaccessible areas.

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.

All testing should be carried out 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.*
- *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 any ACM encountered during the works (type location and action).*
- *Records of laboratory analytical and in situ field test results, including:*
    - *Laboratory results and location plan for each analytical test.*
    - *Field test kit results and particulars of monitoring (e.g. date, location, personnel).*
    - *Laboratory measurements of accuracy and precision.*
    - *Calibration data for field measurement equipment in accord with manufacturers guidance.*
    - *Chain of Custody forms.*
    - *Copies of the certificates for chemical 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.*

6.4 Ground Gas Verification

Ground gas mitigation measures shall be installed by a suitable contractor in accordance with CIRIA 665 and BS 8485. Validation of ground gas membranes will be undertaken in accordance with CIRIA 735.

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 general 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 screening values.*

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 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, excluding the area of internal contaminated slab.*
- *Placement of soils as set out in this Remedial Specification.*
- *Excavation of former pond and placement of in ground barrier.*

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 onsite 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 On Site Reuse – Excavated Material

Any soils proposed for reuse have already been tested during the Groundtech Consulting Ground Investigation with the exception of the material to be investigated beneath existing buildings.

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 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.

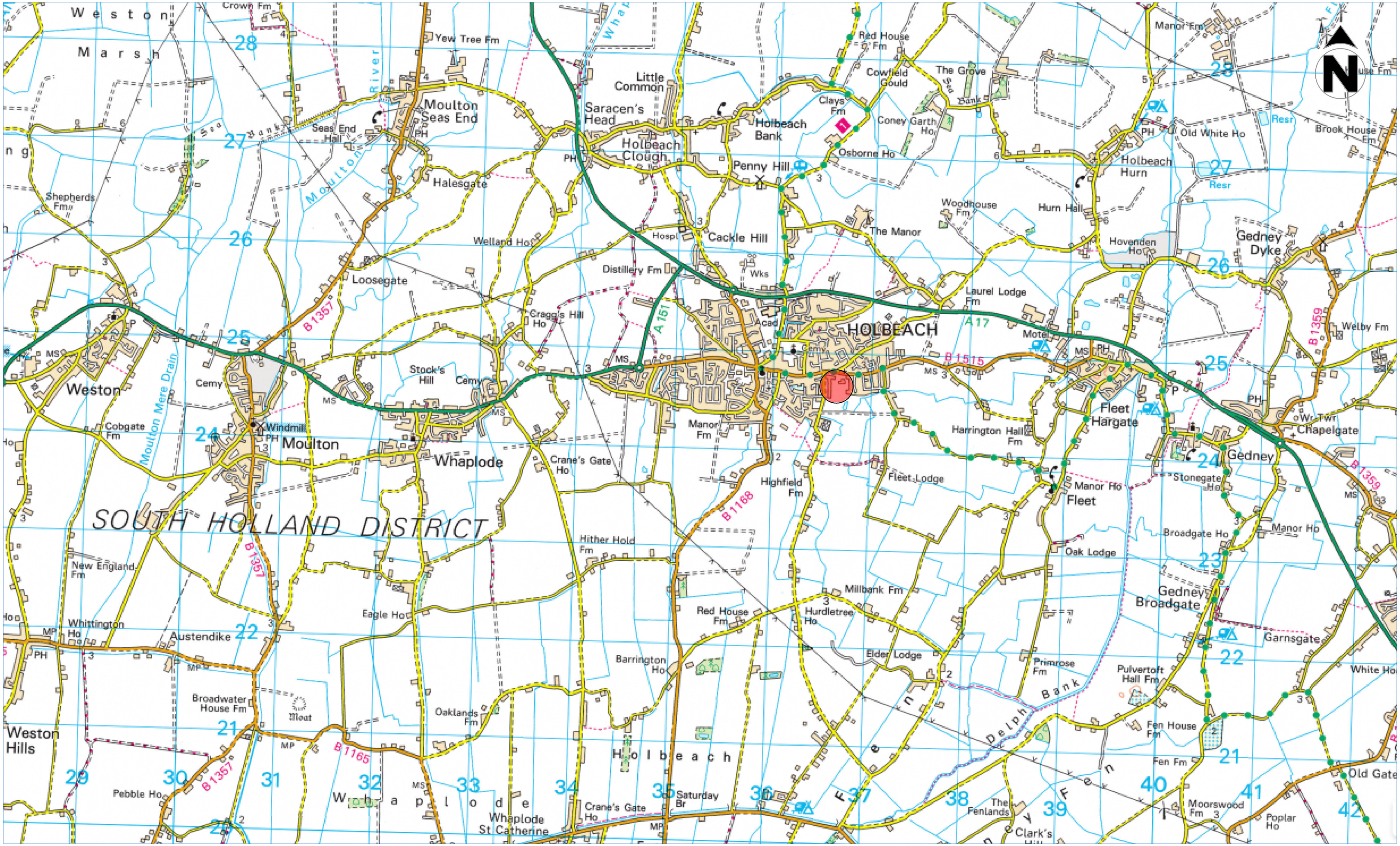
8.0 CONTINGENCY PLAN AND AREAS OF UNEXPECTED CONTAMINATION

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.

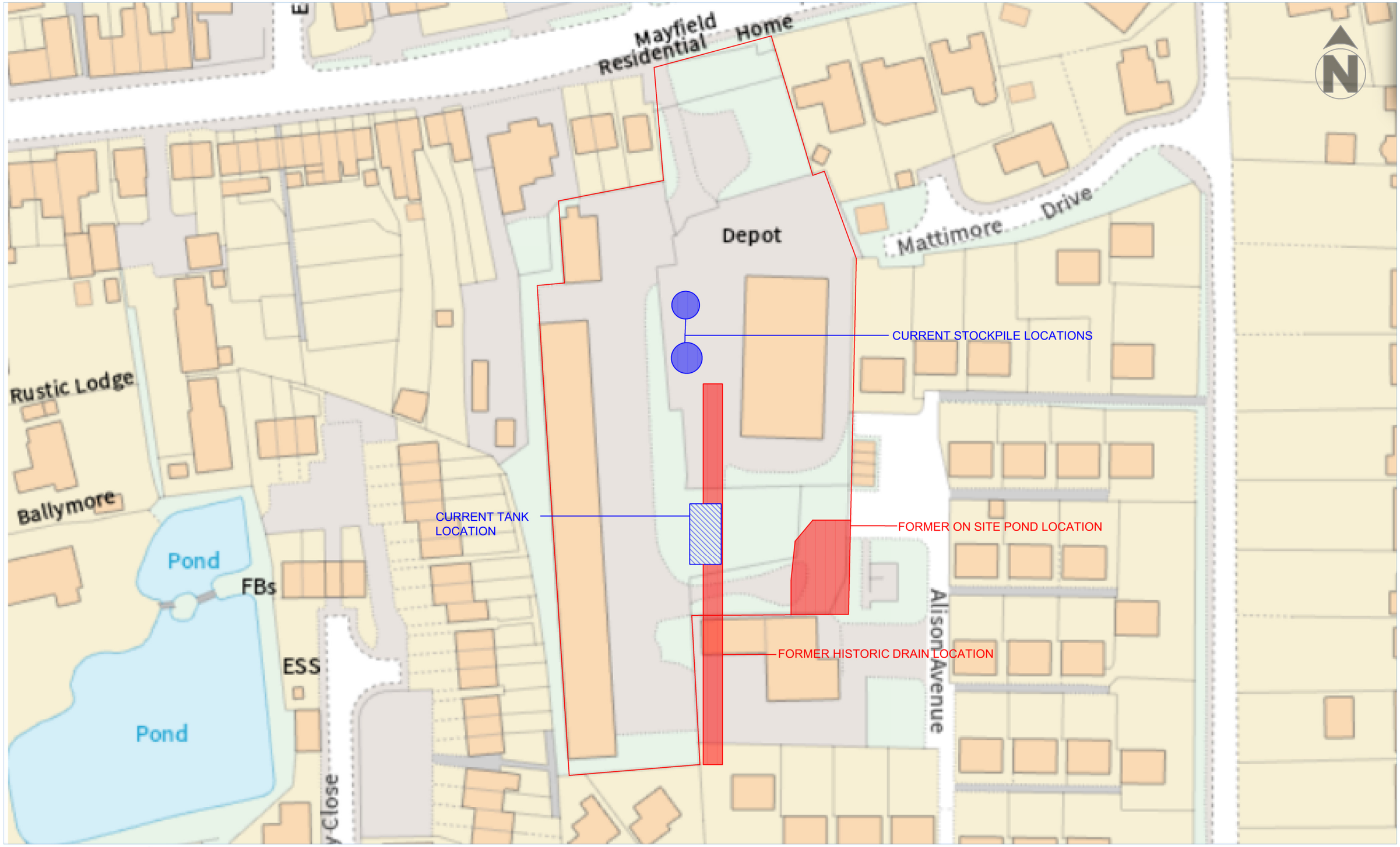
APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT ALDI STORES LIMIED	DATE FEBRUARY 2022		Status
	PROJECT TITLE ALDI HOLBEACH	SCALE NTS		Preliminary Draft Issued For Comment Approved
	PLAN TITLE PROJECT LOCATION PLAN	PLAN NUMBER GRO-21400-P01	Rev. Details Date	

