



GROUNDTECH
CONSULTING

ALDI HOLBEACH

REMEDIATION VALIDATION REPORT

ALDI STORES LIMITED

DECEMBER 2024

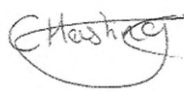
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Plans		
Plan Reference	Revision	Title
GRO-21400-P01	-	Project Location Plan
79-E1602-CDY-XX-XX-DR-C-Ss	-	Proposed Drainage Arrangement
GRO-21400-P10	-	Excavation Delineation Plan

1.0 INTRODUCTION

1.1 Objectives

This validation report has been produced on behalf of Aldi Stores Limited and relates to remediation of a site at Fleet Lane in Holbeach which is being redeveloped with a commercial property.

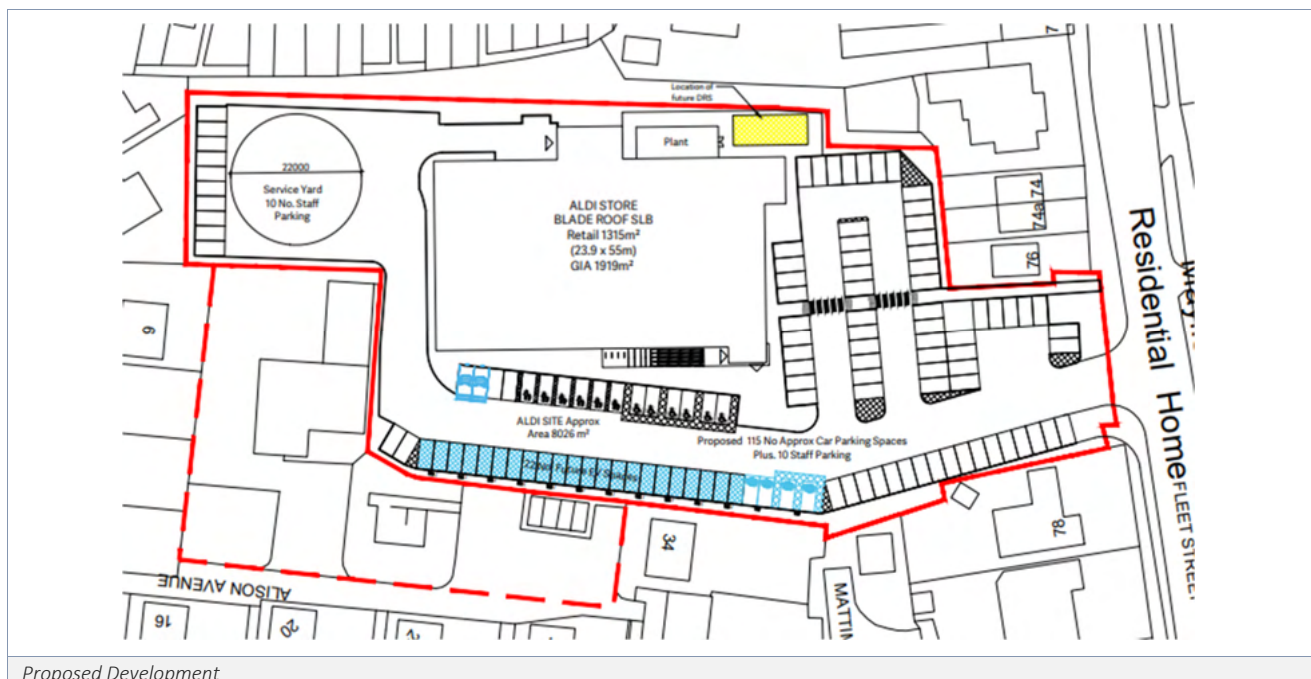
The remediation requirements are outlined in the following documents:

- Geo-Environmental Appraisal GRO-21400-3186 by Groundtech Consulting Limited 25th April 2022
- Ground Gas Risk Assessment GRO-21400-4202 by Groundtech Consulting Limited 31st January 2023
- Remediation Specification GRO-21400-4295_1.1 by Groundtech Consulting Limited 11th May 2023
- Supplementary Geo-Environmental Appraisal GRO-21400-5018 by Groundtech Consulting Limited 18th March 2024

