BROWNFIELD SOLUTIONS LTD

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

CANDOUR SOLAR PROPCO LTD

39 Deansgate, Manchester

Phase II Geo-Environmental Assessment Report

PH/C4293/12462

October 2023

EXECUTIVE SUMMARY	
Location and Brief Site Description	The area to be developed is to the rear of 39 Deansgate, Manchester which comprises an existing 10 storey mixed use building. The building is rectangular with retail units covering the ground floor. The north of the site comprises a 7-storey building utilised for offices above the ground floor. The site currently comprises a spiral vehicle access ramp to an upper floor car park at 39 Deansgate, and to the centre of this on ground level is an electricity substation.
Ground Conditions	Generalised ground conditions from the ground investigation comprise (top down): • Made ground encountered from ground level to between 0.30m and 1.40m bgl. • No natural superficial or bedrock strata were encountered.
Human Health - Soils Contamination	Elevated concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene were encountered within TP03. Chrysotile asbestos was also found at a quantification of 0.046% within TP03. The presence of hardstanding across the commercial site will remain in the proposed development, which will break the pathway between the source and end user. No further contaminants were identified to exceed the relevant screening values, therefore no further consideration in regard to human health is required. The asbestos, whilst it does not pose a risk to the end-user, should be suitably managed to minimise the risk to construction workers through the production of an Asbestos Management Plan.
Controlled Waters – Surface and Groundwater Contamination	The risks to controlled waters are considered to be low and no further action is required.
Outline Remedial Strategy	No specific remedial measures are considered necessary at the site.
Waste	Waste classification for the made ground at the site has revealed the soils tested to be non-hazardous.
Further Work	The following further works will be required to progress to the construction phase: • Detailed foundation design by a structural engineer, including foundation zonation plan and depth schedule. • Production of Asbestos Management Plan (AMP) prior to further works disturbing ground associated with TP03. • Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required.

This executive summary should be read in conjunction with the full report, reference PH/C4293/12462 and not as a standalone document. Report template version 4.2.

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DRAWINGS

Drawing Number	Rev	Title
6145-SRA-XX-00-SK-A-SK-114	-	Initial Works Plan
C4293/01	-	Site Location Plan
C4293/02	-	Exploratory Hole Location Plan
C4293/03	-	Foundation Pit Drawings

APPENDICIES

Appendix	Title
Appendix A	BSL Methodology and Guidance
Appendix B	Exploratory Hole Logs
Appendix C	Chemical Testing Results
Appendix D	Waste Assessment Report

1.0 INTRODUCTION

1.1 Context

This report describes a Phase II Geo-Environmental Assessment carried out by Brownfield Solutions Limited (BSL) for Candour Solar Propco Ltd as appointed by Renaissance Associates Ltd on a site off Deansgate, Manchester and has been completed in general accordance with the following guidance:

- Environment Agency guidance - Land Contamination: Risk Management (LCRM).
- BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
- BS5930: 2015+A1:2020 Code of Practice for Ground Investigations.
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design. General rules plus UK National Annex.
- BS EN 1997-2:2007 Eurocode 7 Geotechnical design. Ground investigation and testing plus UK National Annex.

Definitions of terms and acronyms used within this report is presented in Section 10.0.

1.2 Proposed Development

The proposed development includes the recommissioning of an existing substation and installation of a new HV electrical substation as shown on the Initial Works Plan Drawing, Drawing No. 6145-SRA-XX-00-SK-114 provided by the client. This will support the development of 39 Deansgate for a commercial end use comprising a fourteen-storey steel framed building and basement car park area.

1.3 Previous Reports

This report should be read in conjunction with the BSL Phase I Desk Study Assessment Report (Ref DI/C4298/8729) issued in August 2019, which has been produced for the development of 39 Deansgate, inclusive of the rear service yard.

1.4 Objectives and Scope

The objectives of this report are to determine the geo-environmental setting and ground conditions of the site, highlighting potential risks and areas of concern that may govern the development under the current planning regime.

This report has been produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance. This assessment is also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

An exploratory investigation was undertaken to confirm the findings of the preliminary CSM and risk assessment and meet any objectives that had not been satisfied. The exploratory investigation was undertaken using hand pitting and laboratory chemical testing, with reporting on the findings. The original scope of works included cable percussive drilling with rotary core follow on, however due to the extent of services on site there were no safe positions to do so.

1.5 Limitations

This assessment has been prepared in accordance with the relevant current legislative framework, guidance and risk assessment methodology as outlined in Appendix A. BSL is not liable for any subsequent changes in the guidance and legislation.

The findings and opinions conveyed via this report are based on information obtained from a number of sources as detailed within this report, BSL have assumed this information is correct and reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

BSL have used reasonable skill, care and diligence for the investigation of the site and the production of this report. There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore have not been considered by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, Candour Solar Propco Ltd. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care.

