GroundSolve Ltd
Consulting Geotechnical Engineers

THE SHAMROCK PUB, BENGAL STREET - REMEDIATION STRATEGY

GSL3318

VERSION 1

03 JUNE 2025

FINAL

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jda

GroundSolve Ltd
Consulting Geotechnical Engineers

Document No : GSL_IMSR033
Rev No: 1
Issue date: 08/06/2024

DOCUMENT CONTROL

Report No. :	GSL3318
Report Status:	FINAL
Version No.:	1
Project Engineer:	Alex Ridge
Date of Issue:	03/06/2025

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This report is confidential to the Client and GroundSolve Ltd accepts no responsibility whatsoever to third parties to whom this report is presented.

Version No.	Description of Issue / Revision	Date of Issue	Author	Reviewed By	Approved By
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1 INTRODUCTION

GroundSolve Ltd was commissioned by John Dixon & Associates Ltd to undertake a Remediation Strategy and Verification Plan for a new commercial development at the Shamrock Pub on Bengal Street, Manchester (the "Site").

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

- EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.
- Part IIA of the Environment Protection Act, 1990
- BS5930:2015+A1:2020: "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)
- LCC (2010). Requirements for Contaminated Land Validation.

1.1 Proposed Development

The proposed development of the site is understood to comprise:

- The demolition of the single storey existing buildings within the central part of the site;
- The construction of two storey extension to the main public house building to extend seating capacity and provide an extension of lounge area to the existing pub structure. The existing hard standing area will be used as a new beer garden area, which will include small soft landscaping.

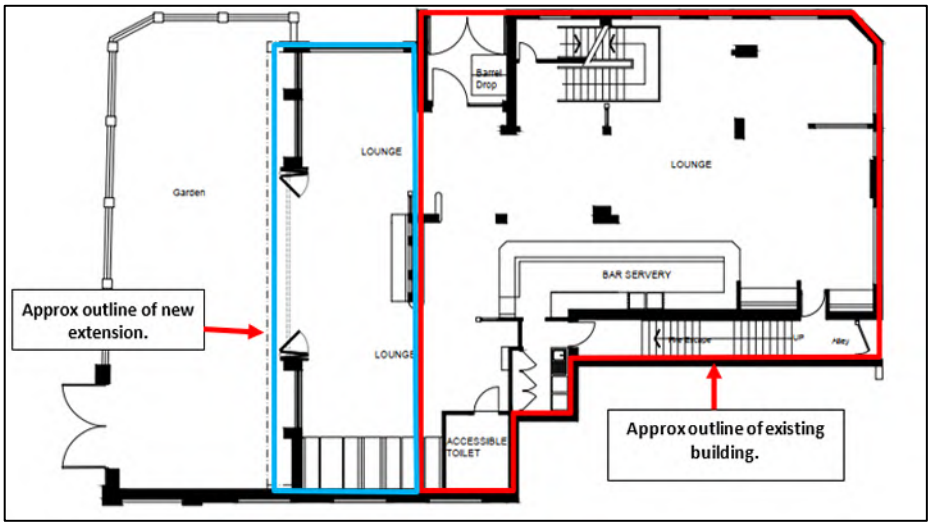


Figure 1 – Extract from Proposed Development Plan

1.2 Objectives

The objective of this document is to present details of the remedial measures required based on the findings of ground investigations. This report presents how the remediation of the site will be undertaken and sets out how the works will be validated. In addition, this document explains how the works will be permitted under current regulatory regimes. The remediation will ensure that upon completion of the proposed development, the ground and conditions at the site can be shown to be appropriate for its intended use, and that it will not pose unacceptable contamination risks to identified receptors.

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed end use.

This report provides a Remediation Strategy and Verification Plan in relation to the above contaminant sources, together with further details of how the developer will deal with encountering unexpected contamination, should this occur.

This document is a working document and may need to be updated, in agreement with the relevant regulatory bodies, at any stage during development dependent on the conditions encountered. This version of this document is to be issued to regulators for approval (i.e., Manchester City Council).