1.2 Proposed Works

The following works were proposed as part of the site remediation:

- Demolition of existing structures and removal of existing stockpiles
- Additional Ground Investigation post demolition in building footprint
- Free phase contamination removal from former pond/landfill area
- Decommissioning and removal of Aboveground Storage Tank (AST)
- Excavation of former drain
- Installation of ground gas precautions
- Installation of cover system in areas of soft landscaping
- Reuse of appropriate soils
- Offsite disposal of unsuitable or excess material



Proposed Development

1.3 Previous Work

Various desk-based studies and Ground Investigations have been completed at the site as outlined in *Section 1.1* to assess potential risks to site users and the wider environment based on a residential end use. The reports should be read in conjunction with this document, a summary of the previous reports is outlined in the following Sections.

2.0 SUMMARY OF PREVIOUS WORK

2.1 Background

The site is irregular in shape and circa 0.8 hectares in area, the topography is generally flat lying with no notable sloped/ramped areas.

The site was occupied by two rectangular shaped commercial buildings, one along the western boundary and the other in the eastern area. The buildings within the western area of the site were active during the Ground Investigation whereas the eastern building had been vacant for some time.

The existing buildings at the site were noted to contain asbestos roofing tiles and in the eastern area two large skips and two stockpiles of demolition materials were present. In the southeastern area a large AST was present situated on a concrete pad with associated concrete ramps adjacent.

Generally, a large quantity of fly tipped materials were present at the site associated with former uses as a council depot.

The site was originally undeveloped with a pond in the south eastern area and a building located in the central northern area from 1888, a suspected drain was constructed along with minor developments in 1904. The western area of the site was shown as an orchard from 1931. In 1969 the pond in the south east was no longer present and assumed to have been backfilled and the building in the northern area had been demolished, a depot and sewage works now occupied the site and a tank was present in the southeastern area associated with the sewage works. Finally, buildings were constructed along the western boundary and the suspected drain is assumed to have been infilled or culverted.

Potential contaminative sources off the site include former sewage works, former pond/landfill coverage, former drain, asbestos roof tiles associated with the existing building, the AST, multiple skips/stockpiles of demolition materials and former orchards.

2.2 Ground Conditions

Made Ground was generally encountered across the site to a maximum depth of 0.7m begl. However was present to depths between 1.3m and 2.5m begl in the vicinity of the former drain and pond located centrally and easterly of the site respectively.

Natural soils underlying the Made Ground consisted predominantly of very soft to soft Clay to a maximum depth of 9.0m begl with variable loose to medium dense Sand to depths of between 5.0m and 16.0m begl. These strata were underlain by firm to stiff Clay to depths of between 13.0m and 19.7m begl.

Bedrock was encountered in CP1 and CP3 from depths of between 18.2m and 19.7m begl and comprised Mudstone recovered as stiff clay.

Ashy material was encountered at the site between 0.05m and 0.35m begl in the northern and southern areas of the site and contained a moderate hydrocarbon odour. Demolition material with a hydrocarbon coating, free phase liquids and hydrocarbon odour was encountered between 0.3m to 1.3m begl in the vicinity of the former pond in the eastern area of the site.

Asbestos is suspected to be present on the site, this was observed within the buildings onsite and within the demolition waste materials stockpiled in the western area.

Shallow groundwater strikes were observed beneath the site between depths of 0.8m and 1.5m bgl, this was encountered in 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.

2.3 Human Health Risk Assessment (Soils)

Metals

No elevated concentrations of metals were recorded at the site during the previous investigations undertaken.

Speciated Polycyclic Aromatic Hydrocarbons (PAHs)

Two elevated concentrations of Dibenzo(ah)anthracene was encountered during the Groundtech Consulting investigation and Supplementary investigation and three elevated concentrations of Dibenzo(ah)anthracene were recorded during the previous investigation undertaken by Delta Simmons.

Two elevated concentrations of Chrysene were also recorded during the Delta Simmons Investigation.

Total Petroleum Hydrocarbons (TPH CWG)

No elevated concentrations of Total Petroleum Hydrocarbons were recorded during either the Groundtech consulting or Delta Simmons investigations.

High concentrations of heavy end hydrocarbon fractions have been recorded in WS02 and WS08 where ashy material was observed.