The investigation carried out on the site has been conducted to provide the best information on the ground conditions within site access and budgetary constraints. The inherent variation of ground conditions allows only for definition of the actual conditions at the locations and depths of exploratory locations at the time of the investigation. Different ground conditions may exist that have not been identified within this investigation.

The recommendations in this report assume that ground levels will remain as existing, unless stated otherwise within the report. If there is to be any re-profiling (e.g. to create development platforms or flood defences) then the recommendations may not apply.

The groundwater results described are only representative of the dates on which they were recorded, and levels may vary seasonally (e.g. due to changes in weather).

This assessment has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Although every effort has been made to position exploratory holes in the least sensitive areas of the site, exploratory hole positions were located approximately as part of this investigation and no guarantee can be given as to their accuracy. Consideration should be given to the possibility that exploratory holes excavated as part of this investigation and indeed any previous ground investigation work by others may be encountered beneath or within the influence of individual foundations. BSL cannot be held responsible for structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

Where it has not been possible to reasonably use an EC7 compliant investigation technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

The chemical testing carried out for this report was not scoped to comply with the requirements of the water supply company and further work may be required, unless otherwise stated.

Notwithstanding site observations concerning the presence or otherwise of archaeological issues, asbestos-containing materials (ACM) or invasive weeds (e.g. Japanese knotweed), this report does not constitute a formal survey of these potential issues.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities prior to implementation to ensure compliance.

2.0 THE SITE

2.1 Location

The site (39 Deansgate) is located off Deansgate, Manchester, M3 2AY. It is situated approximately 0.5 miles from Manchester City Centre, centred on National Grid Reference 383764, 398515 as shown on the Site Location Plan, Drawing No. C4293/01.

2.2 Site Description

The main site features and potential issues identified are detailed below and are shown on the Site Constraints Plan, Drawing No. DNG-REN-00-XX-DR-C-0001-P01.

Feature	Description
Site Area	The site (which includes 39 Deansgate) covers approximately 0.11 hectares.
Site Access	Access is gained off Exchange Street to the east.
Current Land Use and Site Features	39 Deansgate comprises an existing 10 storey mixed use building. The building is rectangular with retail units covering the ground floor. The north of the site comprises a 7-storey building utilised for offices above the ground floor. Adjoining this to the south is a 7-storey block located in the centre of the site on concrete columns above the second-floor rooftop car parking area which covers the remainder of the site. Two small basement rooms are present in the centre of the site which are utilised as plant rooms. To the rear of the building is a small external area housing air conditioning plant and a concrete staircase to the car park above. Within the red line boundary there is a spiral ramp providing vehicular access to the car park above. An electricity sub-station is currently present below/within the centre the ramp to the car park.
Potential Sources of Gross Contamination	No evidence of storage tanks was noted during the site walkover. An electricity station is present within the centre of the spiral ramp in the south-east of the wider site.
Vegetation	No vegetation was recorded at the site.
Topography	The site is generally flat however the rear (east) of the building was noted to be slightly elevated above the levels at the front of the building (west), noted on plans to be approximately 200mm. A retaining wall is also present to the south of the car park ramp.
Site Boundaries	The wider site comprises building footprint / associated infrastructure in its entirety. The north of the building is bound by St Mary's Gate, the east of the site is bound by a commercial building, the south of the site is bound by Barton Arcade, and the west of the site is bound by Deansgate.
Surrounding Area	The site is set within a mixed retail and business area, bordered by office buildings and ground floor retail units.

3.0 SUMMARY OF PREVIOUS REPORTS

3.1 BSL Desk Study

A summary of the relevant points from the Phase I Desk Study completed by BSL for the wider site (reference DI/C4293/8729) is presented below:

- The site has had previous development since 1840 for commercial end use including terraced buildings one of these being noted as 'Air Terminus'.
- A number of cotton related buildings were in close proximity of the site.
- Geology comprises Glaciofluvial Sheet Deposits (Secondary A Aquifer) over Chester Formation (Principal Aquifer).
- The East Manchester Fault is present approximately 100m south of the site.
- There are no records of shallow mines in and around the site.
- The nearest watercourse is the River Irwell circa 99m to the northwest of the site.
- The risk to human health is considered to be low.
- The risk from ground gas is considered to be low and the site is not located in an area requiring radon protection measures.
- The risk to controlled waters is low.
- The site is located in the UXO moderate risk zone.
- Recommendations were for an appropriate Phase II ground investigation to be carried out to confirm the identified risks and obtain information for preliminary design.

4.0 METHOD OF INVESTIGATION

4.1 Objectives

To confirm the risks to the identified receptors and confirm the ground conditions in respect to the identified geo-environmental risks, an appropriate intrusive investigation was undertaken as per the recommendations of the Phase I Desk Study Assessment.

The aim of the fieldwork was to:

- Investigate ground conditions on the site and the potential need for detailed investigation.
- Assess the potential contamination on the site and obtain samples for contamination screening.
- Assess the potential impact of any contamination on controlled waters.
- Give an assessment of the geo-environmental risks associated with redevelopment of the site.