1.3 Previous Investigations

The following reports have already been undertaken and will be summarised in **Section 3**:

- Phase 1 Preliminary Risk Assessment undertaken by Groundsolve Ltd (Ref. 3046/R01, dated January 2024).
- Phase 2 Ground Investigation undertaken by Groundsolve Ltd (Ref: GSL3127, dated August 2024).

1.4 Limitations

This report has been prepared for the sole use of John Dixon & Associates Ltd. No other third party may rely upon or reproduce the contents of this report without the written approval of GroundSolve Ltd. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk.

2 SITE DETAILS AND DESCRIPTION

Table 2.1 Current Site Overview.

Site name	The Shamrock Pub, Bengal Street.
Site address	The Shamrock Inn, 17 Bengal St, Ancoats, Manchester M4 6AQ.
National Grid Reference (NGR)	384995 , 398815.
Approximate Site area	
Site shape	Irregular, with a length of 26m (northwest to southeast) and 17m width (northeast to southwest).
General topography and ground levels	The site is generally flat, however no topographical data has been provided.

Table 2.2 – Summary of Description of the Site and its Environs

Current Use:	Current land use for the development area is as a delivery yard for the Shamrock Pub, which is temporarily closed.
Access	Via Bengal Street, with a 4.50m access gate leading to the yard.
Existing Buildings& Structures	Existing structure on the site is the Shamrock Pub, with some associated outbuildings understood to be used for storage.
Site Surface	The site surface comprises of asphalt with evident scaring noted during the field work.
Vegetation	No vegetation is present on the site
Storage Tanks	Below Ground Tanks: No evidence/none suspected. Above Ground Tanks: None present.
Services	Services running into the property include gas (LP) to the main building and electric running into the site between the building and the yard area. Whilst the investigation took place, a signal was identified on the CAT and Genny Power setting, running along the boundary of the yard and storage garages.

Asbestos	No potential Asbestos Containing Materials (ACMs) noted in the buildings or on the ground surface. However, a refurbishment / demolition asbestos survey will be required prior to demolition
Waste Disposal/ Materials Storage	Site materials storage limited to heras fencing, general metal waste and redundant signage
Surrounding Area	Residential and commercial units on all site boundaries.
Local / Background Knowledge	The site has comprised commercial and residential land use from at least 1848. Circa 1953 a public house located in the south of the site ceases to exist, and instead a property in the northwest of the site which once comprised three plots is shown to have a new public house present. The site configuration is not believed to have changed since this date. Substation present adjacent to east of the site since 1970s.

3 PREVIOUS INVESTIGATIONS

A summary of the findings from previous reports is given in **Table 3.1** below:

Table 3.1: Summary of Phase 1 Investigation. Ref. 3046/R01, dated 22nd January 2024

