



PHASE III REMEDIATION STRATEGY

FOR

J10 PLANNING

AT

GWERSYLLT

BFG1042 R01

JUNE 2023

Prepared For

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1.0 INTRODUCTION

1.1. Background

Bigfoot Geo-environmental Consultants Ltd (BFG) were commissioned by J10 Planning, hereafter referred to as (the client) to prepare a Remediation Strategy (RS) for the proposed development at Gwersyllt, Wrexham.

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Part IIA of the Environment Protection Act, 1990.
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012).
- National Planning Policy Framework (HCA, February 2019).
- BS5930:2015: "Code of practice for site investigations".
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice".
- The Building Regulations 2010. Part C (HM Government 2013).
- Environment Agency: Land Contamination Risk Management (LCRM), Version 3, October 2020.
- Environment Agency (2017) "The Environment Agency's Approach to Groundwater Protection" November 2017 Version 1.1.
- Environment Agency Guidance (October 2020) Land Contamination Risk Management Land Contamination (LCRM).

1.2. Limitations

Report limitations are presented in **Appendix I** and a Glossary is presented in **Appendix II**.

1.3. Development Proposals

It is understood that the proposed development comprises the construction of a Low Secure Unit development with associated landscaping.

An extract of the proposed site development plan is presented as **Figure 1**, below.

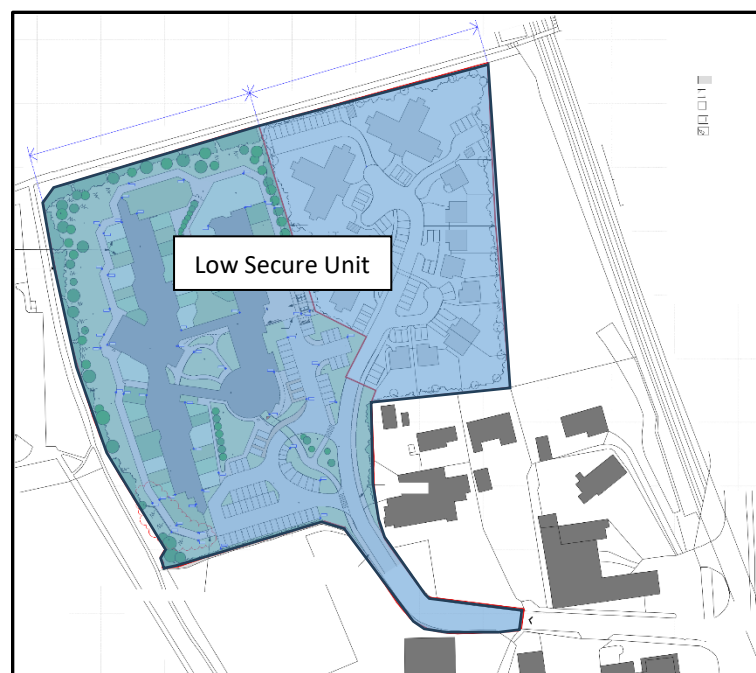


Figure 1 Proposed Site Development Plan

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed commercial end use. If there is a subsequent change in the proposed land, the risk assessments and conclusions should be reviewed to determine whether they are still applicable for the revised end use.

1.4. Planning Status & Requirements

This Site Remediation Strategy is part of a suite of supporting documents submitted with the applications. These supporting documents are in addition to the formal application documents comprising the application forms and the accompanying plans, sections, and elevations.

1.5. Previous Investigations

Clancy Consulting have completed a Phase 2 Site Investigation summarised below which should be read in conjunction with this report:

- Clancy Consulting Ltd, Phase II Geo-Environmental Appraisal Report, (ref: 10/1014/001, dated November 2017);

The site investigation report is discussed in **Section 3** of this report and the information used to derive the updated Conceptual Site Model for the site.

Bigfoot Geo-environmental undertook validation work in the vicinity of the former underground storage tank along with additional trial pitting across the site, with a view to obtaining chemical information for current site conditions.

The works are discussed in **Section 3** of this report and the information used to derive the updated Conceptual Site Model for the site.

1.6. Objectives and Scope of Works

The purpose of the Remediation Strategy is to identify and evaluate feasible remedial techniques and to confirm the process for validation of the implemented scheme. This will allow a safe, cost effective and regulatory compliant redevelopment of the site.

2.0 SITE OVERVIEW

2.1. Site Location & Description

The site is indicated in **Figure 1** above and the site location and description is summarised in **Tables 2.1 and 2.2**.

Table 2.1 Summary of Site Location

Summary of Site Location	Description
Location	Mold Road, Gwersyllt, Wrexham
Grid Reference	331536, 352823
Site Area (ha)	2 ha (approx.)

Table 2.2 Summary of Site Description and its Environs

	Description
Current Use	At the time of writing the Remedial Strategy, the site was derelict land with no buildings present. The site was generally level with a cut embankment in the northwest of the site (along the western and northern boundaries).
Access	Access to site is via Mold Road to the south-east of the site
Existing Buildings & Structures	No buildings present
Site Surface	Demolition rubble, grass and scrub vegetation.
Asbestos	No ACMs noted.
Waste Disposal / Materials Storage	No waste materials or uncontrollable storage of waste materials were noted on site.
Surrounding Area	North: Farmland East: Mold Road with residential properties beyond South: Gwersyllt Sports and Social Club and Commercial/ Industrial Buildings West: Leisure Centre, school with sports fields

3.0 PREVIOUS GROUND INVESTIGATIONS

3.1 Clancy Consulting Ltd, Phase II Geo-environmental Appraisal Report, Mold Road, Wrexham, November 2017 Ref:10/1014/001.

Site History	The historical OS maps dating back to 1872 indicate that the site was first occupied by colliery stockpiles belonging to an adjacent colliery along the western boundary of the site. The stockpile extended in size from 1872 to 1961 covering the whole of the western and part of the northern site area before being removed around 1969. From 1974 the development of industrial buildings occurred including a council depot, works and unidentified industrial buildings along with an electrical sub- station as part of the wider Westminster Industrial Estate. The surrounding area has been occupied by mixed residential and industrial land with a colliery located to the south of the site along with tanks, smithy, brickworks, disused tip and drill shed. Alongside this a railway is located adjacent to the eastern boundary of the site running north south.
Geology	Geological maps indicate the site is underlain by superficial deposits of Glacial Till in the west and Glaciofluvial Deposits in the east. The superficial deposits are anticipated to be underlain by sandstone of the Cefn Rock, a member of the Pennine Middle Coal Measures Formation.
Environmental Setting	The superficial deposits underlying the west of the site (Glacial Till) are classified as an Unproductive Aquifer with the superficial deposits in the east of the site (Glaciofluvial Deposits) are classified as a Secondary A Aquifer. The solid strata located beneath site is classified as a Secondary A Aquifer. The site is not located within a Groundwater Source Protection Zone and there are no groundwater abstraction points within 2km of the site. The nearest surface watercourse is located 700m distant.
Radon	The Radon Guidance on protective measures for new dwellings indicates that the site is in an area where 3% to 5% of properties are above action level and basic radon protection is required for all new structures.
Ground Conditions	The ground investigation has identified Made Ground across the site which is typically between 0.5m and 1.5m in depth. In one location (WS6) the Made Ground was found to be deeper reaching 2.45m. The filled ground typically comprises concrete, tarmac or gravel hardstanding underlain by clayey sand or clay with inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone. Natural strata have been found to be variable in nature and comprising very clayey sand with gravel inclusions of sandstone, siltstone and coal and sandy gravelly clay. These strata are often found to be interbedded. The strength / density of the natural strata has also been found to be variable with the granular soils typically in a loose to medium dense condition with the cohesive strata in a firm to stiff condition. Very weak weathered micaceous sandstone was recorded in five locations in the north-western portion of the site at depths between 1.1m and 3.9m. Possible highly weathered sandstone bedrock was also recorded in a number of other locations, recovered as very dense reddish- brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m. Perched groundwater was encountered across the site at depths ranging from 0.35m to 2.0m.
Contamination	Chemical testing carried out on the Made Ground and natural soils beneath the proposed development site did not identify any elevated levels of contaminants when compared to the LQM/CIEH S4ULs for Human Health Risk Assessment 2015 along with DEFRA Category 4 Screening Levels (C4SLs) SSVs for a residential end use. An asbestos cement tile has been recorded in one location in the south western part of the site and although this in itself does not warrant additional investigations we have

	recommended that the appointed ground works contractor carry out a watching brief during any excavations in this area of the site to check for the presence of asbestos containing materials.
Hazardous Ground Gases	Gas monitoring wells have been installed across the site and the results to date have recorded a maximum steady carbon dioxide concentration of 8.0% during the first visit with concentrations of 4.0% also recorded in two locations with associated oxygen depletion. Whilst gas flow rates have so far been absent, given the above, along with the presence of hydrocarbon contamination in the western portion of the site we would recommend that allowance is made for the installation of gas protective measures in accordance CS2 conditions as set out in BS8485 "Code of Practice for The Design of Protective Measures for Methane & Carbon Dioxide Ground Gases for New Buildings" (2015). Given the presence of hydrocarbons in the western portion of the site, we would recommend that the secure unit buildings also be provided with a hydrocarbon vapour resistant membrane. It must also be ensured that the gas protective measures installed are suitable to mitigate the risk posed from radon gas.
Further Works	Based on the findings of this investigation, we would recommend the following additional works will be required: • Supervision and inspection of the removal of all above ground fuel storage tanks. Excavation of trial pits should then be carried out directly beneath and around the tanks with further soil samples recovered for chemical testing. • Additional trial pits to be excavated beneath existing building footprints following demolition to confirm the ground conditions and depth of filled ground. • Provision of gas protective measures in accordance with CS2 conditions with allowance for a hydrocarbon vapour resistant membrane in the western portion of the site. The gas protective measures must also be suitable to comply with the requirement for basic radon gas protection.