4.2 Site Works

The following site works have been undertaken as part of the intrusive investigation on 29th August 2023.

Method	No.	Range Depths (m bgl)	Purpose
Hand pits	5	0.30 – 1.40	HP01-HP03 located to investigate potential services in the area of the proposed location of the borehole. TP01A and TP03 located to investigate foundation type of surrounding buildings and retaining wall to the south of the site.
Cable Percussive Borehole / Rotary Follow on	1	Not progressed	To confirm geotechnical and geo-environmental properties of underlying soil/rock strata – to aid foundation design.

Access restrictions limited the locations available during the site investigation, furthermore, due to the high number of services present on site and limited safe areas this subsequently led to no cable percussive or rotary drilling.

TP02 was also unable to be carried out due to restricted access behind the car park ramp, it was subsequently moved to TP02A but was terminated due to a cable encountered within the pit. Similarly, TP04 was also unable to be carried out due to a drain being present on the proposed location. TP04 was unable to be move due to headspace restrictions below the car park ramp.

The approximate locations of the exploratory holes are indicated on the Exploratory Hole Location Plan, Drawing No C4293/02. The exploratory hole logs are presented in Appendix B.

The exploratory holes were logged by an experienced geo-environmental engineer in general accordance with the following guidance:

- BS 5930:2015+A1:2020 Code of Practice for Site Investigations.
- BS EN 14688-1:2018 Geotechnical Investigation and Testing – Identification and classification of soil.

4.3 Sampling Strategy

Representative samples were taken from exploratory holes at regular intervals to assist in the identification of the soils and to allow subsequent laboratory testing. They were stored and transported in general accordance with BS 10175:2011+A2:2017.

The type of sample was dependent upon the stratum and the purpose of analysis in accordance with current environmental and geotechnical guidance. The distribution of samples taken across the site is recorded on the exploratory logs.

No specific sampling statistics or grid were utilised in this instance.

4.4 Laboratory Testing

As part of the initial assessment for potential contamination of the site, selected samples were taken for the purpose of chemical contamination testing.

In the absence of particularly contaminative processes on site and the lack of visual evidence of potential hydrocarbon impaction representative soil samples were screened for the following general suite of determinands at a UKAS approved laboratory:

Determinand	No of Samples
BSL Default Soil Suite: Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter (SOM) and pH.	4
Petroleum Hydrocarbons (TPH CWG) inc BTEX and MTBE.	1
Asbestos Screen.	4
PCB Compounds (7 Congeners).	3
Waste Acceptance Criteria (WAC).	1

The Chemical Laboratory Testing Results are presented in Appendix C.

4.5 Monitoring

No gas or groundwater monitoring has been allowed for given the nature of the development and the inherit level of ventilation built into an electricity sub-station.

5.0 GROUND CONDITIONS

5.1 Summary

A brief summary of the ground conditions encountered is presented in the table below:

Stratum	Range Depths - Top (m bgl)	Range Depths - Base (m bgl)	Range Thickness' (m)	Brief Description
Made Ground	GL	0.05 – 0.17	GL – 0.17	Tarmacadam
Made Ground	0.05 – 0.17	0.30 – 1.40	0.05– 1.40	Slightly gravelly SAND.

Details are provided in the logs in Appendix B and the individual strata are described in the sections below.

5.2 Made Ground

Made Ground – General
Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths of between 1.00 – 1.40m bgl.

Tarmacadam surfacing was present across the majority of the site recorded between 0.05m and 0.17m thick.

The composition of the made ground beneath the tarmacadam was fairly consistent across the site comprising gravelly sands with varying amounts of ash as a minor constituent. Gravels consisted of brick, sandstone, mudstone, slag, metal and wood.

Existing Foundations
Two foundation excavations were undertaken. In TP01A existing foundations were observed to comprise a strip of concrete 0.56m wide and 0.30m thick at a depth of 0.10m bgl. In TP03, the retaining wall was followed down to the base of the hand pit.

For full details on existing foundations see Foundation Drawings reference C4293/03. Photographs are also appended.

5.3 Natural Superficial Strata

No superficial strata was encountered during this site investigation.

5.4 Solid Geology

The solid geology of the Chester Formation was not encountered in this investigation.

5.5 Groundwater

No groundwater was encountered during the site investigation.

5.6 Observations

Contamination
During the works undertaken by BSL, observations for both visual and olfactory evidence of contamination were undertaken.

With the exception of ash and slag observed as a minor constituent in the made ground soils, no other evidence of contamination was observed at the site.

Obstructions

There were numerous obstructions encountered within the made ground at the site. The obstructions identified are summarised in the table below:

Location	Depth (m bgl)	Comments
HP01	0.30	Concrete.
HP02	0.50	Concrete
HP03	1.00	Orange ceramic pipe

6.0 TEST RESULTS

6.1 Geo-Environmental Testing

Chemical Laboratory Testing
The chemical test results for soils are presented in Appendix C. The results are summarised and assessed within Section 7.0 of this report.