Summary of main findings from the previous reports	
Site History	The site has comprised commercial and residential land use from at least 1848. Circa 1953, a public house located in the south of the site ceases to exist, and instead a property in the northwest of the site which once comprised three plots is shown to have a new public house present. The site configuration is not believed to have changed since this date. A substation is present adjacent to east of the site since 1970s.
Geological Setting	Published geology indicates the underlying site geology comprises superficial deposits of glacial till (clay) with bedrock geology consisting of Sandstone. Due to the historical land use on site, it is likely that made ground will be encountered. Great Mine Limestone seam (Hole High Limestone Group) runs approximately ~850m southeast of the site, running southeast to northwest, however, is limited in extent toward the site due an erosional unconformity. The site is likely not impacted by activity associated with historical working of the limestone.
Mining	No onsite mining or extraction is noted to have occurred; it is unlikely the site has been influenced by any activity.
Hydrogeology	The superficial deposits are classified as a Secondary Undifferentiated Aquifer, and the bedrock is classified as a Principal Aquifer. No potable extractions are recorded within 1000m. The closest extraction is 1202m west of site. The site is not situated within a source protection zone.
Potential Contamination Sources	**On site:** Made Ground – Historic buildings and potential basement located within the southern part of the site. The infilled basement will likely to have been backfilled with demolition material from the former buildings. Potential for asbestos (ACMs), heavy metals, PAHs. There is a low potential for ground gas. Service Yard – Limited potential for small scale hydrocarbon spillages from vehicle movements and storage of materials. **Off-site:** Substation(s) – There is a substation present adjacent to the eastern boundary, identified on the 1978 historical mapping. PCBs were used as insulating oil within substations from the 1950s up to 1981. There is the potential that PCBs were used on the adjacent site. However, PCBs are typically not very mobile and the underlying ground conditions are likely to reduce migration on to the site. It is recommended that the fieldwork confirms ground conditions and absence of any impacted soils from adjacent substation. Historical Industrial land uses - The surrounding areas have had numerous industrial land uses dating back to the 1800s. Within 250m of the site there has been railway sidings and buildings, garages, mills and depots. There are no specific risks identified from the past industrial land uses to the study site.

Table 3.2: Summary of Phase 2 Investigation. Ref: GSL3127R01, dated August 2024

Summary of main findings from the previous reports	
Scope of Phase 2 Site Investigation	The scope of ground investigation works carried out at the site by GroundSolve comprised: • 3 Machine excavated trial pits to a maximum depth of 2.25 mbgl; • Laboratory testing for chemical contamination and geotechnical.
Findings of the Phase 2 Ground Investigation	The ground conditions at the site (from ground level, down) comprise: Made Ground Bituminous slab, over gravels and red brick concrete cobbles (demolition rubble); over Glacial Till[1] From 1.00m described as stiff grey sandy clay proven to a depth of 2.25 [1] *The Glacial Till is was only encountered in TP01, however is likely to be present under existing concrete slabs at the bases of the historical basement structures.* No groundwater was encountered. Elevated PAHs were present however did not exceed relevant GACs, along with an exceedance of Dibenzo(a,h)anthracene which was elevated above commercial GACs with 1% OM
Phase 2 Conclusions – Geoenvironmental	**Human Health:** Slightly elevated levels of PAHs are present. However, subject to EHO approval is not considered a significant risk. An exceedance of Dibenzo(a,h)anthracene was identified within the made ground around TP01. This impacted material will be under hard standing post construction, eliminating plausible SPR linkages. Shallow Made Ground has recorded elevated TPHs, which is likely to be connected with the asphalt surfacing. Potentially the asphalt is tar based and would be potentially be hazardous and should be disposed accordingly and separate to the remaining material. **Plant growth:** No unacceptable risks (based on current proposed development plans **Controlled Waters:** No unacceptable risks. **Ground Gases (Human Health / Property):** No radon protective measures are indicated by the current guidance.
Reuse of Site-won Materials	Made ground (where present) on site is chemically not suitable for use in any soft standing areas, and will only be suitable for reuse under hard standing. Following treatment the majority of the made ground should be suitable for reuse as engineered fill (subject to additional testing and specification) (subject to the necessary approvals/consents)
Foundations	Existing relict foundations and basements will need to be grubbed out and replaced with a suitably engineered fill. The foundations could then take the form of a conventional reinforced concrete raft based on an allowable bearing capacity of 50kN/m^2
Buried Concrete	It is recommended that DS-1 and AC-1 be adopted for the design of all buried concrete equating to a designated concrete class DC-2.
Further Work	It would be prudent to undertake a formation inspection of the underlying natural strata once the existing basement and floor slabs have been removed.

4 REMEDIATION STRATEGY

4.1 Summary of Risk Assessments

The results of site investigation and laboratory analysis generally record negligible to zero concentrations of potential contaminants, however there are elevated concentrations of Dibenzo(a,h)anthracene within TP01 at a depth of 0.30m bgl and high TPHs concentrations in TP01 at a depth of 0.30m and TP02 at a depth of 0.15m bgl, which as previously discussed are likely resultant from bituminous material being present within the samples. The bituminous material is likely to have a coal tar source.