3.2 Bigfoot Geo-environmental Ltd, Validation Works, Mold Road, Wrexham, May 2023.

Review of the CSM following the Clancy Consulting Ltd 2017 Phase II assessment, no risks relating to ground contamination were identified, other than the identification of the former underground storage tank.

Following the removal of the tank and as part of these remedial works, Bigfoot Geo-environmental (BFG) undertook a ground investigation across the site including:

- Validation sampling in the location of the former tank;
- Soakaway testing across the site; and
- Additional Trial Pitting to review the ground conditions following the removal of buildings and to confirm the earlier findings of the Clancy ground Investigation.

The Ground Investigation comprised the excavation of:

- 5No. Soakaway Trial Pits;
- 9No. Trial Pits;
- 6No. validation samples in the vicinity of the former UST;
- 9No. additional soil samples from across the site.

A plan showing the location of the exploratory holes is included in **Appendix III**.

The general ground conditions encountered comprised:

Made ground	General composition of gravel of fine to coarse sand comprising sandstone, brick, mudstone and concrete. Average Depth: 1 – 1.5m bgl Max Depth: 2.5m bgl (TP06)
Sand	Light yellowish brown mottled grey clayey slightly gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded of sandstone and siltstone. Found as a discrete band in SA1 (0.4m in thickness at 0.4m bgl) and SA5 at 1.2m bgl.
Clay	Firm reddish brown slightly sandy gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone and sandstone. Average Thickness: 1.0m recorded in 10No. of the 14No. locations Max Thickness: 1.5m
Siltstone	Grey and yellowish brown siltstone recorded in TP05 at 1m bgl.

Exploratory Hole Logs are included as **Appendix IV** of this report.

In total 15No. soil samples were submitted for a range of analysis including:

- Metals;
- PAHs
- TPH CWG
- BTEX
- Asbestos

Results are included in **Appendix V** of this report.

Tank Validation Samples

6No. validation samples were taken in the area of the former UST (TP01) in order to confirm removal of the tank and any potential residual contamination. All samples were submitted for TPH CWG and BTEX. All concentrations were found to be below residential without plant up take guidance criteria, confirming no elevated hydrocarbon concentrations remained in situ, following the removal of the tank.

Site Wide Samples

In order to confirm the general ground conditions following removal of buildings across the site, 9No. samples were submitted for analysis. A range of samples (both laterally and vertically) were tested for a range of compounds. All samples returned concentrations below the residential without plant up take guidance criteria. Confirming no residual contamination based on the proposed land use is present.

Although, no chemical exceedances were recorded, the presence of Made Ground across the site is not likely to be suitable to be left at surface. As such, remedial action will be required, specifically within landscaped areas, to ensure a suitable ground cover is in place.

Made Ground is likely to be suitable to be left in situ below hard standing and buildings.

Results are included in **Appendix V** of this report

4.0 REMEDIATION STRATEGY

4.1 Summary of Risk Assessments

Following review of the CSM following the Clancy Consulting Ltd 2017 Phase II assessment, no risks relating to ground contamination were identified, other than the presence of an underground storage tank and the potential for residual hydrocarbon contamination and the presence of a single asbestos tile.

The Clancy ground investigation was progressed with the assumption of residential land use with plant uptake. The new proposal is for a Low Security Unit across the whole site (Residential Land use, no plant uptake).

Bigfoot Geo-environmental undertook validation works in the vicinity of the former underground storage tank to confirm its removal and the removal of any residual contamination along with additional trial pitting and chemical analysis from a range of depths across the site. All chemicals were found to be below the respective guidance criteria.

Contamination at the site was assessed using the contaminant-pathway-receptor linkage approach. Following the site investigation and validation works and the updated future land use, the plausible contaminant sources identified were updated and are detailed in **Table 4.1** below.

Table 4.1 Summary of Contaminant Linkages

Receptor Group	Pollution Source	
	Hotspots	Pervasive
Human Health	None	None
Controlled Waters	No unacceptable contamination, subject to confirmation from the Environment Agency.	
Human health / property (from ground gases)	Ground gas protection measures are required to provide protection for Characteristic Situation 2 ground gas conditions, radon gas and to provide a hydrocarbon vapour barrier.	
General Ground Conditions	Made Ground is not suitable as a growing medium within landscaped areas.	

4.2 General Observations and Requirements

A Remediation Strategy is required in accordance with guidance within LCRM Stage 3 (Land Contamination Risk Management October 2020). In general terms, any works proposed on-site should ensure the Site is 'suitable for use'. The Remediation Strategy shall state the required remediation targets, identify technically feasible remedial options, and then provide a detailed evaluation of the options. In accordance with Part IIA of the Environmental Protection Act, i.e., contamination remaining on-site so that the site does not present an unacceptable risk of significant harm to identified receptors.

The risk assessments have concluded that no specific remediation measures are required to address risks to:

- Human health, however, Made Ground across the site is not suitable as a growing medium within landscaped areas.

This remediation strategy is based on the site being developed with a Low Security residential unit.

The remedial actions required are:

- Made Ground can be left in-situ below buildings and future permanent hard standing (e.g., parking areas, roads, footpaths) excluding service runs and areas where future excavation might be anticipated. Remediation is only required below areas of soft landscaping to enable provision of uncontaminated cover soils in areas of soft landscaping (minimum of 300 mm).
- Demolition and removal of existing hardstanding and relic foundations where required for the proposed development and backfill of associated voids with suitable engineered fill.
- Provision of a clean cover system in areas of soft landscaping. A 300 mm thick cover of 'clean and inert' capping is proposed (comprising 150 mm subsoil and 150 mm topsoil). If suitable, the natural in-situ material may represent the clean cover system subject to chemical testing confirmation.
- Installation of ground gas protection measures.
- Stockpile and possible re-use of site won soils as appropriate across the site as part of earthworks. Made Ground is suitable to be left in-situ under hardstanding.

4.3 Unexpected Contamination

The proposed redevelopment could encounter previously unrecorded hotspots of contaminants. These will be assessed and mitigated in accordance with current good practice. A 'watching brief' is to be maintained by the Principal Contractor during all earthworks at the site. This will enable any previously unidentified contamination on the site to be dealt with in an appropriate manner.

All groundworks personnel will have appropriate training regarding asbestos and will have been given a toolbox talk on unidentified contamination at the site. The groundworks personnel will be involved with the watching brief and will advise the Site Manager as soon as they encounter suspect unidentified contamination.

During the earthworks part of the contract, the Principal Contractor will keep a daily diary of operations which will include a record of visual assessment of contamination and earthworks, photographic record, and any necessary validation testing. All works should be verified independently by suitably qualified and experienced personnel. All of this information will be incorporated into the Verification Report for the relevant part of the work.

If unexpected contamination is encountered, then the procedures set out in **Appendix V** should be implemented.

4.4 Clean Cover System

Where required clean cover materials 300 mm in thickness may be derived, or left in-situ, from shallow natural site won soils and/or from importing topsoil and subsoil for areas of soft landscaping. The Local Planning Authority will require that this soil is suitable, there is appropriate sampling and testing of this soil, and a verification report is produced.

For soft landscaped areas:

- Cover systems, 300 mm in thickness, are to extend across the soft landscaping areas, regardless of the proposed surface cover (where required, to be determined following the additional assessment works on the amenity area).
- Clean cover in soft landscaping area to comprise a minimum thickness of 150 mm of topsoil over a 150 mm thick subsoil.
- No soils are to be imported to site until information on their source, the results of any soil analysis, and an assessment of their suitability for use has been submitted to and agreed in writing by the LPA. This is to ensure that soils used as part of the proposed development are suitable for use, and contaminated soil is not brought on and used within developments. Furthermore, this applies to all development sites, irrespective as to whether there has been a remedial action required at the site.
- The LPA recommend that samples are taken at the source of the material, and then further sampling undertaken once the material has arrived at the site. This ensures that any non-compliant material is not

imported to site, therefore negating the need for removal back off site (which can take time and add cost to a development, in addition to the problem of potentially contaminating a clean site).

- The frequency of testing should normally be undertaken in line with the following requirements. It is recommended that the LPA should be consulted, and sampling requirements agreed, prior to work commencing on site. The assessment criteria proposed to be used should also be agreed prior to work or chemical analysis commencing.
 - Sampling of topsoil shall be depending on source as outlined in **Table 4.2**, 1 sample per 250 m³ with a minimum of 3 samples from any 1 source (Greenfield/ manufactured soils) or 1 sample per 50 m³ with a minimum of 3 samples from any 1 source (Brownfield/ screened soils) with the test results meeting the requirements of **Appendix VIII**.
 - Sampling of subsoil shall be depending on source as outlined in **Table 4.2**, 1 sample per 250 m³ with a minimum of 3 samples from any 1 source (Greenfield/ manufactured soils) or 1 sample per 100 m³ with a minimum of 3 samples from any 1 source (Brownfield/ screened soils) with the test results meeting the requirements of **Appendix VIII**.
 - Sampling of hardcore crushed brick or stone (e.g., 6F2 material) shall be sampled at a frequency of 1 and per 1000 m³ as outlined in **Table 4.2** with the test results meeting the requirements of **Appendix VIII**.
 - Chemical criteria to be met are as set out in **Appendix VIII**.