The findings of the laboratory testing indicate that no impact to the soils has been caused by the former AST at the site.

Asbestos

Asbestos was detected in the previous investigation by Delta Simmons in two locations both identified as Chrysotile quantified as <0.001mass % (i.e. trace).

No asbestos was encountered during the previous Ground Investigation by Groundtech Consulting.

Asbestos was encountered within 4 locations during the supplementary investigation and comprised Chrysotile fibre bundles generally ranging between <0.001%mass and 0.003%mass.

The asbestos encountered was likely associated with the former developments at the site.

Outline Remedial Strategy

As the site was to be covered in hardstanding, no remedial measures were required with regards to contaminated soils, in minimal areas of soft landscaping a cover system should be placed it is recommended that a minimum 300mm of "clean" topsoil/subsoil be placed.

As a minimum the free phase contamination required removal offsite and should was to be disposed at a suitably licensed waste facility. The free phase contamination encountered was likely present offsite associated with the former pond at the site. The demolition material and stockpiles also required removal offsite.

Vapours

Excavation and removal of free phase products and hydrocarbon impacted soils was recommended which would remove the vapour source, if successful excavation and removal was undertaken then no further measures were required with respect to vapours.

Ground Gas

Gas Monitoring undertaken at the site indicates that the site falls into CS3 in accordance with BS 8485 and 3 points of protection were required and gas protection measures were considered necessary.

In addition, radon precautions are not necessary.

2.4 Risk to Controlled Waters

Localised mobile contamination had been encountered in the vicinity of the former pond at the site, it was proposed to excavate and remove any hydrocarbon impacted soils from the site and no further action was required with respect to controlled waters.

2.5 Summary

The risks identified by the previous investigation are summarised in the tables below:

Human Health

Receptor	Level of Risk	Comments
Site End Users	Low	Elevated contamination encountered at the site and free phase/hydrocarbon impacted soils present. Proposed development will be entirely surfaced with hardstanding which will break and pathway to site end users and the risk is considered to be low.
Site End Users (Asbestos)	Low	Low to very low risk.
Site End Users (VOCs)	Moderate	Moderate risk as contaminants above vapour saturation limit encountered.
Site End Users (Ground gas)	High	The site has been classified as CS3 based on the final ground gas monitoring results and ground gas precautions are required.

Controlled Waters

Receptor	Level of Risk	Comments
Secondary A Aquifer	Low	Mobile contamination encountered, hydrocarbon impacted soils to be removed from site.
Unnamed watercourse	Low	Mobile contamination encountered, impermeable deposits will restrict lateral migration of impacted soils.

Groundworkers

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

2.6 Options Appraisal

The most appropriate approaches with respect to contamination at the site are outlined below:

- *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*
- *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*

2.7 Satisfying Remedial Specification Objectives

The remediation objectives will be satisfied in the following way:

Further Testing and Delineation of Surplus materials.

Contaminated topsoil that is determined unsuitable for use at the proposed development will be stockpiled separately from the remaining topsoil for disposal off site. Any remaining suitable topsoil can be stripped and stockpiled for placement during the construction phase.

Groundtech Consulting will need to be present during hotspot excavation to inspect for suspect material and oversee effective segregation, stockpiling and validation of soils. The contractor is to satisfy itself with regards to volumes of soil to be excavated and disposed.

All unsuitable material, as defined in the Remedial Specification, shall be disposed of by the enabling works contractor to appropriately licensed off-site facilities.

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.

Demolition of existing structures/Removal of Stockpiles

Prior to any works, the site shall be cleared of rubbish, debris and approved vegetation.

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.

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.

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.

The procedure for decommissioning and removal of the AST is outlined in the Remedial Specification.

Additional Ground Investigation post demolition of existing structures

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.

Excavation/delineation of contamination features

The former pond encountered in the Ground Investigation in the eastern areas will be removed during the enabling works and the surrounding impacted soils will also be removed to remove the requirement for vapour resistant membranes within the proposed development.

The materials associated with these features are unsuitable for reuse at the site. The materials shall be segregated and stockpiled within the approved working area of the site until they are removed to a suitable licenced waste disposal facility.

The enabling works contractor shall also break up and remove all below ground structures associated with the former drain at the site as well as the concrete pad and features associated with the former sewage works and AST at the site as shown on Groundtech plan GRO-21400-P05.