GroundSolve conclude that the risk from elevated Dibenzo(a,h)anthracene concentrations to the proposed development is considered low as the area with impacted material is within the footprint of the proposed extension, and therefore will be under hard standing, as such it will likely not require any additional remediation due to the following factors:

- The elevated concentrations are located within the area of the proposed extension therefore not in an area of soft landscaping.
- The shallower materials are likely to be removed from site during site clearance and preparation for the proposed development.
- Material which recorded high concentrations of TPHs are those of which contained bituminous fragments.
- No topsoil / subsoil is present on site, therefore any new garden areas will require imported material. Verification that any imported material is suitable will carried out as part of the works.

Whilst unexpected contamination is not anticipated, the proposed development could encounter previously unrecorded hotspots of contaminants. These will be assessed and mitigated in accordance with current good practice.

4.2 General Observations and Requirements

The risk assessments have shown there is no subsoil / topsoil present on site and 'clean' imported material will be required for any areas of soft landscaping. It is anticipated that these areas will be limited in size as part of the new 'Beer Garden' in the southern area of the site.

The remedial actions required for the soft landscaped areas are:

- Removal of all undesirable made ground from the soft landscaping areas to a depth of 300mm **or** natural strata.

- Provision of a clean cover system in areas of soft landscaping. A 300 mm thick cover of 'clean and inert' suitably chemically validated capping is proposed (comprising 150mm subsoil and 150mm topsoil).
- Made Ground can be left in-situ below building floor slabs and future permanent hard standing (e.g., parking areas, roads, footpaths), excluding service runs and areas where future excavation might be anticipated (assuming all geotechnical requirements are met).
- Validation and reporting to confirm the remediation has been carried out successfully.

Dust

During the construction works there will be a risk from dust to on site workers and people occupying adjacent properties. This can be mitigated through good environmental practice. Appropriate risk assessments should be carried out by the contractor to allow suitable control measures 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:

- Method statement for site activities including control of dust generation;
- Having adequate site hygiene facilities allowing staff to keep a good level of personal hygiene.
- All groundworkers should have been trained in asbestos awareness and should keep a look out for this being encountered during excavations.
- The method statement shall have a contingency plan which should be implemented if the presence of asbestos is suspected in groundworks; and
- Only permitting smoking or eating on site in appropriate pre-designated areas.

The proximity of residential receptors in the environs of the site and construction workers, control of fugitive dust will be a priority. As a minimum it is anticipated the works will be undertaken in accordance with BRE best practise guidance and that the following measures will be introduced to assist with control of dust generation during the groundworks phase of the works:

- Access roads and any stockpiles created during groundworks should be regularly damped down with water.
- Vehicles used to transport materials/wastes and aggregates should be enclosed or tarpaulined.
- Vehicle movements and speed should be kept to a minimum within the site.
- Dust generating equipment (e.g. mobile crushing and screening equipment) should be located to minimise potential nuisance impacts to receptors as far as practicable; and

Minimising drop heights of all loading and unloading activities that involve the transfer of soils and demolition materials.

Main Earthworks

The proposed construction will result in the redevelopment of the existing public house along with new beer garden which may include limited landscaped areas. Areas of buildings and hardstanding will be sufficient to break potential pollutant linkages relating to human health from the limited areas of impacted topsoil and made ground encountered on the site.

The following procedures will be applied:

- Removal of Made Ground as required to natural strata or to accommodate 300mm thick, clean-cover system.
- Stockpiling of made ground, separately from all other materials, prior to appropriate disposal.
- Placement of clean cover system, comprising min. 150mm topsoil and 150mm subsoil.

Imported topsoil and subsoil will be required to be analysed for a suitable suite of contaminants in relation to human health (in addition to topsoil being compliant with BS3882:2015). Further details regarding sampling frequency and analysis are presented in **Table 4.2**.