Table 4.2 - Specification of Materials Validation Laboratory Analysis

Material Use & Source		Testing Frequency
Imported or Site Generated Topsoil Materials	Greenfield	1 Sample Per 250 m ³ Minimum 3 samples per source
	Remediated	1 Sample Per 100 m ³ Minimum 3 samples per source
	Brownfield	1 Sample Per 50 m ³ Minimum 3 samples per source
	Unknown	1 Sample Per 50 m ³ Minimum 3 samples per source
Imported or Site Generated Subsoil Materials	Greenfield	1 Sample Per 250 m ³ Minimum 3 samples per source
	Remediated	1 Sample Per 100 m ³ Minimum 3 samples per source
	Brownfield	1 Sample Per 100 m ³ Minimum 3 samples per source
	Unknown	1 Sample Per 100 m ³ Minimum 3 samples per source
Imported or Site Generated Fill Material		1 Sample Per 100 m ³ Minimum 3 samples per source
Imported or Site Generated Engineered Fill Material		1 Sample Per 1000 m ³ Minimum 3 samples per source

Excavated material is to be stockpiled by stratum and tested in accordance with **Appendix VIII**. This will ascertain the suitability for use for incorporation into a clean cover system; with imported or site won topsoil completing the remedial measure.

Test results should be compared against screening criteria provided in **Appendix VIII** as well as a phytotoxicity assessment undertaken on topsoil materials. Where materials are found to contain concentrations of contaminants in excess of the screening criteria, further assessment will be required to ensure their suitability for use.

4.5 Permitting

Re-use of Soils

Materials management and re-use of arisings on-site is set out in **Section 6.1** and **Appendix VI**. If excavation volumes dictate, it is recommended that the CL:AIRE Code of Practice is implemented for the development and a Materials Management Plan is used for the site to allow the re-use of soils at the site.

If the CL:AIRE procedures are followed, excavated arisings from other sites can be re-used on this site if the soil is natural uncontaminated soil, particularly topsoil and subsoil can be imported under the CL:AIRE Code of Practice for the required clean cover.

If excavation volumes are limited, the use of U1 exemptions should be considered, where appropriate, with associated chemical testing of any material re-used or imported to site.

As with most developments, there will be waste materials produced from excavations for drainage/services. Where possible, these arisings should be incorporated into soft landscaping with the arisings being separated into Made Ground and Superficial Deposits as they are excavated in order to facilitate the re-use.

4.6 Waste Assessment

It is recommended that that should any of the below materials be encountered on-site, they will require quantification and separation into a number of waste types on-site so as to enable recovery/recycling of materials to minimise off-site disposal along the following lines:

- Metal – recover and sell as scrap.
- Timber, tree roots and vegetation – chip and use in landscaped areas.
- Plastic & polystyrene – send to landfill.
- Concrete, tarmac, bricks, gravel, and tiles – crush and use as hardcore.
- Tyres – send-off site to be shredded or incinerated.
- Soils - use in soft landscaping, if these have ‘moderate’ levels of contamination they can be capped with ‘clean’ materials from the site or adjacent area to north.
- Asbestos-cement board – dispose at a suitably licensed landfill site in accordance with legislation and EA Guidance.

As with most developments, there will be waste materials produced from excavations for drainage/services. Where possible, these arisings should be incorporated into soft landscaping with the arisings being separated into Made Ground and Superficial deposits as they are excavated in order to facilitate the re-use.

4.7 Waste Characterization and Classification

If there is a portion of excess soil this will then have to be sent to a suitable landfill site. A summary of current relatively complex guidance on categorising waste from earthworks is presented in **Appendix VI**. A two-phase approach is required comprising comprises:

- Waste Characterisation; and,
- Waste Classification (Waste Acceptance Criteria).

Waste Characterisation

No assessment was undertaken during site investigation to determine whether or not any materials located on-site would be considered to be hazardous in terms of waste classification. An initial waste classification exercise is recommended to be undertaken.

It cannot be discounted that some ground materials at the site may classify as hazardous, particularly if found to contain ACM or locally elevated contamination.

Any hazardous material that is excavated, such as any Made Ground material that is geotechnically unsuitable, will need to be removed from site. In accordance with the Waste Regulations, pre-treatment of hazardous materials is required prior to disposal. Due to the limited size of the site, it is recommended that hazardous material be taken to a soil treatment centre for pre-treatment where the soils hazardous properties may be reduced. The site must register as a producer of Hazardous Waste with the Environment Agency and appropriate Duty of Care Waste Transfer procedures followed.

Waste Classification

In order to determine whether soils can be sent to a licensed landfill for disposal, further testing is required comprising landfill Waste Acceptance Criteria (WAC) analysis for both total concentrations for certain chemicals and for leachate analysis.

4.8 Ground Gas

The investigation indicates CS2 classification, requiring gas protection measures for the proposed development. In accordance with BS8485: 2015 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' the building designer can consider alternative appropriate protective measures in order to achieve a protective measure score of 3.5 for Type A Buildings (Private buildings with small room sizes).

From BS8485:2015 Table 3 the new building can be classed as a Building Type A and from Table 4 of this standard a Score of 3.5 points of protection will be required. The standard does not provide set requirements but it provides a menu of different options which in combination can be used to provide an appropriate Score as set out in Table 4 of this standard. An example of appropriate protection measures are:

- Floor Slab:
 - Block and beam ground floor slab – Score 0, or
 - Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement) – Score 0.5; or
 - Cast in situ monolithic reinforced ground-bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations (with only nominal mesh reinforcement– Score 1.0;
- Passive sub floor dispersal layer
 - Very good performance– Score 2.5;
 - Good performance– Score 1.5;
 - Media used to provide the dispersal layer are:
 - Clear void
 - Polystyrene void forming blanket
 - Geocomposite void former blanket
 - No-fines gravel layer with gas drains
 - No-fines gravel layer
- gas resistant membrane meeting all of the following criteria – Score 2.0:
 - Sufficiently impervious to gases with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method);
 - Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
 - Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
 - Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, dropping tools etc);
 - capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
 - verified in accordance with CIRIA C735.

5.0 VERIFICATION PLAN

5.1 General

All stages of the remediation works should be verified independently by suitably qualified and experienced personnel. Verification reports should be prepared for each stage.

The verification report shall include as a minimum:

- Summary of pre-development conditions.
- Summary and details of any unexpected contamination encountered during the construction works.
- Description of any remedial measures including excavation volumes, obstructions, soils placement and laboratory analysis.
- Information on waste disposal including waste carriers, receiving sites and volumes of materials moved.
- Validation of ground gas protection measures.
- Validation of clean cover systems in soft landscaping areas.
- Details of the source and volumes of imported materials clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use via comparison to the criteria in **Appendix VIII**, where required.

On completion, a copy of the Verification Reports should be sent to the Local Authority Environmental Health Officer and the Environment Agency Contaminated Land Officer for their approval so that planning conditions can be discharged. A copy of the report should be sent to the NHBC, local authority building control officer or other similar authority for their approval. Where such organisations are involved in the development process, it is advised that approval be sought to any remediation works from these organisations prior to the commencement of development.

5.2 Verification of Earthworks / Remediation

The verification works/ report should include:

- A description of the works, sample location plan, test results, photographs, interpretation.
- This report should also meet the requirements of the verification requirements of the CL:AIRE CoP Materials Management Plan for the site (should this be required) to allow the re-use of soils at the site.
- In order that regulatory compliance can be confirmed, a copy of all site licences, consents, Waste Transfer Notes and imported material consignment notes shall be included.

5.3 Verification of Site Won and Imported Subsoil and Topsoil

Site won or imported soils will be tested to ensure suitability. BFG propose the following soil validation strategy:

Pre-Placement of Soils

- Site won material to be proven suitable for use and tested as detailed in **Table 4.2** and compared to appropriate assessment criteria in **Appendix VIII**.
- Any imported material (for both sub-soil and topsoil) to be tested as detailed in **Table 4.2** and compared to appropriate assessment criteria in **Appendix VIII**.

Post Placement of Soils

- Place sub-soil and topsoil to a minimum thickness of 300 mm in in landscaped areas, which includes a suitable thickness of topsoil (minimum of 150 mm) as a growing medium.
- Acceptable Methods of Validating Capping Thickness:

1. Geo-environmental Engineer to inspect formation layer to verify that site levels permit application of agreed capping thickness. Geo-environmental Engineer to digitally photograph formation layer. Digital photographs for every soft landscaped area must adequately illustrate formation layer.
 2. Geo-environmental Engineer to verify thickness of capping layer via augured or hand dug exploratory verification holes (hand dug or machine excavated only where capillary break layer incorporated) within each soft landscaped area. Large soft landscaped areas may require a greater number of exploratory verification holes at the discretion of the Local Authority.
 3. Geo-environmental Engineer to digitally photograph every soft landscaped area post capping.
 4. All data to form part of a Validation Report which must include, inter alia, prints of all digital photographs titled with location of soft landscaped area.
- Submit a Validation Report confirming the works have been undertaken in accordance with this agreed strategy.

5.4 Verification of Gas Protection Measures

Verification will be required for the installed ground gas protection measures. Details of work undertaken for installation of the chosen ground gas protection measure solution including details of the works, photographs, material specifications and any requirements in accordance with CIRIA C735 for ground gas membranes and confirm that the requisite number of air bricks have been installed and any sub-floor void has a suitable height and is clear of any debris preventing air flow.

6.0 REGULATORY REQUIREMENTS

6.1 Remediation

Any proposals to remediate or develop the site should be agreed with the relevant authorities (e.g., local authority environmental health officer, Environment Agency etc) to obtain Planning Permission prior to commencement of the works and should be agreed with the NHBC, or similar, or with the local authority building control officer prior to commencement of the works.