7.0 GEO-ENVIRONMENTAL RISK ASSESSMENT

7.1 Introduction

The samples were tested for an assessment of the chemical contamination that may pose a risk to human health. The results were examined with reference to a selection of guidance documents as detailed in Appendix A. In this case the LQM/CIEH S4ULs and DEFRA C4SLs for a commercial end use have been adopted as Tier 1 generic screening values.

The apparent exceedance of the relevant screening value is taken as indicating further detailed assessment or remedial action is required.

A summary assessment sheet is presented in Appendix C alongside the chemical test results. Results are discussed in detail in the sections below.

7.2 Soils Test Results and Risk Assessment – Human Health

Metals
No metals have been detected above the adopted screening criteria.

Asbestos
Chrysotile loose fibres have been detected in one sample from TP03 at 1.00m bgl. On quantification analysis the asbestos level was 0.046%.

Poly Aromatic Hydrocarbons (PAHs)
The locations, depth and concentrations of elevated species of PAHs are summarised in the table below:

Exploratory Hole	Depth (m)	Stratum	Species	Concentration (mg/kg)	Adopted Screening Value (mg/kg)
TP03	1.00-1.10	Made Ground	Benzo(a)anthracene	210.00	180
TP03	1.00-1.10	Made Ground	Benzo(b)fluoranthene	260.00	45
TP03	1.00-1.10	Made Ground	Benzo(a)pyrene	210.00	36
TP03	1.00-1.10	Made Ground	Dibenz(a,h)anthracene	34.00	3.60

Total Petroleum Hydrocarbons (TPH CWG)
No petroleum hydrocarbons have been identified above the adopted screening criteria.

BTEX and MTBE
No BTEX or MTBE compounds have been detected above the laboratory limit of detection and subsequently fall above the screening criteria .

Polychlorinated Biphenyls (PCBs)
No PCBs have been detected above the laboratory limit of detection and subsequently fall above the screening criteria.

7.3 Summary – Human Health Risk Assessment

Based on the testing and assessment undertaken it would appear that there is localised contamination within the made ground in the form of PAHs.

Chrysotile asbestos fibres have been detected in one sample out of four tested, at a level of 0.046%.

The above pose a risk to human health and will require further consideration.

7.4 Controlled Waters Risk Assessment

Groundwater/surface water testing has not been carried out based on the preliminary CSM risk assessment and the site is not considered to pose a significant risk to controlled water for the following reasons:

- No significant gross or mobile contamination has been identified on site in soils based on the results obtained as a potential indicator of groundwater contamination.
- There is no indication under present conditions of significant pollution of controlled waters and conditions following development of the site will not be any worse.
- For the made ground, the preparation of samples for leachability analysis has not been undertaken as this is an aggressive methodology and provides theoretical values which are unlikely to be representative of existing site conditions, real site leaching concentrations will be reduced significantly from that indicated by the laboratory testing, furthermore this would not be representative of post construction conditions, which will significantly reduce infiltration.
- The concentrations of leachable substances that could emanate from the site will be subject to dilution and dispersal during transport and so the risks will reduce with distance from the site and into the identified surrounding water bodies.
- The site does not lie within 500m of an SPZ.
- There are no potable (sensitive) water abstractions within 2000m.

7.5 Qualitative Risk Assessment

The CSM has been revised based on the findings of the site investigation and laboratory testing results and these are presented overleaf.

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On site Made ground PAHs, asbestos	Ingestion, direct contact, inhalation of dusts	End-users	Unlikely	Medium	Low	Made ground was proven to depths of 1.40m bgl during the site investigation with asbestos and PAH exceedances above the commercial screening criteria. A new sub-station is proposed in the area of the current car park ramp. The proposed development indicates that the development area will be surfaced in hardstanding, as such there is not anticipated to be a pathway between end-users and the site soils. As such, the risk is considered to be low.
Made ground Ground Gas (carbon dioxide and methane)	Migration into confined spaces, inhalation and asphyxiation/ explosion	End-users / property / structures	Negligible	Severe	No Linkage	Made ground was proven to depths of 1.40m bgl during the site investigation, generally made ground encountered to these depths are not considered to be a significant source and would not be considered to be a significant reservoir for gas build up. Although it should be noted that the made ground was not bottomed out and therefore the complete thickness is not known. Furthermore, as this development is limited to an electricity sub-station, there will not be any permanent residents within the building and the building when accessed will likely only be for short durations. As with most buildings housing plant, the substation will be built with an inherent level of ventilation thus inhibiting the ability for ground gases to accumulate within the structure. Therefore, the risk to end-users is considered to be negligible.
Electricity Substation PCBs	Ingestion, direct contact, inhalation of dusts	End-users	Unlikely	Medium	Low	From the chemical testing of the made ground within the vicinity of the sub-station, no elevations of PCBs have been detected. Furthermore, given the substation has only been in place since the current building has been in place it is considered that the hardstanding will have prevented contaminants from reaching the soils. The risk is considered to be low.