Notes

SITE LOCATION



GROUNDTECH CONSULTING

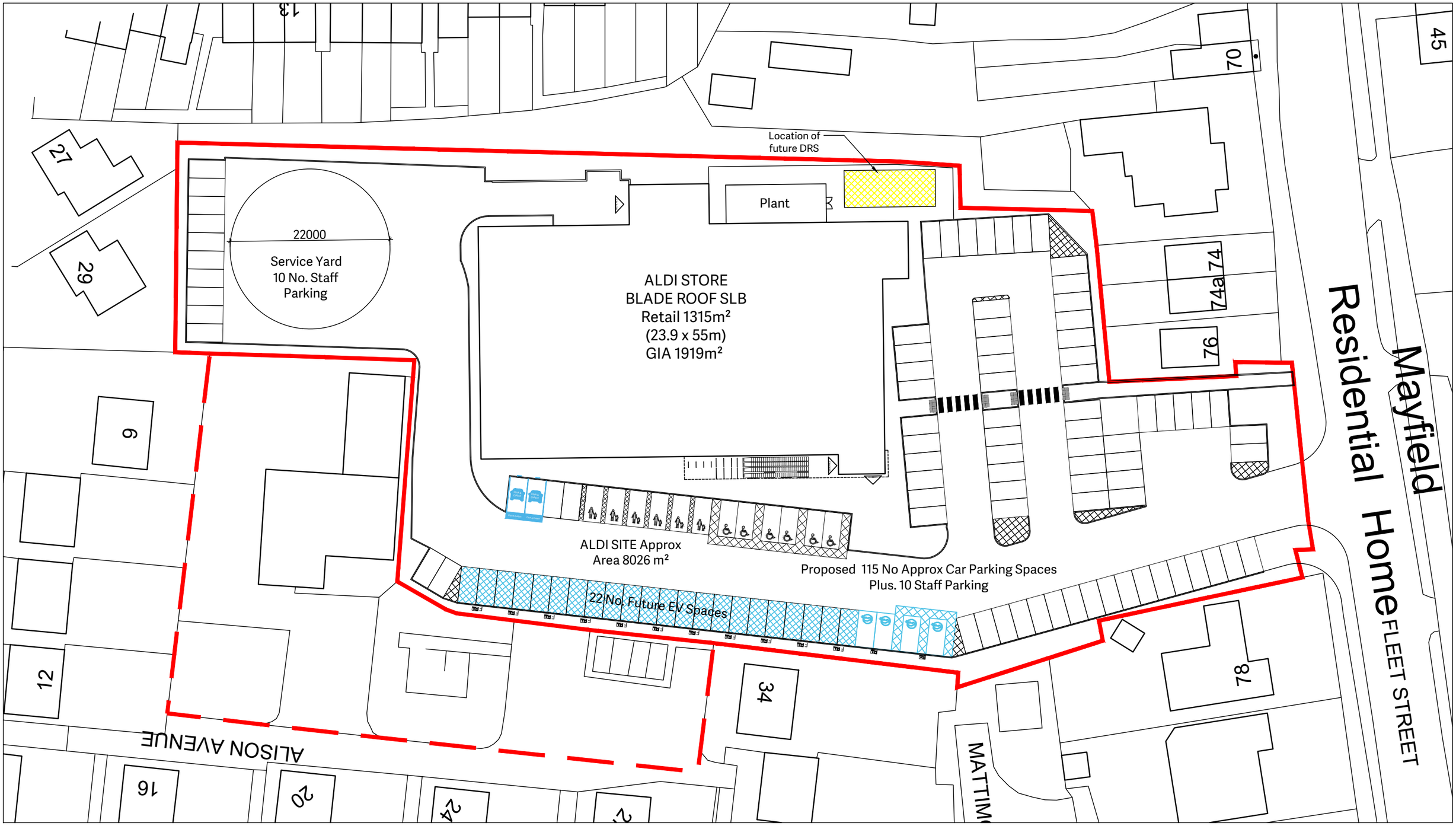
CLIENT	ALDI STORES LIMITED
PROJECT TITLE	HOLBEACH
PLAN TITLE	PRELIMINARY DEVELOPMENT CONSTRAINTS PLAN
DATE	FEBRUARY 2022
SCALE	NTS
PLAN NUMBER	GRO-21400-P02