Should soil excavation, re-use and import volumes dictate, it is recommended that the development implements the procedures in the CL:AIRE document 'The Definition of Waste: Development Industry Code of Practice,' Version 2 (2011) to enable legal re-use of arisings and importation of excavated arisings from other sites if the imported soil is natural uncontaminated soil (or Made Ground can be imported and re-used if it has been treated to a required specification under an Environmental Permit). Note, untreated Made Ground cannot be imported in accordance with the CL:AIRE Code of Practice.

If excavation volumes are limited, the use of U1 exemptions should be considered, where appropriate, with associated chemical testing of any material re-used or imported to site.

6.2 Health & Safety

The works should be undertaken in compliance with all relevant regulations, guidance, and legislation. As outlined within the HSE publication "Successful Health and Safety Management – HSG65" this report should inform your development of safe systems of work and information as an input into the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2015. All risk control measures should be in accordance with the guidelines laid down within the Management of Health and Safety at Work Regulations 1999 and the Asbestos Working Plan implemented.

In accordance with the Construction Design and Management (CDM) Regulations 2015, BFG has acted in the role of Principal Contractor and as Principal Designer for the works as described in this report. With issue of this report BFG has discharged and completed all contractual and legal requirements for these positions and we have no further involvement with the project. The Principal Contractor is responsible for obtaining any necessary approvals from regulatory bodies and third parties to fully implement the works.

Asbestos and Risks to Human Health (Construction Phase)

During the construction works there will be a risk from dust to on-site workers and people occupying adjacent properties. Appropriate risk assessments should be carried out by the contractor to allow appropriate controls for the mitigation of risk to health of construction workers to be put in place. This risk can be controlled to within acceptable limits by:

- Workers wear suitable Personal Protective Equipment (PPE) and if necessary appropriate RPE.
- Having adequate site hygiene facilities allowing staff to keep a good level of personal hygiene.
- All ground workers should have been trained in asbestos awareness and should keep a look out for this being encountered during excavations.
- Only permitting smoking or eating on site in appropriate pre-designated areas.

7.0 REFERENCES

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22. HMSO: 1995: Part 2A of the Environmental Protection Act 1990, as inserted by Section 57 of the Environment Act 1995, was brought into force on 1 April 2000.
23. LQM/CIEH: 2009 Nathaniel CP, McCaffrey C, Ashmore MH, Cheng YY, Gillett A, Ogden R & Scott D: 2009. The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition). Land Quality Press, Nottingham.
24. MAFF: 1998: Code of Good Agricultural Practice for the Protection of Soils
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26. NHBC: 2020: NHBC Standards.
27. Statutory Instruments: 2012: Health and Safety. The Control of Asbestos Regulations 2012. No. 632 coming into force 6th April 2012.
28. Statutory Instruments: 2012: Environmental Protection, England. Contaminated Land (England) (Amendment) Regulations 2012 No. 263 coming into force 6th April 2012.
29. Statutory Instruments: 2015: The Construction (Design and Management) Regulations 2015 (CDM 2015).
30. UKWIR: 2010: Guidance for the selection of Water Supply Pipes to be Used in Brownfield Sites. Report Ref No 10/WM/03/21. UK Water Industry Research Limited.

APPENDIX I – LIMITATIONS

APPENDIX I - LIMITATIONS

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Bigfoot Geo-environmental Consultants and the Client as indicated in Section 1.0.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. In addition to the above Bigfoot Geo-environmental Consultants note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.
7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
10. This report presents an interpretation of the geotechnical information established by excavation, observation, and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that manmade deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently, there may be conditions present not revealed by this investigation.
11. Bigfoot Geo-environmental Consultants cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by Bigfoot Geo-environmental Consultants is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Bigfoot Geo-environmental Consultants in this connection without their explicit written agreement there to by Bigfoot Geo-environmental Consultants.
12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II - GLOSSARY

GLOSSARY

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation



APPENDIX III - DRAWINGS



Company	Drawing No	Revision	Title
BFG	001	0	Exploratory Hole Location Plan



BIGFOOT GEO-ENVIRONMENTAL CONSULTANTS 	Job No. & Title: BFG1042 Gwersyllt	Client: J10 Planning	Drawn by: BH Approved by: BH Date: June 2023	Notes: NOT TO SCALE	Drawing Title: BFG1042 Exploratory Hole Location Plan
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APPENDIX IV – EXPLORATORY HOLE LOGS

PROJECT	Gwersyllt	 TRIAL PIT LOG SA1
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	SA1	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.40	MADE GROUND: Grass over brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is fine to medium angular to rounded of sandstone, concrete, brick.	0.20	ES	
0.40	0.80	Light yellowish brown mottled grey clayey slightly gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded of sandstone and siltstone.	0.50	ES	
0.80	2.00	Firm reddish brown slightly sandy gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone and sandstone. Occasional 100mm pockets of brown clayey gravelly fine to medium sand. Perched water in sand pockets.			

Remarks	
Stable ground conditions, Poor infiltration	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	BIGFOOT GEO-ENVIRONMENTAL CONSULTANTS  TRIAL PIT LOG SA2
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	SA2	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.20	MADE GROUND: Grey very gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded of limestone, concrete, brick. Occasional cobbles of brick.	0.20	ES	
0.20	2.10	Firm reddish brown very sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded to rounded of sandstone and siltstone. Occasional cobbles of sandstone and siltstone.	0.50	ES	

Remarks

Stable ground conditions, Limited infiltration

Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	

U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample

PROJECT	Gwersyllt	 TRIAL PIT LOG SA3
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	SA3	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.80	MADE GROUND: Light grey gravelly fine to coarse SAND. Gravel is fine to coarse of sandstone, brick, mudstone, concrete. Occasional cobbles of concrete.	0.30	ES	
0.80	2.00	Firm reddish brown mottled grey slightly sandy CLAY. Sand is fine to medium.	1.00	ES	

Remarks	
Stable ground conditions, Poor infiltration	
Old derelict pipe and telecom cables @ 0.2m bgl	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	 TRIAL PIT LOG SA4
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	SA4	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	1.00	MADE GROUND: Grass over dark brown and grey clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of concrete, brick, sandstone, siltstone, charcoal. Occasional cobbles of brick and concrete. Rare buried derelict cables.	0.40	ES	
1.00	2.10	Firm reddish brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded to rounded of sandstone and siltstone.	1.10	ES	

Remarks	
Stable ground conditions, Poor infiltration	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	SA5	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

TRIAL PIT LOG

SA5

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.40	MADE GROUND: Brownish grey slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded of brick, sandstone, concrete, quartzite. Rare pieces of metal.	0.60	ES	
0.40	1.20	MADE GROUND: Dark brownish grey clayey slightly gravelly ashy SAND. Gravel is fine to coarse angular to subangular of slate, brick, mudstone.			
1.20	2.20	Brown mottled light yellowish brown clayey slightly gravelly SAND. Gravel is fine to medium subangular to subrounded of sandstone.	1.50	ES	

Remarks

Stable ground conditions, Good infiltration

Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	

U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample

PROJECT	Gwersyllt	 TRIAL PIT LOG TP01
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP01	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.90	MADE GROUND: Brownish grey mottled black gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of sandstone, brick and concrete. Cobbles of sandstone and concrete.	0.70	ES	
0.90	2.00	Firm reddish brown mottled grey slightly sandy CLAY. Sand is fine to medium.			
			1.20	ES	

Remarks	
Stable ground conditions	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	 TRIAL PIT LOG TP02
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP02	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.90	MADE GROUND: Multicoloured very gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of brick, concrete, mudstone, sandstone. Frequent cobbles of brick and concrete.	0.50	ES	
0.90	1.20	MADE GROUND: Black and dark grey gravelly fine to coarse ashly SAND. Gravel is fine to coarse angular to subangular of brick, concrete, mudstone, sandstone. Occasional cobbles of brick and concrete.			
1.20	1.50	Firm to stiff greyish brown sandy CLAY. Sand is fine to medium.			

Remarks Stable ground conditions.	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	 TRIAL PIT LOG TP03
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP03	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.30	MADE GROUND: Greyish brown and grey slightly clayey gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded of mudstone, concrete.			
0.30	1.50	Firm reddish brown slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded to rounded of siltstone and sandstone. Occasional pockets of grey patches from decaying matter.			

Remarks	
Stable ground conditions	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	BIGFOOT GEO-ENVIRONMENTAL CONSULTANTS  TRIAL PIT LOG TP04
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP04	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	1.50	Firm reddish brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded to rounded of sandstone and siltstone.	0.20	ES	

Remarks

Stable ground conditions,

Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	

U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample

PROJECT	Gwersyllt	BIGFOOT GEO-ENVIRONMENTAL CONSULTANTS  TRIAL PIT LOG TP06
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP06	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	2.20	MADE GROUND: Grass over dark brown and reddish brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of concrete, brick, sandstone, siltstone. Rare plastics. Occasional cobbles of brick. Rare buried derelict cables.	1.00	ES	

Remarks

Stable ground conditions

Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	

U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample

PROJECT	Gwersyllt	 TRIAL PIT LOG TP05
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP05	
DATE	04/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.20	MADE GROUND: Greyish brown and grey slightly clayey gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded of mudstone, concrete.	0.10	ES	
0.20	1.00	Firm reddish brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded to rounded of sandstone and siltstone.			
1.00	1.10	Grey and yellowish brown SILTSTONE.			
Remarks Stable ground conditions					
Method/ Plant	Mechanical Excavator				
Stability	Stable				
Shoring	None				
Weather					
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample					

PROJECT	Gwersyllt	BIGFOOT GEO-ENVIRONMENTAL CONSULTANTS  TRIAL PIT LOG TP07
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP07	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	1.50	MADE GROUND: Grass over dark brown and reddish brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of concrete, brick, sandstone, siltstone. Rare plastics. Frequent cobbles of brick and concrete. Occasional boulders of concrete. Rare buried derelict cables.	0.70	ES	

Remarks

Stable ground conditions

Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	

U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample

PROJECT	Gwersyllt	 TRIAL PIT LOG TP08
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP08	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	2.50	MADE GROUND: Brown and grey slightly clayey very gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of concrete, mudstone, sandstone, brick, wiring. Frequent cobbles of brick and concrete.	2.00	ES	
2.50	2.80	Firm reddish brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded to rounded of sandstone and siltstone.			