Installation of Ground Gas Precautions

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 protection is to be installed by the ground works contractor (or specialist contractor on their behalf) and the installer should be qualified and experienced. 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 in accordance with CIRIA C735.

Installation of the Cover System in Areas of Soft Landscaping

A clean cover system is required in soft landscaped areas to reduce the risk to an acceptable level. The 300mm cover system should be installed by the ground works contractor and validated by Groundtech Consulting.

2.8 Supplementary Geo-environmental Investigation

Groundtech Consulting visited the site on the 6th December and 7th of December 2023 to carry out further investigation works in previously inaccessible areas of the site post demolition of the former buildings the findings are presented in Groundtech Appraisal *GRO-24100-5018*.

Eighteen additional trial pits were undertaken across the site to identify potential unidentified contamination. The results of the supplementary investigation concluded that contamination was present, however was in line with the previously identified contamination at the site and so no amendments to the remedial requirements of the site were necessary.

3.0 VALIDATION

3.1 Remediation Objectives

The objective of this document is to verify that the Remedial Specification has been adhered to with respect to the remediation works carried out at the site. This Remedial Validation Report is based on the results of the validation visits completed between the 29th April 2024 and the 12th November 2024.

3.2 Site Visits

Groundtech Consulting Limited visited site on the following dates and supervised the following works:

29th April 2024

1. *Site Visit to conduct former pond delineation exercise, establish the location of the former drain and undertake water sampling in the former pond area.*

30th April 2024

1. *Conducted trial pitting to establish the location of the former drain.*
2. *Conducted additional trial pitting to establish the extent of the former pond.*
3. *Conducted water sampling of hydrocarbon/free phase impacted soils in the vicinity of the former pond.*

10th May 2024

1. *Supervised and sampled the excavation of the former drain.*

20th May 2024

1. *Supervise Additional Trial pits to obtain geotechnical information for Attenuation Tank Construction.*

8th August 2024

1. *Supervise the excavation of former pond area.*

2nd September 2024

1. *Supervise the excavation of former pond area.*

3rd September 2024

1. *Supervise the excavation of former pond area.*

6th September 2024

1. *Supervise the final excavation of former pond area.*

12th November 2024

1. *Undertake sampling of imported topsoil for use in cover system.*

3.3 Pond Delineation

Excavation of the former pond area was undertaken over multiple visit to the site due to access restraints and other activities going on in the area.

Groundtech Consulting visit the site between the dates of the 29th of April 2024 and the 6th of September 2024 to supervise the excavation of the former pond area to remove the source of hydrocarbon impacted soils, and free phase contamination to remove the vapour risk at the site.

Groundtech Consulting supervised trial pits in the area of the former pond on the 30th April 2024 to collect groundwater samples to determine the chemical composition of the hydrocarbon impacted waters in the former pond area, and to collect samples of the groundwater for the remainder of the site.

The result of this testing determined that the impacted waters in the former pond area required removal from site due to elevated concentrations above the commercial screening values recorded by the laboratory testing results, the Groundwater Testing Results are presented in *Appendix 7*. Ref 24-043849.



Trial Pit excavation to obtain groundwater sample (Former Pond Area)

The groundwaters in the remainder of the site had not been impacted by the hydrocarbon and free phase contamination. The Groundwater Testing Results are presented in *Appendix 7* Ref 24-017835 and 24-017833.



Trial Pit excavation to obtain groundwater sample (Wider Site)

Groundtech Consulting then visit the site on the 8th August 2024 to delineate the contaminated materials associated with the former Pond area, during this time sheet piling had been installed at the site to accommodate an attenuation tank. The sheet piling encroached on the extents of the former pond and contaminated materials were visible along the north western extent of this area. Due to the sheet piling the extents of the former pond had already been delineated along the north western extent and so Groundtech Consulting conducted trial pits to determine the extent of this area in the remaining directions. The contaminated material that was encountered during the sheet piling for the attenuation tank was removed from site as hazardous waste, waste transfer notes are presented in *Appendix 4*.