Controlled Waters						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Made Ground PAHs, Metals	Overland flow, / migration through saturated zone	River Irwell 99m away (Surface waters)	Unlikely	Medium	Low	It is considered contaminants associated with the made ground and other past industrial uses are unlikely to impact the River, as over this distance, there is potential for contaminants to attenuate and degrade. Furthermore, the majority of the site is surfaced in hardstanding and will remain so and part of the proposed development, this will inhibit lateral migration to the river will likely aid in betterment of drainage, preventing overland flow and the mobilisation of any contaminants. Previous site use does not suggest any significant contaminative processes. Therefore the risk is considered to be low.
	Leaching through unsaturated zone / Migration through saturated zone	Secondary A Aquifer (Ground-water)	Unlikely	Medium	Low	The majority of made ground on site is covered in hardstanding and will remain so as part of the development, which will prevent infiltration of rainwater and the mobilisation of any contaminants. The site does not lie within an SPZ. There are no potable water abstractions within 2000m of the site. The nearest groundwater abstraction is for general cooling. Therefore, the risk is considered to be low.
	Migration through saturated zone	Principal Aquifer (Ground-water)	Unlikely	Medium	Low	As stated above, the site will be surfaced with hardstanding and with a new surface water drainage system installed which will further reduce the risk to controlled waters. By virtue of the development taking place, this should contribute to an overall "betterment" of groundwater quality. Therefore, the risk is considered to be low.

7.6 Outline Remedial Measures

No pathway for contamination has been identified onsite and the risk from contamination is considered to be low, therefore no specific remedial measures are required for soils in respect to human health for the proposed end use.

Utilities
Given the nature of the development it is assumed that a potable water supply is not required. However, should this not be the case, the level of protection for the clean potable water supply pipes should be determined using the local water company risk assessment criteria in accordance with UKWIR.

As the site is brownfield, there is the assumption that barrier pipe would be utilised, although requirements should be confirmed by risk assessment and with the water supply company.

General
It is recommended that the approval of the Regulators (Local Authority / Environment Agency) is obtained in regard to the above prior to any irrevocable action is taken at the site.

In addition, the writing and approval of a Materials Management Plan (MMP) or suitable exemptions/permits will be required to allow re-use of suitable material at the site.

A watching brief is recommended during groundworks for any unidentified sources of contamination. If any gross contaminated material is encountered works should cease in that area and BSL consulted.

7.7 Health and Safety Issues

During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
Made Ground (heavy metals, PAHs)	Ingestion, direct contact, inhalation of dusts.	Construction Workers	Likely	Mild	Moderate/low
Asbestos	Ingestion, direct contact, inhalation of dusts.	Construction Workers	Likely	Medium	Moderate

Above trace levels of chrysotile asbestos have been identified in one sample to date. The risk from asbestos should be highlighted in the method statements and site induction. If further evidence of asbestos is encountered in the soils, work should cease until asbestos control measures have been agreed and put in place. Asbestos is further discussed in Section 7.8 below.

The risk from made ground will be mitigated by standard PPE including gloves. Welfare facilities should be made available to wash before hand to mouth activities.

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

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided.
- Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

7.8 Asbestos

The investigation of asbestos issues within structures was beyond the scope of this report. However, guidance from UK Government indicates that asbestos should be assumed to be present in buildings unless proven otherwise.

Any asbestos within structures will require removal prior to re-development. This will need to be done by a suitably qualified experienced and licensed contractor, who ensures that adequate PPE is provided to operatives, and that all the relevant legislation is adhered to.

In addition, the presence of asbestos within the ground will require, a safe system of work to be set up on site to deal with the asbestos risk from the made ground detailed through the production of an Asbestos Management Plan. This may include but be not limited to:

- The use of qualified personnel where required.
- Careful segregation of stockpiles on site.
- Defining transport routes.
- Cleaning down of machinery in designated areas.
- Decontamination unit for ground workers.
- Damping down of soils to prevent dust migration.

Excavations in soils containing asbestos should comply with the CL:AIRE publication 'Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials' (CARSOIL) and CAR 2012. All such works will need to be agreed with the regulatory bodies (HSE and/or LA).

Additional guidance is provided within the BSL methodology Guidance Note in Appendix A.

8.0 WASTE SOIL CLASSIFICATION & ASSESSMENT

8.1 Summary

BSL have undertaken a preliminary assessment of potential excavation waste to arise from the site during redevelopment to:

- Classify the excavation waste to arise as either hazardous or non-hazardous.
- Identify the most sustainable options for the wastes to arise in accordance with the waste hierarchy.
- Provide a written description of the waste required as part of the Duty of Care.
- Provide details of "hazardous properties" to complete hazardous waste consignment note (where applicable).
- Be able to provide a basic classification report to a landfill operator (where waste is destined for landfill disposal).