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- CURRENT PRELIMINARY DEVELOPMENT CONSTRAINTS
- SITE BOUNDARY
- HISTORIC PRELIMINARY DEVELOPMENT CONSTRAINTS

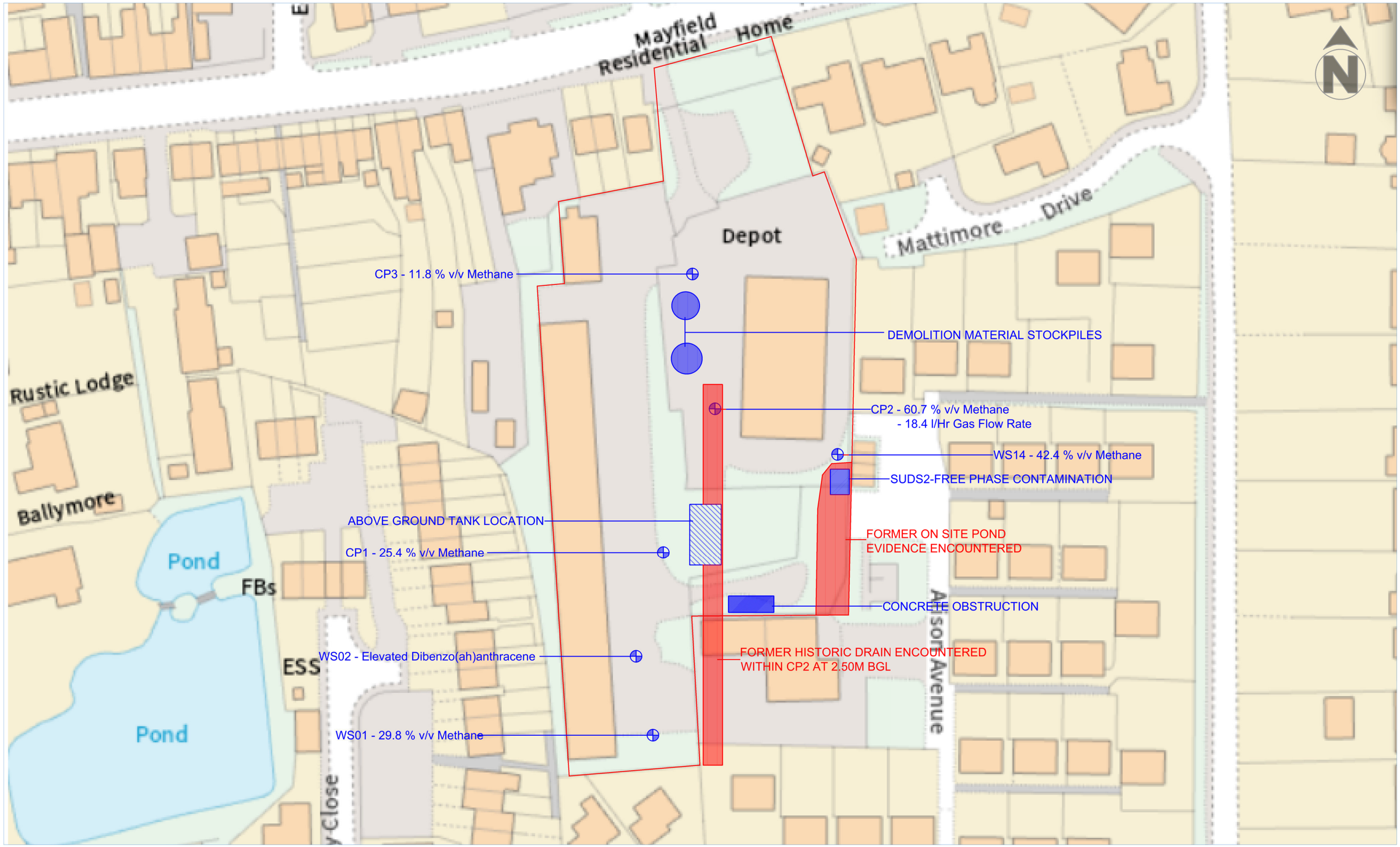


STOAS ARCHITECTS

THE LODGE - COLESHILL MANOR - BIRMINGHAM - B46 1DL - TEL 0121 747 1943
1 DUNSTON PLACE - DUNSTON ROAD - CHESTERFIELD - S41 8NL - TEL 01246 389 860

CLIENT	ALDI STORES LIMITED	SCALE	1:500 @ A3	DRAWN	LC
PROJECT	FLEET STREET, HOLBEACH	DATE	02/09/2021	CHECKED	MSB
TITLE	FEASIBILITY 02	DWG No.	J21A89 - FEAS 02	REV	A

ALL DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO ANY SHOP OR SITE WORKS BEING COMMENCED. ANY DISCREPANCIES TO BE REPORTED TO STOAS ARCHITECTS BEFORE ANY WORK IS PUT IN HAND. DO NOT SCALE FROM THIS DRAWING. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT CONSULTANTS' AND SPECIALISTS' DRAWINGS. THIS DRAWING IS THE PROPERTY OF STOAS ARCHITECTS. COPYRIGHT IS RESERVED BY THEM AND THE DRAWING IS ISSUED ON THE CONDITION THAT IT IS NOT COPIED, REPRODUCED, RETAINED OR DISCLOSED TO ANY UNAUTHORISED PERSON EITHER WHOLLY OR IN PART WITHOUT THE WRITTEN CONSENT OF STOAS ARCHITECTS.



GROUNDTECH CONSULTING

CLIENT	ALDI STORES LIMITED
PROJECT TITLE	HOLBEACH
PLAN TITLE	DEVELOPMENTS CONSTRAINTS
DATE	MARCH 2022
SCALE	NTS
PLAN NUMBER	GRO-21400-P05

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- CURRENT DEVELOPMENT CONSTRAINTS
- SITE BOUNDARY
- HISTORIC DEVELOPMENT CONSTRAINTS

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.