Delineation of former pond material

Groundtech Consulting visit site on the 2nd of September 2024 to supervise the excavation of the former pond. Excavation was started in the previously delineated area however a large ingress of water was encountered associated with the previously identified free phase and hydrocarbon impacted soils in the original Groundtech Consulting Investigation.

No provision was made on site to accommodate the large ingress of water and so the exercise was postponed until a tanker could be mobilised to site. The impacted waters were encountered in the excavation however are also migrating from offsite, this is because the former pond is present offsite to the east. A ground barrier is to be installed around the perimeter of the excavation to prevent the ingress of these impacted water.



Delineation of former pond material (Water Ingress)

Groundtech Consulting visit site on the 3rd September and 6th of September 2024 to supervise the final excavation of the former pond area at the site, a tanker was present on site for the exercise and during the excavation of the hydrocarbon impacted material the contaminated groundwater was pumped from the excavation. Due to the ingress of water from an offsite source, the excavation was carried out in stages to contain the impacted waters and to allow for this to be pumped from the excavations.

During the excavation, an imported cohesive material was used to create a barrier along the site boundary where the former pond extended offsite to prevent further water ingress and to also act as an impermeable barrier for mobile contaminants present offsite.



Delineation of former pond material (Initial Excavation)

Validation samples were obtained on the base and sides of all excavations and geo-environmental testing scheduled to determine if sufficient excavation had been undertaken to validate the source of the contamination had been removed. The laboratory testing confirmed that no elevated concentrations of contamination were present in the surrounding in-situ soils and no further visual or olfactory evidence of contamination was present. The validation testing results are presented in *Appendix 8*.



Delineation of former pond material (Staged Excavation)

The contaminated soils were stockpiled in a bunded visqueen area to prevent cross contamination and then removed from site. Waste transfer notes for the exported contaminated material are provided in *Appendix 4*.



Delineation of former pond material (Staged Excavation)



Delineation of former pond material (Final Excavation)

A plan showing the extents of the former pond material excavated is presented in Groundtech Plan GRO-21400-P10.



Delineation of former pond material (Final Excavation)

3.4 Excavation of Former Drain

Groundtech Consulting visit the site on the 10th May 2024 to supervise the delineation and excavation of the former drain encountered during the Groundtech Consulting Investigation.



Former Drain Excavation

The drain had previously been encountered by the groundworks during foundation excavations and so this was traced out by a trial trench exercise. The trench was conducted along the length of the drain and associated drain segments and surrounding materials were removed.



Former Drain Excavation (Relic chamber segments)

The extent of the former drain excavation is presented on Groundtech Plan *GRO-21400-P10*. Waste transfer notes for the exported material is presented in *Appendix 4*. The former drain excavation was validated visually only and all associated material and relic construction material was removed from site as hazardous waste.



Former Drain Excavation (Relic chamber segments)

During the enabling works, an additional drainage chamber was encountered in the vicinity of the former sewage works at the site, this chamber along with associated drains was excavated and removed from the site.



Drainage Chamber (Former Sewage Works)

3.5 Demolition of Existing Structures and Decommissioning of Aboveground Storage Tank (AST)

PBM Contractors Ltd undertook the demolition works at the site which comprised the demolition of the former gym in the east and the depot buildings along the western area of the site. During these demolition works the tank that was identified during the initial Ground Investigation by Groundtech Consulting in the central southern area of the site required decommissioning in accordance with the remedial specification.

The stockpiles identified at the site also required removal along with the skips at the site.



Demolition of Existing Structures (Former Gym)

During the demolition works it was identified that this AST was empty and clean and did not require decommissioning and was disposed from site to a registered waste receiver as scrap metal. Waste transfer notes for the demolition material, stockpiled materials and scrapped metal are presented in *Appendix 4*.



Demolition of Existing Structures (Former Depot)

During the demolition of the former structures a watching brief was in place by the demolition contractors for ACMs, where encountered these were disposed of to an appropriate licensed waste disposal facility.

3.6 Installation of CS3 Ground Gas Precautions

The final Ground Gas Risk Assessment undertaken by Groundtech Consulting (*GRO-21400-4202*) concluded CS3 ground gas precautions were required at the site as significantly high concentrations of methane and carbon dioxide have been recorded by the monitoring likely associated with the underlying superficial deposits.