Remarks	
Stable ground conditions	
Method/ Plant	Mechanical Excavator
Stability	Stable
Shoring	None
Weather	
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample	

PROJECT	Gwersyllt	 TRIAL PIT LOG TP09
PROJECT NO.	BFG1042	
EXPLORATORY HOLE ID	TP09	
DATE	05/05/2023	
DESCRIBED BY	JL	
LOGGER SIGNATURE	JL	

Strata			Samples and Tests		
From (m)	To (m)	Description	Depth,m	Type	Result
0.00	0.40	MADE GROUND: Dark grey slightly sandy fine to coarse angular to subrounded of GRAVEL of concrete, brick, sandstone.	0.30	ES	
0.40	0.60	MADE GROUND: Multicoloured sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone.			
Remarks Stable ground conditions					
Method/ Plant		Mechanical Excavator			
Stability		Stable			
Shoring		None			
Weather					
U=Undisturbed, P=Piston, D=Disturbed, B= Bulk, W=Water, ES=Environmental Soil Sample, EW=Environmental Water Sample					



APPENDIX V – LABORATORY RESULTS

Bradley Hall

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e: reception@i2analytical.com

e: brad@bfgeo.co.uk

Analytical Report Number : 23-32937

Project / Site name:	Gwersylit, Wrexham	Samples received on:	09/05/2023
Your job number:	BFG1042	Samples instructed on/ Analysis started on:	11/05/2023
Your order number:	105	Analysis completed by:	17/05/2023
Report Issue Number:	1	Report issued on:	17/05/2023
Samples Analysed:	16 soil samples		



Signed:

Elżbieta Suchy
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674092	2674093	2674094	2674095	2674096
Sample Reference				SA1	SA1	SA2	SA2	SA3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10	0.50	0.30
Date Sampled				04/05/2023	04/05/2023	05/05/2023	05/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	11	4.8	9.4	9.3
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.9	0.9	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA	SCA	SCA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.2	10.6	7.9	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	70	260	170	10	170
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.13	0.087	0.005	0.086
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	34.8	132	87.4	5	86.1
Organic Matter (automated)	%	0.1	MCERTS	3.5	0.5	1.5	0.5	1.4
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2	0.3	0.9	0.3	0.8

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.21	< 0.05	0.13	< 0.05	0.1
Anthracene	mg/kg	0.05	NONE	0.07	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	NONE	0.32	< 0.05	0.16	< 0.05	0.2
Pyrene	mg/kg	0.05	NONE	0.32	< 0.05	0.16	< 0.05	0.18
Benzo(a)anthracene	mg/kg	0.05	NONE	0.17	< 0.05	0.11	< 0.05	0.14
Chrysene	mg/kg	0.05	NONE	0.22	< 0.05	0.17	< 0.05	0.21
Benzo(b)fluoranthene	mg/kg	0.05	NONE	0.33	< 0.05	< 0.05	< 0.05	0.35
Benzo(k)fluoranthene	mg/kg	0.05	NONE	0.12	< 0.05	< 0.05	< 0.05	0.12
Benzo(a)pyrene	mg/kg	0.05	NONE	0.25	< 0.05	< 0.05	< 0.05	0.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	0.19	< 0.05	< 0.05	< 0.05	0.15
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	0.24	< 0.05	< 0.05	< 0.05	0.18

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	2.44	< 0.80	< 0.80	< 0.80	1.83
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Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674092	2674093	2674094	2674095	2674096
Sample Reference				SA1	SA1	SA2	SA2	SA3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10	0.50	0.30
Date Sampled				04/05/2023	04/05/2023	05/05/2023	05/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	6.9	6	8.2	7.4
Barium (aqua regia extractable)	mg/kg	1	MCERTS	92	69	60	76	63
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.94	0.62	0.33	0.68	0.54
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	< 0.2	0.4	0.3	0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	9.1	17	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	25	17	14	22	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	82	35	33	23	58
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	16	7.8	25	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	23	21	12	19	19
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	98	35	42	47	58

Monoaromatics & Oxygenates

Benzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, 1D, TOTAL}	mg/kg	10	NONE	57	< 10	120	< 10	< 10
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TPH2 (C6 - C10) _{HS, 1D, TOTAL}	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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TPH C6 - C40 _{EH, CU+HS, CU, 1D, TOTAL}	mg/kg	10	NONE	57	< 10	120	< 10	< 10
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS, 1D, AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS, 1D, AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS, 1D, AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH, CU, 1D, AL}	mg/kg	1	NONE	1.2	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH, CU, 1D, AL}	mg/kg	2	NONE	2.3	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH, CU, 1D, AL}	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH, CU, 1D, AL}	mg/kg	8	NONE	23	< 8.0	41	< 8.0	9.1
TPH-CWG - Aliphatic >EC35 - EC40 _{EH, CU, 1D, AL}	mg/kg	10	NONE	11	< 10	13	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS, 1D, AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS, 1D, AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS, 1D, AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH, CU, 1D, AR}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH, CU, 1D, AR}	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH, CU, 1D, AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH, CU, 1D, AR}	mg/kg	10	NONE	< 10	< 10	44	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40 _{EH, CU, 1D, AR}	mg/kg	10	NONE	< 10	< 10	15	< 10	< 10
TPH Total C5 - C40 _{EH, CU+HS, 1D, TOTAL}	mg/kg	10	NONE	57	< 10	120	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-32937
Project / Site name: Gwersyllit, Wrexham
Your Order No: 105

Lab Sample Number				2674097	2674098	2674099	2674100	2674101
Sample Reference				SA3	SA4	SA4	SA5	SA5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.40	1.10	0.60	1.50
Date Sampled				04/05/2023	05/05/2023	05/05/2023	04/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.1	13	10	22	17
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.9	0.9	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA	SCA	SCA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8	7.9	7.8	6.7	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	100	38	62	470	370
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.052	0.019	0.031	0.24	0.19
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	51.6	18.9	31.1	237	185
Organic Matter (automated)	%	0.1	MCERTS	0.9	4.5	0.9	4.2	1.8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	2.6	0.5	2.4	1

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	0.48	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	0.32	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	NONE	< 0.05	2	0.3	0.21	< 0.05
Anthracene	mg/kg	0.05	NONE	< 0.05	0.39	0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	NONE	< 0.05	1.1	0.15	0.08	< 0.05
Pyrene	mg/kg	0.05	NONE	< 0.05	0.92	0.13	0.06	< 0.05
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05	0.37	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	NONE	< 0.05	0.4	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.36	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	0.26	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	0.23	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	< 0.80	7.07	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674097	2674098	2674099	2674100	2674101
Sample Reference				SA3	SA4	SA4	SA5	SA5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.40	1.10	0.60	1.50
Date Sampled				04/05/2023	05/05/2023	05/05/2023	04/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.7	15	7.4	15	3.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	110	75	110	77
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.8	0.89	0.66	1.2	0.5
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.6	1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	15	17	17	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26	37	18	35	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	54	20	49	30
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	26	22	26	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	27	23	21	35	15
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	60	76	47	50	28

Monoaromatics & Oxygenates

Benzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
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TPH2 (C6 - C10) _{HS,1D,TOTAL}	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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TPH C6 - C40 _{EH,CU+HS,CU,1D,TOTAL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40 _{EH,CU,1D,AL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40 _{EH,CU+HS,1D,TOTAL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674102	2674103	2674104	2674105	2674106
Sample Reference				TP01 ES1 -North	TP01 ES2 -East	TP01 ES3 -South	TP01 ES4 -West	TP01 ES5 -Base
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.20	1.20	1.20	1.20
Date Sampled				04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	36	< 0.1	< 0.1	39	< 0.1
Moisture Content	%	0.01	NONE	9.1	10	9.6	8.9	11
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.9	0.9	0.9

Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	-
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Complex Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	-	-	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	NONE	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	NONE	-	-	-	-	-
Acenaphthene	mg/kg	0.05	NONE	-	-	-	-	-
Fluorene	mg/kg	0.05	NONE	-	-	-	-	-
Phenanthrene	mg/kg	0.05	NONE	-	-	-	-	-
Anthracene	mg/kg	0.05	NONE	-	-	-	-	-
Fluoranthene	mg/kg	0.05	NONE	-	-	-	-	-
Pyrene	mg/kg	0.05	NONE	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	NONE	-	-	-	-	-
Chrysene	mg/kg	0.05	NONE	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	NONE	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	NONE	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	NONE	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	NONE	-	-	-	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	-	-	-	-	-
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Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674102	2674103	2674104	2674105	2674106
Sample Reference				TP01 ES1 -North	TP01 ES2 -East	TP01 ES3 -South	TP01 ES4 -West	TP01 ES5 -Base
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.20	1.20	1.20	1.20
Date Sampled				04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	-
Chromium (hexavalent)	mg/kg	1.2	NONE	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Monoaromatics & Oxygenates								
Benzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Petroleum Hydrocarbons								
TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	NONE	-	-	-	-	-
TPH2 (C6 - C10) _{HS,1D,TOTAL}	mg/kg	0.1	NONE	-	-	-	-	-
TPH C6 - C40 _{EH,CU+HS,CU,1D,TOTAL}	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	NONE	< 2.0	2.2	< 2.0	4.2	3.8
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	NONE	14	13	< 8.0	35	9
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	NONE	24	< 8.0	< 8.0	28	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40 _{EH,CU,1D,AL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	16	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40 _{EH,CU+HS,1D,TOTAL}	mg/kg	10	NONE	42	21	< 10	94	15