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

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

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

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

6. Welfare Facilities

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

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

7. Working Hours

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

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

8. Mobile Plant

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

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

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

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

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

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

9. Unexploded Ordnance (UXO)

The site is in an area which is considered to be at a low risk with regards to UXO.

10. Surveying

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

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

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

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

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

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

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

11. Testing

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

12. Offsite Disposal

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

WAC testing should be undertaken on material exported from site to landfill, or other appropriately licensed facility. Material shall be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991, Environmental Permitting (England and Wales) Regulations 2016 and where appropriate the

Special Waste Regulations, 1996 and Hazardous Waste (England and Wales) Regulations 2005. A transfer note shall be completed, signed and retained by all parties involved. The transfer note shall state the volume of waste, the nature of the material and statement to the chemical composition. The waste transfer notes shall be kept by the Contractor for a period of at least 2 years.

13. Contamination

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

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

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

14. The Control of Noise, Vibration and Dust Nuisance

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

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

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

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

General

No fires shall be permitted on site.

Dust Mitigation

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

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

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

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

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

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

With regards to stockpiles:

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

Odour

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

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

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

Noise

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

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

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

15. Asbestos in Soils

Asbestos fibres have been identified locally in the Made Ground soils that have been screened at the site during previous Ground Investigation works by Delta Simons. A watching brief should be maintained during future ground works.

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. 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:

- *Potentially contaminated Made Ground beneath the existing structures.*
- *Decommissioning and removal of an AST.*
- *Installation of a cover system in soft landscaped areas and POS.*

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 in 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.*
- *Decommissioning and removal of an AST.*
- *Materials management, comprising excavation, screening, and reuse of suitable material.*
- *Disposal of surplus or unsuitable soils.*

Cover System

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

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

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

The hardsurfacing will effectively act as a cover system for the majority of the commercial end use site.

Materials Management

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

This option is technically simple and represents a low-cost strategy that can be implemented rapidly. There is a main disadvantage 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 are placed at depths or beneath the proposed hardsurfacing where the risk of future contact is low.

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.

Unsuitable material will be disposed off site, this will include the arisings from the historic pond and the possibly the drain.

Decommissioning and Removal of Above ground Storage Tank (AST)

The above ground storage tank located in the south east of the site should be decommissioned, emptied and removed off site by an approved contractor and any impacted soils excavated and removed.

This process involves suitable disposal of the AST and any surrounding affected soils.

This option is technically simple and represents a low-cost strategy that can be implemented rapidly.

Applicability of Remediation Options and Initial Assessment – Soils

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Effective on hydrocarbons	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Containment - Cover System	*Y*	*n/a*	*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*	*n/a*	*Y*	*Y*	*££*	*Weeks to months*	*Removal of unsuitable material and risk.*	*Y – in conjunction with materials management.*
Containment - hydraulic barriers	*N*	*n/a*	*N*	*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*
Containment - in ground barriers	*Y*	*n/a*	*Y*	*Y*	*£££*	*Months*	*Source of hydrocarbon contamination is the pond which is mostly off the site, after the hydrocarbons have been excavated on the subject site – a barrier is require to prevent offsite contamination migrating onto the site.*	*Y*
Soil flushing	*N*	*n/a*	*N*	*N*	*£££*	*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	*N*	*n/a*	*N*	*N*	*£££*	*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*

Remedial Activity	Effective on Asbestos	Effective on Metals	Effective on PAHs	Effective on hydrocarbons	Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility
Soil washing	*N*	*n/a*	*N*	*N*	*£££*	*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)	*Y*	*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*	*n/a*	*N*	*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*	*n/a*	*N*	*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*	*n/a*	*N*	*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 - Screening Values