8.2 Waste Classification Procedure

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. It is the responsibility of the waste producer to classify this waste. The classification process is described in the 'Guidance on the classification and assessment of waste' WM3 and aims to determine whether the waste is Hazardous or Non-Hazardous to human health and the environment.

Hazardous wastes are signified by entries where the code is followed by an asterisk, where some wastes are deemed hazardous without further assessment, which are termed "Absolute Entries" e.g. most waste oils. Alternatively, waste entries are termed "Mirror" entries that require further assessment of hazardous properties, in order to determine whether they are hazardous waste or not (e.g. soil and stones). The EWC codes relevant to excavation wastes are:

- 17 05 03* - soil and stones containing dangerous substances.
- 17 05 04 – soil and stones other than those mentioned in 17 05 03.

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste, Decision 2003/33/EC and Landfill Regulations 2005) led to the establishment of a methodology for classifying wastes.

Wastes first need to be classified based on their total concentrations and classified as either hazardous or non-hazardous waste. WAC testing is only required if the end disposal route is a landfill and WAC analysis must not be used for waste classification.

Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. A waste must comply with the WAC limits for the relevant landfill, otherwise the soil will need to be pre-treated. There are three different WAC criteria, these are:

- Inert waste.
- Stable Non-Reactive Hazardous Waste (SNRHW).
- Hazardous waste.

There are no standard set of WAC limits for non-hazardous landfill sites and each non-hazardous landfill will have its own set of criteria under which it is licenced to accept non-hazardous waste. These will need to be determined through the selected waste receiver prior to disposal.

A non-hazardous waste should not be compared with WAC limits for hazardous or SNRHW waste sites and the WAC test should only be used to determine if the waste is suitable for disposal at an inert waste landfill site. Likewise, wastes classified as hazardous based on their total concentrations should not be compared with WAC limits for inert waste landfill sites, as these will not be accepted.

Details of how material should be classified for waste disposal are presented in the BSL Methodology and Guidance in Appendix A and are summarised in the table below:

	PRIOR TO LEAVING SITE			
Classification based on Total Concentrations[1]	**Non-Hazardous Waste**		**Hazardous Waste**	
	IF SOILS CANNOT BE RE-USED ELSEWHERE AND MUST GO TO LANDFILL			
WAC testing	Below inert WAC limit values	Above inert WAC limit values	Below hazardous WAC limit values[4]	> WAC limit values
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill[2]	HAZARDOUS landfill	PRE-TREATMENT[3]

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
2 Individual sites may have certain limit values pre-determined in their licence.
3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.
4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

Waste classified as non-hazardous can be accepted into a non-hazardous landfill without having to pass any numerical WAC.

Soils above hazardous WAC limit values require pre-treatment prior to disposal. The effective pre-treatment, typically involving separation, sorting and screening, can offer cost savings through reducing the hazardous nature and volumes of soil. Costs for disposal of non-hazardous/hazardous soils are significant compared to the disposal of inert material.

Inert Waste
The possibility of automatic inert classification of the naturally occurring "clean" soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing. This is the case if:

- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill.

8.3 Waste Classification and Waste Acceptance Criteria (WAC)

We have reviewed the testing results and assessed them through a waste classification database which allows users to code and classify waste as defined in the EWC (European Waste Catalogue) based on EC Regulation 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures (CLP) and latest Environment Agency guidance (WM3 "Guidance on the classification and assessment of waste - Technical Guidance").

The samples tested were screened against assessment criteria within WM3 using the HazWasteOnline tool to assess whether they contained any contaminants in the hazardous range.

The Waste Classification Report and WAC testing results are presented in Appendix D. The results of the waste assessment based on total concentrations are presented in the table below, alongside the WAC analysis test results.

Location	Depth (m)	Stratum	Waste Classification	WAC Analysis	Landfill	Comments
HP01	0.20	MADE GROUND	Non-Hazardous Waste	-	-	-
HP03	0.50	MADE GROUND	Non-Hazardous Waste	Exceeds Inert WAC	NON-HAZARDOUS landfill	Arsenic pH
TP01	0.20	MADE GROUND	Non-Hazardous Waste	-	-	-
TP03	1.10	MADE GROUND	Non-Hazardous Waste	-	-	Asbestos

Based on the waste classification database assessment, the majority of the made ground soils have been classified as **non-hazardous**, with the soils associated with HP03 acceptable in a non-hazardous landfill.

Whilst the one WAC testing carried out shows exceedances of arsenic and pH levels placing the waste classification as stable non-reactive hazardous, no other exceedances of arsenic were identified in the laboratory testing, and the pH level was calculated using a crushed sample, not on the received sample. Therefore, the actual arisings that will constitute the waste are likely to be classified as inert.