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number				2674107
Sample Reference				TP01 ES6-Blackfill
Sample Number				None Supplied
Depth (m)				0.90
Date Sampled				04/05/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	10
Total mass of sample received	kg	0.001	NONE	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	140
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.072
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	72.2
Organic Matter (automated)	%	0.1	MCERTS	1
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	NONE	1
Acenaphthylene	mg/kg	0.05	NONE	< 0.05
Acenaphthene	mg/kg	0.05	NONE	1.8
Fluorene	mg/kg	0.05	NONE	1.4
Phenanthrene	mg/kg	0.05	NONE	6.6
Anthracene	mg/kg	0.05	NONE	1.3
Fluoranthene	mg/kg	0.05	NONE	4.3
Pyrene	mg/kg	0.05	NONE	3.5
Benzo(a)anthracene	mg/kg	0.05	NONE	1.2
Chrysene	mg/kg	0.05	NONE	1.1
Benzo(b)fluoranthene	mg/kg	0.05	NONE	1
Benzo(k)fluoranthene	mg/kg	0.05	NONE	0.49
Benzo(a)pyrene	mg/kg	0.05	NONE	0.93
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	0.39
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	0.08
Benzo(ghi)perylene	mg/kg	0.05	NONE	0.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	25.6
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Analytical Report Number: 23-32937
Project / Site name: Gwersyllt, Wrexham
Your Order No: 105

Lab Sample Number	2674107
Sample Reference	TP01 ES6-Blackfill
Sample Number	None Supplied
Depth (m)	0.90
Date Sampled	04/05/2023
Time Taken	None Supplied

Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
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Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.9
Barium (aqua regia extractable)	mg/kg	1	MCERTS	86
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.87
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	22
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	56

Monoaromatics & Oxygenates

Benzene	µg/kg	5	NONE	< 5.0
Toluene	µg/kg	5	NONE	< 5.0
Ethylbenzene	µg/kg	5	NONE	< 5.0
p & m-xylene	µg/kg	5	NONE	< 5.0
o-xylene	µg/kg	5	NONE	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	NONE	66
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TPH2 (C6 - C10) _{HS,1D,TOTAL}	mg/kg	0.1	NONE	< 0.1
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TPH C6 - C40 _{EH,CU+HS,CU,1D,TOTAL}	mg/kg	10	NONE	66
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	NONE	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	NONE	8.2
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	NONE	21
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	NONE	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40 _{EH,CU,1D,AL}	mg/kg	10	NONE	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	NONE	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	NONE	4.7
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	NONE	17
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10
TPH-CWG - Aromatic >EC35 - EC40 _{EH,CU,1D,AR}	mg/kg	10	NONE	< 10
TPH Total C5 - C40 _{EH,CU+HS,1D,TOTAL}	mg/kg	10	NONE	66

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-32937
Project / Site name: Gwersyllt, Wrexham

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2674092	SA1	None Supplied	0.2	Brown loam and sand with concrete and vegetation.
2674093	SA1	None Supplied	0.5	Brown sandy clay with gravel.
2674094	SA2	None Supplied	0.1	Brown loam and sand with concrete and brick.
2674095	SA2	None Supplied	0.5	Brown clay and sand with gravel.
2674096	SA3	None Supplied	0.3	Brown loam and sand with gravel and vegetation.
2674097	SA3	None Supplied	1	Brown clay and sand with gravel and vegetation.
2674098	SA4	None Supplied	0.4	Brown loam and clay with gravel and vegetation.
2674099	SA4	None Supplied	1.1	Brown clay and sand with gravel.
2674100	SA5	None Supplied	0.6	Brown clay and sand with gravel.
2674101	SA5	None Supplied	1.5	Brown sandy clay.
2674102	TP01 ES1 -North	None Supplied	1.2	Brown clay and sand with gravel and stones.
2674103	TP01 ES2 -East	None Supplied	1.2	Brown sandy clay with gravel.
2674104	TP01 ES3 -South	None Supplied	1.2	Brown sandy clay with gravel.
2674105	TP01 ES4 -West	None Supplied	1.2	Brown clay and loam with gravel and vegetation.
2674106	TP01 ES5 -Base	None Supplied	1.2	Brown sandy clay with gravel and vegetation.
2674107	TP01 ES6-Blackfri	None Supplied	0.9	Brown clay and sand with clinker and gravel

Analytical Report Number : 23-32937
Project / Site name: Gwersyllt, Wrexham

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

Analytical Report Number : 23-32937
Project / Site name: Gwersyllit, Wrexham

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	NONE
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	TPH> C10 Dry soil n-house method with silica gel split/clean up. TPH <C10 by Wet by HS-GC-MS	L088/L076		NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

APPENDIX VI – GUIDANCE FOR CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL AT A LANDFILL SITE

APPENDIX VI - GUIDANCE FOR CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL AT
A LANDFILL SITE

GUIDANCE FOR CLASSIFICATION OF SOIL FOR OFF SITE DISPOSAL AT A LANDFILL SITE

Many site developments create a portion of excess soils and Made Ground which if not re-usable, are required to be disposed off-site at a suitably licensed landfill site. The regulations and associated guidance published by the Environment Agency is relatively complex and lengthy. This guidance provides a summary of the following documents which should be referred to when assessing soil (and common constituents found within Made Ground on remediation sites) for off-site disposal:

- Guidance for Waste destined for disposal in landfills: Interpretation of the Waste Acceptance Requirements of the Landfill (England and Wales) Regulations 2002 (as amended) (EA, 2004).
- Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance Procedures (EA, April 2005).
- WM3 - Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Wastes (EA, May 2015).
- European Regulation No 1272/2008 on Classification, Labelling and Packaging of substances 2015 (CLP 2015).
- Guidance on Waste Destined for Disposal in Landfill (EA, June 2006).
- Treatment of Non-hazardous wastes for Landfill (EA, February 2007).

It is important to distinguish between the waste classification system and the designation of materials as “suitable for use” on site. A material may be retained on site for an appropriate end use if that end-use is clearly designated and that a site-specific risk assessment ensures that it does not pose a risk to human health or controlled waters. However, if this material is excavated and sent for disposal, the material is then subject to waste management regulations and the two systems cannot be directly correlated. It is therefore important to note that classifying a material as hazardous (should it be excavated and become a waste) does not necessarily indicate that it might not be suitable to be kept on site for re-use. Separate guidance in the form of a Code of Practice (CL:AIRE Version 2, 2011) has been developed jointly between the development industry and the Environment Agency to provide best practice when assessing whether materials are wastes or not, and for determining when waste can cease to be waste for a particular use.

In accordance with the current waste regulations (or Landfill Directive, as they are more commonly known), from 30th October 2007 all waste materials produced from construction sites have to be pre-treated prior to disposal. Pre-treatment includes waste minimisation, recovery (e.g., separation of demolition waste to be used as hardcore) and separation of materials into different waste categories (e.g., separate inert waste from hazardous waste etc). Mixing of different waste types shall be avoided and intentional mixing of inert materials with hazardous waste to ‘dilute it’ and hence change its waste classification, is illegal.

The current waste regulations (based on the EU landfill directive) introduced a two-tier classification system for waste materials, defining them as either being hazardous or non-hazardous. Landfills are licensed to take wastes based on a three-tier classification system with the non- hazardous waste divided into two sub-categories:

- Non-Hazardous - inert.
- Non-Hazardous - non-hazardous.
- Hazardous.

Waste materials are categorised with a six-figure numeric code in the European Waste Catalogue. Commonly found construction and demolition wastes including excavated soil from contaminated sites and Made Ground with their waste codes are summarised below (this is not a comprehensive list):

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
17 01 01 Concrete	Concrete, possibly with reinforcement (from Construction & Demolition)	✓		
17 01 02 Bricks		✓		
17 01 06* Mixtures of concrete, bricks, tiles & ceramics containing dangerous substances	These are not normally considered hazardous but if they are contaminated (e.g., by asbestos) then could be hazardous – see comment above			✓

17 01 07 Mixtures of concrete, bricks, tiles & ceramics other than those in 17 01 06	This is mixed inert's c.f. 17 09 04	✓		
17 05 03* soils and stones containing dangerous substances				✓
17 05 04 soils and stones other than those mentioned in 17 05 03	Soil and stones only (excluding topsoil, peat, soil, and stones from contaminated sites)	✓		
17 06 05* Construction materials containing asbestos	e.g., corrugated asbestos sheeting			✓
17 08 02 Gypsum-based construction materials other than those mentioned in 17 08 01	Plaster & plasterboard (although specific disposal requirements are required for high sulphate waste – see EA guidance 'Understanding the Landfill Directive' version 1.0 March 2010.		✓	
17 09 01* Construction & demolition wastes containing mercury				✓
17 09 02* Construction & demolition wastes containing PCBs	Waste with more than 50 mg/kg of PCB's are hazardous			✓
17 09 03* Other mixed construction & demolition wastes containing dangerous substances	Broad range of potentially (see notes below – if asterix the waste is hazardous) hazardous wastes			✓
17 09 04 Mixed construction & demolition wastes other than those mentioned in 17 09 01, 17 09 02 & 17 09 03	Mixed inert's with soil, asphalt, cables, vegetation, plaster, etc. (this waste can only be considered inert if it passes the waste acceptance criteria identified in the regulations).	✓	✓	

Note: all wastes with an asterix code are hazardous regardless of whether they are mirror or absolute entries in the EWC list the decision to with regard to composition must come before applying the code for mirror entries.