4.3 Unexpected Contamination

Whilst significant gross contamination is not anticipated, 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. Should any unusual ground conditions, visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, GSL and the Local Authority should be informed and further assessment may be required.

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

4.4 Clean Cover System

A clean cover system, 300 mm in thickness, shall be installed in all garden and soft-landscaped areas, typically 150mm subsoil and 150mm topsoil.

Chemical validation of all imported soils to be used on site in gardens and soft landscaping areas should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements is presented in Table 4.2. Ideally this should be sampled at source to prevent double handling if the soil fails. However, where this is not possible then material imported

should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens to ensure suitability for use.

Table 4.2 – Summary of Contaminant Linkages

Material Type	Source	Suite of Analysis	Sampling Rate*
Topsoil	Greenfield	Suite A	1 sample per 50m^3
	Brownfield / Unknown	Suite B	
Subsoil	Brownfield / Unknown	Suite B	1 sample per 150m^3
	Site won natural material	Suite A	
Physical Stone Break Layer	First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.	
	Recycled Stone (6F2 / screened)	Suite B	1 sample per 500m^3

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

*Minimum sampling rate of 3no. samples per source.

Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882).

Imported material to be used in gardens will be compared against residential with plant uptake criteria shown in Table 4.3.

Table 4.3 – Acceptance Criteria for imported material (Residential with Plant Uptake).

Analyte	Soil Re-Use and Importation Criteria		Analyte	Soil Re-Use and Importation Criteria	
	mg/kg	Reference		mg/kg	Reference
Metals			**BTEX**		
Arsenic (total)	37	S4UL	Benzene	0.087	S4UL
Cadmium (total)	22	S4UL	Toluene	130	S4UL
Chromium (total)	520	HWT	Ethyl Benzene	47	S4UL
Chromium (hexavalent)	6	S4UL	Xylene – 0	60	S4UL
Copper (total)	200	BS3882	Xylene – M or P	56	S4UL
Lead (total)	200	C4SL			
Mercury	40	S4UL	**Petroleum Hydrocarbons$^{\$}$**		
Nickel (total)	130	S4UL	Aliphatic > EC5 - EC6	42	S4UL
Selenium	250	S4UL	Aliphatic >EC6 - EC8	100	S4UL
Vanadium	410	S4UL	Aliphatic >EC8 - EC10	27	S4UL
Zinc (total)	2,009**	HWT	Aliphatic >EC10 - EC12	130	S4UL
			Aliphatic >EC12 - EC16	1000**	HWT
Inorganic			Aliphatic >EC16 - EC21	1000**	HWT

Analyte	Soil Re-Use and Importation Criteria		Analyte	Soil Re-Use and Importation Criteria	
	mg/kg	Reference		mg/kg	Reference
Sulphate	2400***	-	Aliphatic >EC21 - EC35	1000**	HWT
Phenol	120	S4UL			
			Aromatic >EC5 - EC7	70	S4UL
PAH[&]			Aromatic >EC7 - EC8	130	S4UL
Naphthalene	2.3	S4UL	Aromatic >EC8 - EC10	34	S4UL
Acenaphthylene	170	S4UL	Aromatic >EC10 - EC12	74	S4UL
Acenaphthene	210	S4UL	Aromatic >EC12 - EC16	140	S4UL
Fluorene	170	S4UL	Aromatic >EC16 - EC21	260	S4UL
Phenanthrene	95	S4UL	Aromatic >EC21 - EC35	1000**	HWT
Anthracene	2400	S4UL	Aromatic>EC35-44	1000**	HWT
Fluoranthene	280	S4UL	Aromatic>EC44-EC77	1000**	HWT
Pyrene	620	S4UL			
Benz(a)anthracene	7.2	S4UL	Asbestos	Not detected (<0.001%) for topsoil and subsoil	Lab LoD
Chrysene	15	S4UL			
Benzo(b)fluoranthene	2.6	S4UL			
Benzo(k)fluoranthene	77	S4UL			
Benzo(a)pyrene	2.2	S4UL			
Indeno(123cd)pyrene	27	S4UL			
Benzo(ghi)perylene	320	S4UL	Total Organic Carbon	6%	
Dibenzo(ah)anthracene	0.24	S4UL			

4.5 Permitting

Re-Use of Soils

It is proposed that the existing made ground onsite will not be reused. The material will be stockpiled until removal off site to appropriate landfill.