Proposed End Use	Unit	Commercial			Source
SOM	%	1	2.5	6	
Arsenic	mg/kg	640	640	640	SGVs
Beryllium	mg/kg	12	12	12	LQM S4ULs
Boron (water soluble)	mg/kg	240000	240000	240000	LQM S4ULs
Cadmium	mg/kg	230	230	230	SGVs
Chromium (Total)	mg/kg	8600	8600	8600	LQM S4ULs
Chromium (VI)	mg/kg	49	49	49	DEFRA C4SLs
Copper	mg/kg	68000	68000	68000	LQM S4ULs
Lead	mg/kg	2300	2300	2300	DEFRA C4SLs
Organic Mercury	mg/kg	26	26	26	LQM S4ULs
Nickel	mg/kg	980	980	980	LQM S4ULs
Selenium	mg/kg	13000	13000	13000	SGVs
Vanadium	mg/kg	9000	9000	9000	LQM S4ULs
Zinc	mg/kg	730000	730000	730000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	3200 (304) sol	5900 (558) sol	12000 (1150) sol	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	7800 (144) sol	17000 (322) sol	40000 (736) sol	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	2000 (78) sol	4800 (190) sol	11000 (451) vap	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	9700 (48) sol	23000 (118) vap	47000 (283) vap	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	59000 (24) sol	82000 (59) sol	90000 (142) sol	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	1600000 f	1700000 f	1800000 f	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	1600000 f	1700000 f	1800000 f	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	26000 (1220) sol	46000 (2260) sol	86000 (4710) sol	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	56000 (869) vap	110000 (1920) sol	180000 (4360) vap	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	3500 (613) vap	8100 (1500) vap	17000 (3580) vap	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	16000 (364) sol	28000 (899) sol	34000 (2150) sol	LQM S4ULs
Aromatic EC 12 -16	mg/kg	36000 (169) sol	37000	38000	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	28000 f	28000 f	28000 f	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	28000 f	28000 f	28000 f	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	28000 f	28000 f	28000 f	LQM S4ULs
Benzene	mg/kg	95	95	95	SGVs
Toluene	mg/kg	4400	4400	4400	SGVs
Ethyl Benzene	mg/kg	2800	2800	2800	SGVs
Xylene - o	mg/kg	2600	2600	2600	SGVs
Xylene - m	mg/kg	3500	3500	3500	SGVs
Xylene - p	mg/kg	3200	3200	3200	SGVs
MTBE (methyl tert-butyl ether)	mg/kg	7900	13000	24000	CL:AIRE 2010
Acenaphthene	mg/kg	84000 (57) sol	97000 (141) sol	100000	LQM SAULs
Acenaphthylene	mg/kg	83000 (86.1) sol	97000 (212) sol	100000	LQM S4ULs
Anthracene	mg/kg	520000	540000	540000	LQM S4ULs
Benz(a)anthracene	mg/kg	170	170	180	LQM S4ULs
Benzo(a)pyrene	mg/kg	35	35	77*	DEFRA C4SL*/LQM S4ULs
Benzo(b)fluoranthene	mg/kg	44	44	45	LQM S4ULs
Benzo(ghi)perylene	mg/kg	3900	4000	4000	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	1200	1200	1200	LQM S4ULs
Chrysene	mg/kg	350	350	350	LQM S4ULs
Dibenz(ah)anthracene	mg/kg	3.5	3.6	3.6	LQM S4ULs
Fluoranthene	mg/kg	23000	23000	23000	LQM S4ULs
Fluorene	mg/kg	63000 (30.9) sol	68000	71000	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	500	510	510	LQM S4ULs
Naphthalene	mg/kg	190 f (76.4) sol	460 f (183) sol	1100 f (432) sol	LQM S4ULs
Phenanthrene	mg/kg	22000	22000	23000	LQM S4ULs
Pyrene	mg/kg	54000	54000	54000	LQM S4ULs
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.