Note that further testing of the soils (WAC testing) may be required on the actual arisings in order to satisfactorily categorise the soil for its suitability for disposal to landfill.

Waste Containing Asbestos

Should soils contain asbestos, the concentration and type of asbestos identified, in addition to the chemical composition (i.e. hazardous or non-hazardous detailed above), will determine which waste code is applicable to the soils and which landfill will accept it.

Waste	Conc. by Weight (%)	EWC 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 04 (soil and stones other than those mentioned in 17 05 03*)	Non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.
Non-hazardous soils containing asbestos fibres	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos.
Non-hazardous Soils containing ACM (Mechanically separable)	>0.1%	17 06 05 (construction material containing asbestos) 17 05 04 (soil and stones other than those mentioned in 17 05 03*)	ACMs disposed of at a hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos. Soils should be disposed of at a non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.

Waste	Conc. by Weight (%)	EWC 2002 Catalogue Entry Code	Waste Disposal Route
Hazardous soils containing ACM	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.

A watching brief should be maintained for evidence of Asbestos Containing Materials (ACMs), any ACMs observed should be handpicked and disposed of in accordance with current asbestos disposal regulations.

8.4 Options Assessment

Following the classification of waste materials, the options available for the waste can be considered in the context of the waste hierarchy as below:

- Onsite re-use (with or without prior treatment) under suitable exceptions/permits.
- Offsite processing for recycling or recovery e.g. screening.
- Offsite disposal (with or without prior treatment) i.e. landfill.

Where feasible, efforts should be made to retain soils for onsite re-use to minimise costs and maximise the sustainability of projects.

Based on the above, the possible options for the generation of waste soils at the site are described in the table below:

Waste Generation Source	Comments
Made Ground from site levelling/foundations excavations/services excavations	Samples of made ground from across the site have been classified as non-hazardous for off-site disposal purposes, although should be suitable for re-use on site if required under suitable exemptions/permits.
Crush	Crushed concrete is/will be site derived from structures which had not been used for potentially contaminative activities. These should be subject to an asbestos survey and removal of asbestos as required, prior to demolition and crushing of structures. Assuming the above criteria are met, with materials containing no asbestos or ACM, crushed concrete is considered to be inert without testing. Where samples of crushed concrete have been subject to totals testing this is likely to hazardous due to pH, and where subject to WAC testing, the sulphate and TDS limits are breached, this is to be expected due to the presence of concrete.

General
If any gross hydrocarbon contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

Where it is necessary to dispose material off site it is recommended that materials are segregated and sufficient time is allowed to further classify the actual soil arisings that constitute the waste, including discussion with landfill sites and waste transfer stations to find the best disposal route. It is illegal to dilute and mix soils without a suitable permit.

8.5 Re-use of Soils

By definition in law, any material excavated from the ground becomes waste at the moment of excavation. If that soil (now a “waste”) is then placed on another part of the development site (or used on another development site) without an appropriate materials management plan, permit or exemption being in place, by law this material is defined as “illegally deposited waste”.

Landfill tax rules allow HM Revenue & Customs (HMRC) to recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site is also liable to pay Landfill Tax.

In order to comply with UK legislation and avoid excessive costs, if the re-use of soils is proposed on site, this should be done in accordance with the relevant exemptions or permits in place.

Soils Re-use Under DoWCoP
One of the main industry mechanisms for allowing the re-use of soils in construction is the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE DoWCoP) also known as a Materials Management Plan (MMP). Further guidance is provided in the BSL Methodology and Guidance in Appendix A.

To implement the DoWCoP (for Route A), there is a requirement to notify the Environment Agency and Local Authority of the intention to use the code of practice in principal, after which there is a 21-day notice period for their response.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

- The aims and objectives of the project meet the requirements of the Waste Framework Directive (does not harm human health or the environment).
- The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
- There is certainty of use (planning consents are in place alongside materials tracking, which should be in place as part of good site practice in any case).
- Quantity (the quantity of materials used should be known).

Information on existing site levels, proposed levels, volumes generated (e.g. foundation / drainage excavation arisings) would need to be known in order to complete the MMP.

If the DoWCoP is the chosen route, the MMP should be in place and declared by a Qualified Persons (QP) before works commence, otherwise excavated soils could constitute an illegal deposit of waste and enforcement action could be taken by the EA and HMRC.

The declared MMP should be amended as new import sources are added.

Once the project is complete, a verification report detailing soils re-use/import will need to be produced and submitted to CL:AIRE, which may be subject to a random audit process. Sites found to be non-complaint with the CoP can be referred to the EA for further investigation.

Regardless of implementing re-use under the code of practice or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs.

Re-use of soils containing asbestos should comply with the CL:AIRE publication 'Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials' (CAR-SOIL™) and CAR 2012.

In terms of the re-use of brick/concrete crush materials, the DoWCoP does cover aggregates, but only on the site of origin, and the EA WRAP aggregate Quality Protocol might best apply to ensure quality standards, which are discussed further below.