4.6 Waste Characterisation and Classification

Excess soil will be sent to a suitable landfill site. A summary of current relatively complex guidance on categorising waste from earthworks is presented in **Appendix B**. A two-phase approach is required comprising comprises:

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

Waste Characterisation

The results of the total concentrations form the chemical testing on soil samples have been assessed to determine whether or not they are hazardous in terms of waste classification. The results of this assessment indicate that none of the materials encountered during the investigation can be classified as hazardous.

Shallow Made Ground has recorded elevated TPHs, which is likely to be connected with the asphalt surfacing. Potentially the asphalt is coal tar based and would be potentially hazardous and should be disposed accordingly. It would be recommended that these are disposed separately to the remaining material, which would be characterised as non hazardous. Further testing may need to be required.

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. No WAC testing was carried out as part of this investigation. WAC testing will have to be carried out to confirm the landfill waste classification and if any pre-treatment is required. This is best carried out once all material to be disposed of is stockpiled, and volumes can be accurately assessed.

5 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. Verification will be required in two stages:

- Initial earthworks/remediation – soil removal in order to achieve 300mm cover system.
- Verification of imported subsoil and topsoil.

On completion a copy of the Verification Reports should be sent to the Local Authority Environmental Health 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

It is recommended that any remediation carried out on the site is validated by a third party and suitable documentary evidence provided in a Site Completion Report, such as photographs, consignment documents and analytical results. This should include as a minimum:

- A description of the works, sample location plan, test results, photographs, interpretation;
- All consignment noted for the removal of the topsoil and made ground.

- Photographic evidence of the natural strata where present, and the depth of the environmental cover system installed.
- Chemical validation of all imported soils (sampling density shown in Table 4.2 above).
- As-built Drawings;
- Description of how the use of materials links with the Remediation Strategy;
- Reference to site investigation data and risk assessments;
- Record of quantity of materials used;
- Details of any unexpected contamination identified onsite, its risk assessment and remediation.
- 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.

6 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) 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.

6.2 Health and 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.

In accordance with the Construction Design and Management (CDM) Regulations 2015, GroundSolve 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, GroundSolve 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.

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8 DEFINITIONS

AOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GQRA	Generic Quantitative Risk Assessment
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
ppm	Parts per million
ppmv	Parts per million by volume
SAC	Special Area of Conservation
SPZ	Source Protection Zone (see **Error! Reference source not found.**)
SSAC	Site-Specific Assessment Criterion
SSSI	Site of Special Scientific Interest