Some materials are classified as Inert Waste based in its origin (e.g., 17 01 01 Concrete, or glass) without any requirement for laboratory chemical analysis.

However, most soils will require laboratory testing to confirm whether they are classified as Hazardous Waste. The protocol for assessing these materials and the appropriate threshold values is complicated and are set out in the Environment Agency's "Technical Guidance WM3 Hazardous Waste – Interpretation of the Definition and Classification of Hazardous Waste" (2015). If the test results for the waste indicates that it is not hazardous then further analysis of the waste is required to determine whether it is Inert Waste. If the waste does not meet the criteria for either Hazardous or Inert, then it is by default classified as Non-hazardous Waste.

As an alternative location to landfills for off-site disposal of inert and non-hazardous waste, there are a number of sites which have Waste Permit Exemptions that can accept certain categories of inert and non-hazardous wastes. Additionally, some quarries can accept certain types of wastes to be used for quarry restoration material. For both alternatives to disposal at landfill sites the material still requires chemical testing as these sites have site specific acceptance criteria for wastes. It should also be noted that these types of sites do not incur landfill tax which in the 2018/19 tax year is £2.80 for inactive waste (inert and some types of non-hazardous waste) and £88.95/Tonne for active waste (some types of non-hazardous waste and hazardous waste. Note that the Inland Revenue uses a different classification scheme for waste for tax purposes to the European Waste Classification scheme.

Waste Categorisation

The process of determining the category of wastes is a three-stage process:

- Stage 1 – is the waste either Hazardous or Inert by definition without the requirement for chemical analysis (if it is then Stages 2 and 3 are not required).
- Stage 2 - Waste characterisation.
- Stage 3 - WAC classification.

Waste characterisation determines if a waste is hazardous or not. Excavated soil is characterised using a system based on the contaminants present and their hazardous properties. The system uses total concentrations of the contaminants. Thresholds (as a percentage of the waste) have been set for the various hazardous properties.

Fourteen hazardous properties together with other scenarios where material could cause a hazard have been defined:

- Hazardous properties: explosive, oxidising, highly flammable/flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, toxic for reproduction, mutagenic and ecotoxic.
- Substances which can release toxic/very toxic gases in contact with water, acid, or air.
- Substances which, after disposal, can yield another substance, e.g., a leachate, which possesses any of the above hazardous properties.

Some of the hazardous properties are sub-divided e.g., there are three categories of carcinogenic, mutagenic, and toxic for reproduction substances. The hazardous properties were originally defined in the European Hazardous Waste Directive 91/689/EC. Should a waste contain a contaminant with one or more of the listed hazardous properties at a concentration equal to or above the threshold value for the particular property, then the waste is hazardous. The hazardous properties of a wide range of chemicals are sourced from CLP 2015.

There are many reasons why waste soil is classified as being hazardous, but the majority of reasons can be divided into the following four groups:

- Hydrocarbons – this is probably the most common reason for the hazardous classification of soils. For most soils hydrocarbon analysis will be required for both Polycyclic Aromatic Hydrocarbons (PAH) and speciated Petroleum Hydrocarbons (PHCs) but depending on the site's history other groups of organic contaminants may also be included in any analysis suite for soil samples.
- Metals – Particularly sites from former metal processing or mining sites and some types of ash have metal concentrations that are sufficiently high to characterise materials requiring disposal as hazardous waste.
- Asbestos.
- Anions – e.g., sulphate in plasterboard (there are special disposal requirements for high sulphate waste and specific WAC requirements); it is possible that sulphate salts of metals and semi-metals could make the waste hazardous – the sulphate concentration could possibly be significant under H12, H13 and H14.

The characterisation of wastes with significant metal concentrations involves some processing of the analysis data. The chemical analysis results for inorganic substances are generally reported as total concentrations e.g., total lead, total arsenic, total sulphate etc. However, CLP 2015 deals with the hazardous properties of actual compounds e.g., lead sulphate, arsenic pentoxide, nickel carbonate. Therefore, the total metal results have to be converted into assessed chemical analysis results for the compound most likely to be present in the soil samples. For example, if the sample contains high total lead concentrations and high sulphate concentrations, then the lead is likely to be present in the soil as lead sulphate. The most likely compounds can often be determined from a desk study or previous site uses. If the site has been derelict for a number of years, consideration should be given as to whether water soluble compounds should or should not be chosen, as rainfall could have removed them from the soil (this does not apply if the soil has been taken from below under a concrete slab etc). Chemical knowledge and common sense needs to be used in choosing a suitable compound.

If no data is available, then a worst-case scenario has to be assumed and the most hazardous compound likely to be present has to be chosen. For example, metal chromates (lead chromate, nickel chromate) are often the most hazardous compounds formed by many metals, but if the chromium concentrations in the soil are low, chromates are unlikely to be present. It should also be noted that for many of the hazard categories, the cumulative hazard from different compounds is added (e.g., add the concentrations of the copper, lead, and zinc compounds together to assess the Hazard Category H14 Ecotoxicity).

If the results of the above assessment determine that the waste is hazardous, it must then be analysed for the Waste Acceptance Criteria (WAC) analysis contained within appropriate Environmental Permitting Regulations (this comprises

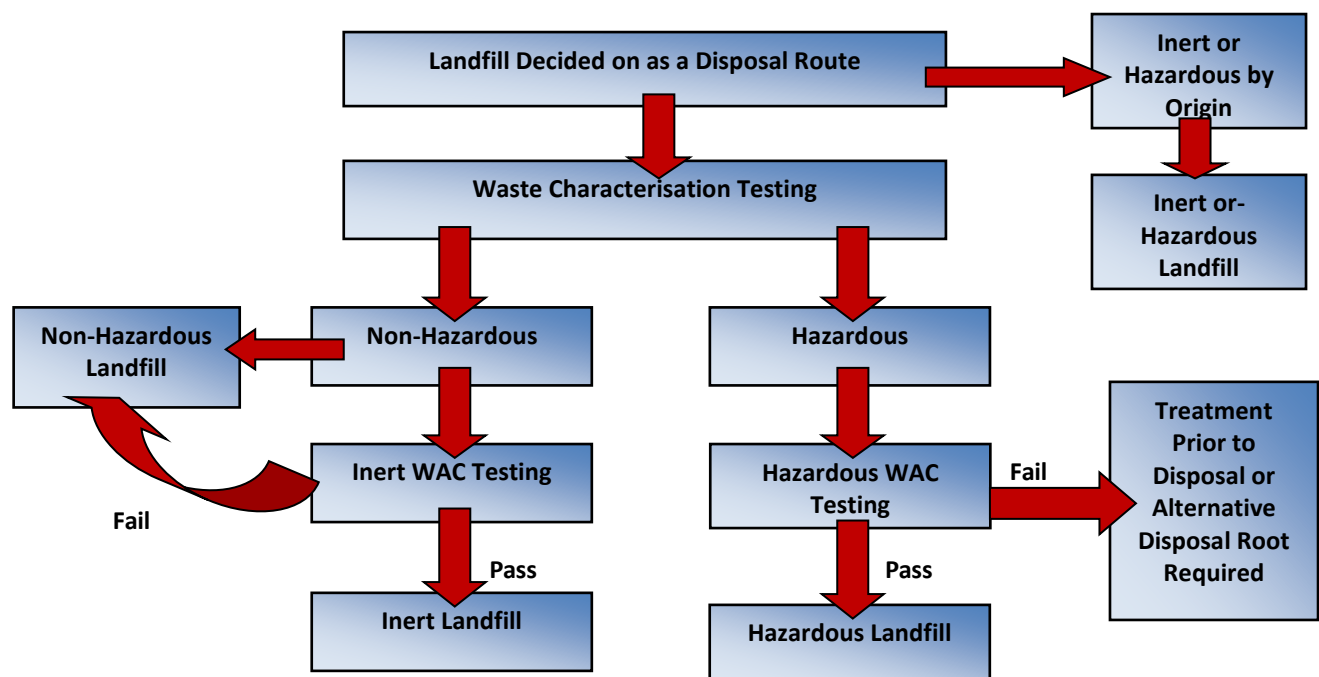
mainly leachate but also analysis for TOC and Loss on ignition). WAC limit values have been set for the listed determinands. If any of the determinands exceed their limit value, the waste must be pre-treated to reduce concentrations to below the limit values before the waste may be disposed of at a landfill site licensed to take hazardous waste.

For waste classified as not being hazardous, then there are two options available. Currently, waste correctly characterised as not being hazardous may be disposed of without WAC testing to a non-hazardous landfill. Alternatively, WAC testing for Inert Waste can be carried out (this is similar to the list for hazardous waste with the addition of PAH's, BTEX and Mineral Oil). If the results pass the Inert WAC criteria it can be disposed of at an Inert Waste Landfill. If any of the WAC test results exceed the Inert WAC criteria the waste has to be disposed at a non- hazardous landfill. There are WAC limits for non-hazardous waste set for pH and TOC. If these two criteria are not met, then the waste must be pre-treated to so that it meets the criteria before it can be disposed.