A Juta GP 5+ gas membrane was installed at the site which comprises a multi-layer composite polyethylene membrane suitable for resisting Carbon dioxide and Methane affected sites. The ground gas membrane is presented in *Appendix 6*.



CS3 Gas Membrane

The installation of the Gas membrane was undertaken by Geoshield between the 6th September and 17th September 2024 and the relevant information is presented in the Geoshield verification reports (*GEO104785*).

The Gas Membrane was then verified by Paul Colbeck of Geoshield under a separate heading on the 25th of September 2024.



CS3 Gas Membrane

Finally, a verification certificate was issued to JB Construction on the 5th of December 2024 for the correct installation and verification of the gas membrane.

The Geoshield installation, validation and certification reports are presented in *Appendix 6*.

3.7 Disposal of Unsuitable/Additional Soils

Disposal

During the enabling works all demolition material was crushed and removed from site, the minimal topsoil at the site was determined to be unsuitable for reuse at the proposed development and was stripped and stockpiled on site prior to removal off site.

The majority of the Made Ground was also stripped during the enabling works, removed off site to a licenced waste facility and replaced with imported materials.

Exported materials are summarised in the table below:

Material	No. Loads	Approximate Volume (m ³)
Soil and Stone	355	3,200.0
Concrete	60	540.0
Hazardous Soil and Stone	128	1,150.0
Muck	4	36.0
Construction Waste Away	2	20.0
Clay	2	20.0
Graded Recycle	3	27.0

Waste transfer notes for the exported material are summarised in *Appendix 4*.

Reuse of soils

No materials were reused as part of the enabling works.

Imported Material

Materials were imported to the site for use during the enabling phase, the following soils were imported to the site:

Material	No. Loads	Approximate Volume (m ³)
6F5	3	27.0
Type 1	11	100.0

Waste transfer notes for the imported material are summarised in *Appendix 5*.

3.8 Removal of Obstructions

Footings were encountered across the site associated with the previous developments. All shallow obstructions were removed during the enabling works and oversize material was segregated and stockpiled for removal off site.

All concrete pads and ramps associated with the former sewage works were grubbed up, crushed, segregated and stockpiled for removal off site. A watching brief was in place during the enabling works by the enabling works contractor and no evidence of contamination was encountered at the site in relation to the former sewage works.



Former Sewage Works Concrete Pad

The former drain located centrally to the site was excavated along with an associated chamber.

No other obstructions were encountered during the enabling works.

Waste transfer notes for the excavated obstruction material are presented in *Appendix 4*.

3.9 Geo-Environmental Testing

Geo-Environmental testing has been undertaken in line with the validation requirements for the site as outlined below:

- *During the excavation of the former pond and drain*
- *Determine waste disposal of materials*
- *Validation of base and sides of excavations to determine the extents of the impacted materials*

The excavated material from the former pond and drain was tested for a suite of metals, Speciated PAHs, TPH CWG and screened for asbestos. These materials were determined to be unsuitable for reuse at the site and exported as hazardous waste to a licenced waste disposal facility.

Validation samples from the base and sides of excavations were tested for the same Contaminants of Concern (CoC) and no elevated concentrations were recorded. It was determined that the contamination at the site had been delineated sufficiently in line with the requirements of the remedial specification.

The Geo-Environmental testing results are presented in *Appendix 8*.

3.10 Cover System

The enabling works carried out to date do not include the placement of the required clean cover layer. This will be placed and validated at a later date and a separate cover system validation report will be produced.

Topsoil for use in the cover system has been imported to site and Geo-environmental testing has been undertaken to determine suitability for use in the cover system at the site, imported topsoil was tested for a suite comprising heavy metals, speciated PAHs, TPH and asbestos. No elevated concentrations of contamination were recorded in the laboratory testing results and the material is suitable for use in the cover system when compared to the commercial screening values as specified in the remedial specification for the site ref. *GRO-21400-4295*. The geo-environmental testing results are presented in *Appendix 9*.

3.0 CONCLUSION

Through the validation works undertaken at the site, all contaminative sources have been removed and validated in line with the remedial specification for the site. Groundtech Consulting maintained supervision of the validation works at the site to ensure the below validation was undertaken:

- *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*
- *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*

Groundtech Consulting can confirm that the validation works has been undertaken in accordance with the approved remedial specification.