APPENDIX A - DRAWINGS





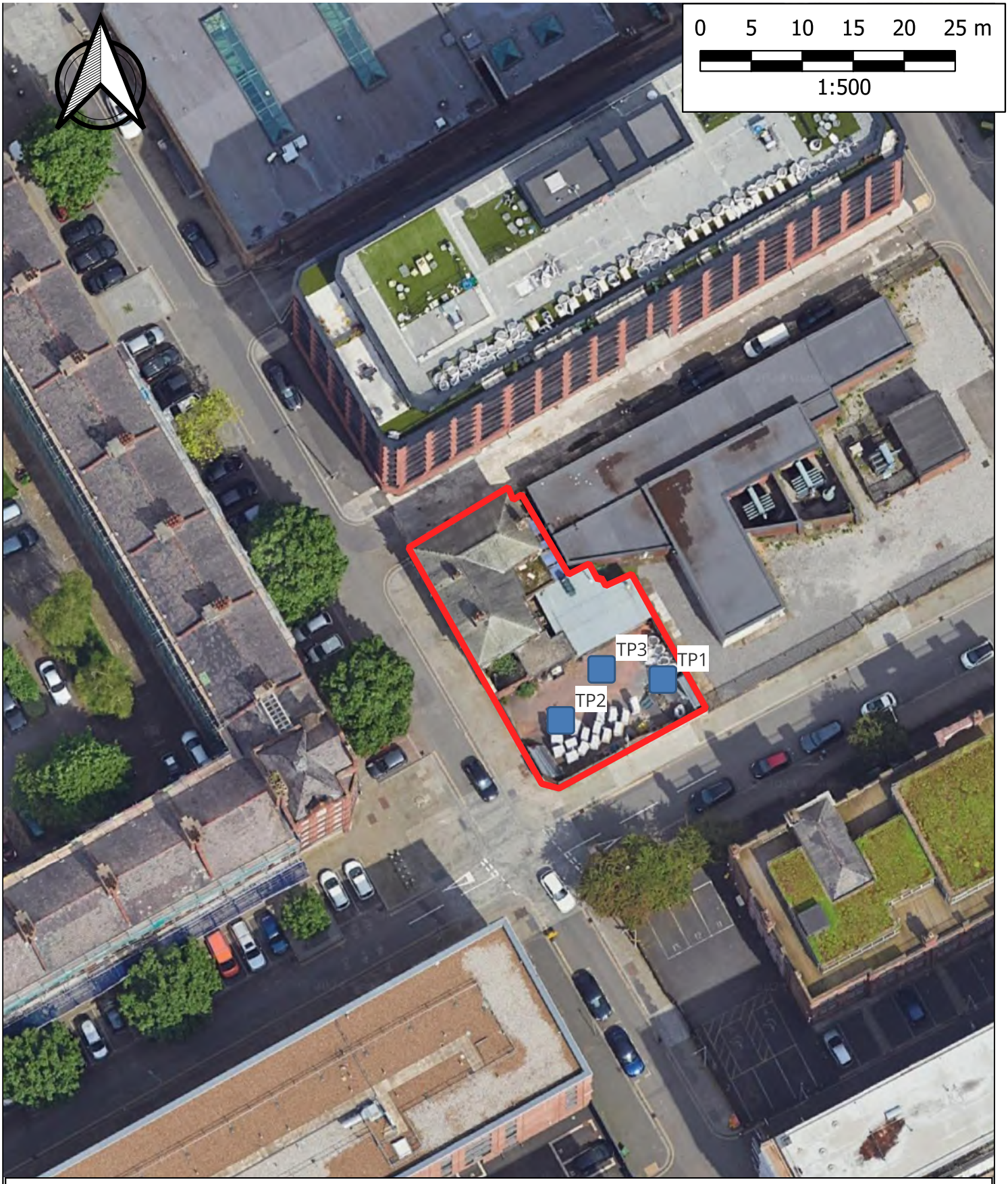
KEY

Site Location

(C) OpenStreetMap Contributors

Sampling locations and features annotated are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor.

Client: John Dixon & Associates LTD				Title: Site Location and Boundary Plan		GroundSolve Ltd Consulting Geotechnical Engineers
Site: The Shamrock Pub, Bengal Street				Scale (see scale bar): 1:20,000 @ A4 1:500 @ A4	Figure: 1	Revision:
Job No.: GS3127	Drawn By: AR	Checked By: SF	Drawn: 25/07/2024			



KEY

Site Location

Trial Pit Location

(C) OpenStreetMap Contributors

Sampling locations and features annotated are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor.