If materials fail the WAC criteria it may be possible to pre-treat the waste on-site or be taken to a soil treatment centre for pre-treatment to reduce the soil's hazardous properties (e.g., by bioremediation of hydrocarbons).

It should be noted that in order to dispose of Hazardous Waste, the site must register as a producer of Hazardous Waste with the Environment Agency. When disposing of waste materials to landfill sites the appropriate Duty of Care Waste Transfer procedures must be followed.

Landfilled Waste Decision Tree



Landfill Tax

It should be noted that HM Revenue and Customs (HMRC) classify wastes for tax purposes using a different scheme to the threefold landfill EU Landfill Directive scheme (i.e., the hazardous, non-hazardous and inert). HMRC have a two-fold system for landfill tax. The Standard Landfill Tax is currently £88.95/T and applies to all wastes unless they qualify for the reduced rate of landfill tax of £2.80/T. The wastes that qualify for the reduced rate of Landfill Tax are set out in The Landfill Tax (Qualifying Material) Order 2011 with supplementary information on the interpretation of these regulations in HMRS "Notice LFT1 – A General Guide to Landfill Tax" (May 2012) and HMRC Briefing Notes 15/12 and 18/12.



APPENDIX VII – UNFORESEEN GROUND CONTAMINATION

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UNFORESEEN GROUND CONTAMINATION

There is the potential for areas of previously unexpected contamination to be present, as is the case with any “brownfield” site. Any significant quantities of asbestos, significant ashy soils, unusual, brightly coloured, or significantly oily or odorous material should be considered in this category. If unexpected contamination is found the following procedures should be adhered to:

1. All site works at the position of the suspected contamination will cease.
2. A suitably trained geo-environmental specialist should assess the visual and olfactory observations of the condition of the ground and the extent of contamination, and the Client and the Local Authority should be informed of the discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.
3. The suspected contaminated material will be investigated and tested appropriately in accordance with the assessed risks. The investigation works will be carried out in the presence of a suitably qualified geo-environmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.
4. The unexpected, contaminated material will either be left in-situ or be stockpiled whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires to be disposed as appropriate.
5. Where the material is left in-situ awaiting results it will be reburied or covered with plastic sheeting.
6. Where the potentially contaminated material is to be temporarily stockpiled it will either be placed either on a prepared surface of clayey Alluvium, or on 2000-gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
7. Any areas where unexpected visual or olfactory ground contamination will be surveyed, a photographic record kept, and testing results incorporated into the Verification Report.
8. A photographic record will be made of relevant observations.
9. The testing suite will be determined by the independent geo-environmental specialist on the basis of visual and olfactory observations.
10. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
11. The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority and if necessary, the Environment Agency, materials should either be:
 - re-used in areas where test results indicate that it meets compliance targets so it can be re-used without treatment; or;
 - treatment of material on site to meet compliance targets so it can be re-used; or
 - removal from site to a treatment centre or to a suitably licensed landfill or permitted treatment facility.
12. Verification Report will be produced for the work.

Asbestos

Asbestos cement products and asbestos fibres have not been encountered in the soils at the site but based on the age of the Made Ground material containing asbestos could be expected to be encountered. If non-notifiable asbestos (e.g., chrysotile asbestos cement board) is encountered in excavations then it will be dealt with in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and the HSE’s ACoP for asbestos (2013). Finding non-notifiable asbestos is a very common occurrence on brownfield sites and is a relatively low risk activity and can be dealt with as a matter of routine. Therefore, it is not proposed that the Council will be notified but an appropriate record will be kept of confirmatory testing and disposal. This will be included in remediation verification reports.

If suspect notifiable asbestos is encountered, then the Council and the HSE will be notified. An appropriate action plan will be agreed with the Council and the HSE in accordance with CAR 2012. The action plan will include the preparation of the Risk Assessment and Plan of Work in accordance with CAR and other statutory requirements including:

- Site mobilisation.
- Excavation methodology.
- Handling, movement, and storage on-site of excavation arisings.
- Any processing of excavation arisings containing ACMs.

- Movement and placement of arisings to final destination.
- Placing of cover system over soils with and ACMs remaining on-site.
- Off-site disposal of ACMs.
- Licences.
- PPE & RPE.
- Dust and fibre monitoring.

Potential mitigation measures that would be required include:

- Ensuring works are carried out by suitably trained and experienced personnel with working with asbestos.
- Site investigation and risk assessment.
- Removal or treatment of asbestos hotspots.
- Use of PPE and RPE by construction workers.
- Compliance monitoring.

Unexpected Tanks

No buried underground fuel storage tanks have been encountered during the site investigation works; however, there remains a low risk that tanks are present on-site. Should an underground tank be encountered, operations should cease in the area. Additionally, there may be pipework associated with these tanks which could have oily residues. The following procedures are to be adhered to if tanks and pipework are identified:

1. All site works at the position of the tanks/pipework should stop.
2. A description of the tank should be made by the geo-environmental engineer including condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic record will also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. The independent geo-environmental engineer will inform Client and the Local Authority.
5. During the presence of the independent geo-environmental engineer, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined on the basis of visual and olfactory observations by independent geo-environmental engineer.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Degassing and removal of the tank by a suitably qualified contractor will be required, and a Naked Flame Certificate should be provided.
10. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be kept and included in the Verification Report.
11. Excavation and remediation of any contaminated soils around the tank will be carried out.
12. Samples of the base and sides of the resultant hole will be sampled and supervised by the independent geo-environmental engineer to confirm whether risks to human health or controlled waters.



APPENDIX VIII – REMEDIATION / VALIDATION CRITERIA

APPENDIX VIII – REMEDIATION / VALIDATION CRITERIA

SUITABILITY TARGETS FOR IMPORTED OR SITE WON MATERIALS – RESIDENTIAL (WITHOUT PLANT UPTAKE)

Determinand	Units	Screening Value for Use of Site Won or Imported materials	Screening Value Source
Metals & Inorganics			
Arsenic	mg/kg	40	(i)
Barium	mg/kg	1350	(i)
Beryllium	mg/kg	1.7	(i)
Boron	mg/kg	11000	(i)
Cadmium	mg/kg	85	(i)
Chromium	mg/kg	910	(i)
Chromium (VI)	mg/kg	6.0	(i)
Copper	mg/kg	7100	(i)
Lead	mg/kg	310	(ii)
Inorganic Mercury	mg/kg	56	(i)
Nickel	mg/kg	180	(i)
Selenium	mg/kg	430	(i)
Vanadium	mg/kg	1200	(i)
Zinc	mg/kg	40000	(i)
Cyanide	mg/kg	43	(i)
Asbestos ^[1]	%	Not detected (detection limit <0.001%)	N/A
Organics – PAHs and Phenol			
		1% SOM	
Phenol	mg/kg	1200	(i)
Naphthalene	mg/kg	13	(i)
Acenaphthylene	mg/kg	6000	(i)
Acenaphthene	mg/kg	6000	(i)
Fluorene	mg/kg	4500	(i)
Phenanthrene	mg/kg	1500	(i)
Anthracene	mg/kg	37000	(i)
Fluoranthene	mg/kg	1600	(i)
Pyrene	mg/kg	3800	(i)
Benzo(a)Anthracene	mg/kg	15	(i)
Chrysene	mg/kg	32	(i)
Benzo(b)Fluoranthene	mg/kg	4	(i)
Benzo(k)Fluoranthene	mg/kg	110	(i)
Benzo(a)Pyrene	mg/kg	3.2	(i)
Indeno(123-cd)Pyrene	mg/kg	46	(i)
Dibenzo(a,h)Anthracene	mg/kg	0.32	(i)
Benzo(ghi)Perylene	mg/kg	360	(i)
Organics – TPHs			
Aliphatic TPH C ₅ -C ₆	mg/kg	160	(i)
Aliphatic TPH C ₆ -C ₈	mg/kg	530	(i)
Aliphatic TPH C ₈ -C ₁₀	mg/kg	150	(i)
Aliphatic TPH C ₁₀ -C ₁₂	mg/kg	770	(i)
Aliphatic TPH C ₁₂ -C ₁₆	mg/kg	4400	(i)
Aliphatic TPH C ₁₆ -C ₂₁	mg/kg	110000	(i)
Aliphatic TPH C ₂₁ -C ₃₅	mg/kg	110000	(i)
Aliphatic TPH C ₃₅ -C ₄₀	mg/kg	110000	(i)
Aromatic TPH C ₅ -C ₇	mg/kg	1400	(i)
Aromatic TPH C ₇ -C ₈	mg/kg	3900	(i)
Aromatic TPH C ₈ -C ₁₀	mg/kg	270	(i)
Aromatic TPH C ₁₀ -C ₁₂	mg/kg	1200	(i)

Determinand	Units	Screening Value for Use of Site Won or Imported materials	Screening Value Source
Aromatic TPH C ₁₂ -C ₁₆	mg/kg	2500	(i)
Aromatic TPH C ₁₆ -C ₂₁	mg/kg	1900	(i)
Aromatic TPH C ₂₁ -C ₃₅	mg/kg	1900	(i)
Aromatic TPH C ₃₅ -C ₄₀	mg/kg	1900	(i)
BTEX			
Benzene	mg/kg	1.4	(i)
Toluene	mg/kg	3900	(i)
Ethyl Benzene	mg/kg	4400	(i)
Xylene – Total	mg/kg	430	(i)
Screening Value Source			
(i) LQM/CIEH Suitable for Use Level (S4UL) (2015).			
(ii) Defra Category 4 Screening Level (2014).			