Client:	John Dixon & Associates LTD
Site:	The Shamrock Pub, Bengal Street
Job No.:	GS3127
Drawn By:	AR
Checked By:	SF
Drawn:	25/07/2024
Title:	Exploratory Hole Location Plan
Scale (see scale bar):	1:500 @ A4
Figure:	2
Revision:	

GroundSolve Ltd
Consulting Geotechnical Engineers

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

GroundSolve Ltd

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 inerts 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 top soil, 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			✓

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
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 inerts with soil, tarmac, 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 is included in any analysis suite for soil samples;
- Metals – Particularly sites from former metal processing or mining sites and also 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).

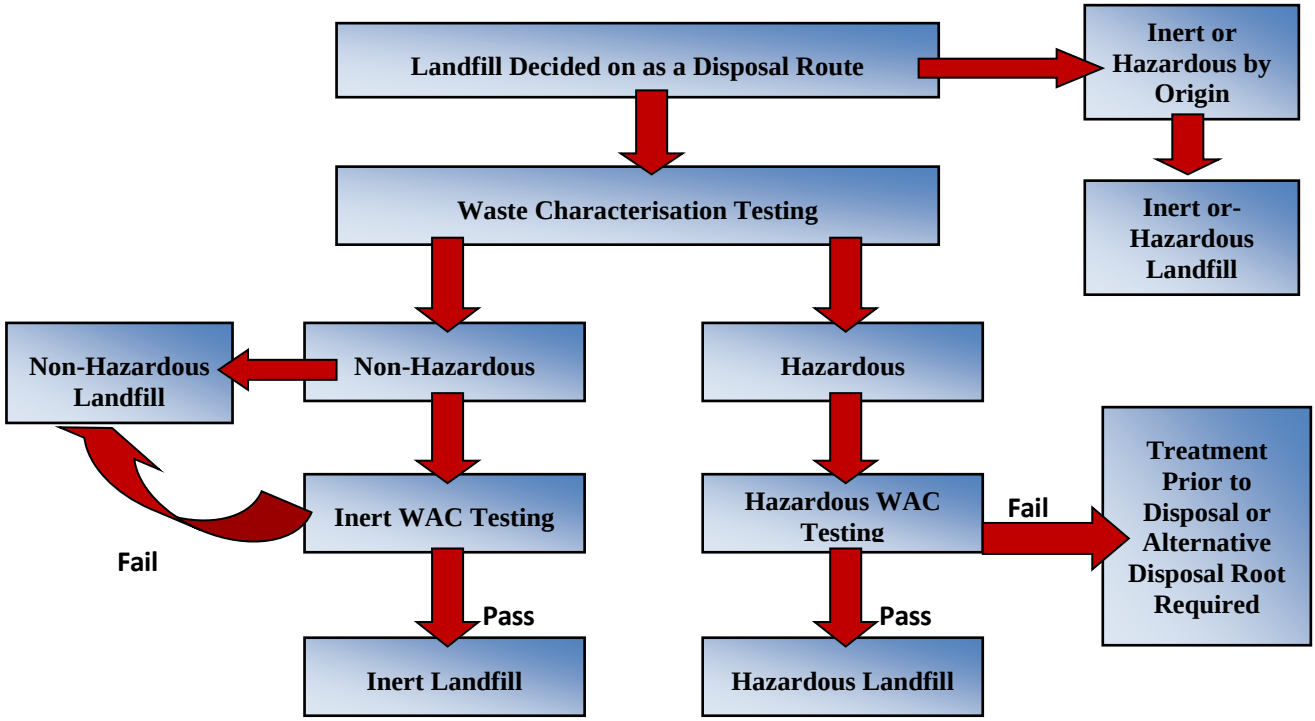
If the results of the above assessment determine that the waste is hazardous, it must then be analysed for the Waste Acceptance Criteria (WAC) analysis contained within appropriate Environmental Permitting Regulations (this comprises mainly leachate but also analysis for TOC and Loss on ignition). WAC 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 C - UNFORESEEN GROUND CONTAMINATION

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 recorded 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 reused without treatment; or
    - treatment of material on site to meet compliance targets so it can be reused; 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; and,
- 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; and,

- 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 recorded 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.