Soils Re-use under Exemptions and Permits

Other potentially suitable options to allow the re-use and/or import of soils and aggregates on site are provided in the table below:

Re-use Mechanism	Description
U1 Exemption	Can be applied to re-use/import of soils and stones, but only up to 1000 tonnes or for brick and concrete up to 5000 tonnes. This is usually an efficient way to re-use small volumes of waste materials. However, only one U1 can be filled in per site in any 3-year period. Quick and free via online registration.
WRAP Quality Protocols	Describes how processed demolition arisings can be removed from regulatory waste regime. Requires a demonstration of appropriateness by: • Factory Production Control Manual. • Facility Permit (or Exemption). • Grading Analysis.
Waste Framework Directive (WFD) exclusion	In regard to "clean" naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion which is an EA regulatory position statement. So long as the project can prove the four criteria listed above for the DoWCoP, then permits or the DoWCoP are not required. However, many projects still use the CoP to ensure compliance.
T5 Screening and blending of waste	The T5 exemption allows you to temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. The limit is 5,000 tonnes. This applies to: • Screening soil on a demolition site to remove wood and rubble. • Blending soil and compost that has been produced under an exemption on a construction site to produce better soil for landscaping on that site (e.g. peaty deposits). • Crushing waste (except bricks, tiles and concrete) before screening or blending • Grading waste concrete after it has been crushed to produce a certain type of aggregate.
T7 Exemption	The T7 allows treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size. This needs to be registered with the Local Authority.
Other Permitting Routes	Other options include use under an Environmental Permit (Standard or Bespoke Rules), however these may be a time consuming and costly route, where use of the other above options (if applicable) are likely to be more feasible in construction.

9.0 CONCLUSIONS

9.1 Geo-Environmental

Geo-Environmental – Human Health
Testing of the made ground at the site revealed localised contamination in the form of PAHs within TP03 at depths of 1.00-1.10m bgl.

Chrysotile fibres (loose fibres) have been detected in one sample of the made ground across the site within TP03. On quantification analysis the asbestos level within the sample was 0.046%.

The presence of hardstanding currently present across the commercial site will remain in the proposed development, which will break the between the source and end user. No further contaminants were identified to exceed the relevant screening values, therefore no further consideration in regard to human health is required.

Geo-Environmental – Controlled Waters
The overall risk to controlled waters is considered to be low and no further action is required.

Waste
Waste classification for the made ground at the site has revealed the soils tested to be non-hazardous.

9.2 Geotechnical

Concrete classification
DS1 AC-1s conditions prevail in the made ground.

Highways
CBR values of 2% are likely to be achieved in the made ground found at formation levels, for pavement design purposes, unless proven otherwise by in-situ testing at formation level by a specialist geotechnical engineer.

Drainage (SUDS)
Drainage to soakaways is considered unsuitable for this site.

Slopes & Retaining Structures
Consideration should be given in regard to the structural integrity of the retaining wall onsite whilst designing the foundation solution and a structural engineer should be consulted in this matter.

9.3 Further Work

The following further work is considered necessary to progress the site to construction phase:

- Detailed foundation design by a structural engineer, including foundation zonation plan and depth schedule.
- Production of Asbestos Management Plan (AMP) prior to further works disturbing ground associated with TP03.
- Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required.

10.0 ABBREVIATIONS AND DEFINITIONS

GLOSSARY	
Term / Abbreviation	**Definition**
AST	Above Ground Storage Tank.
B(a)P	Benzo (a) Pyrene.
BGS	British Geological Survey.
BRE	Building Research Establishment.
BS	British Standard.
BSL	Brownfield Solutions Ltd.
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes.
CBR	California Bearing Ratio (used in pavement/highways design).
CAR 2012	Control of Asbestos Regulations (2012).
CBCB	Cheshire Brine Compensation Board.
CBCD	Cheshire Brine Compensation District.
CBR	California Bearing Ratio.
CIEH	Chartered Institute of Environmental Health.
CIRIA	Construction Industry Research Association.
CL:AIRE	Contaminated Land: Applications in Real Environments.
CLEA	Contaminated Land Exposure Assessment.
CLO	Contaminated Land Officer.
COMAH	Control of Major Accident Hazards.
Contamination	Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. There is no assumption in this definition that harm results from the presence of the contamination. Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. Contamination may relate to soils, surface water, groundwater or ground gas.
Controlled Waters	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three-mile limit of territorial waters.
CPT	Cone Penetration Test.
CSM	Conceptual Site Model. A schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. The conceptual site model is initially derived from the information obtained by the preliminary investigation (i.e. the Phase I Desk Study). This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of intrusive investigations can provide additional data that can be used to further refine the conceptual site model.
DCP	Dynamic Cone Penetrometer.
DNAPL	Dense Non-Aqueous Phase Liquid.
DoWCoP	Definition of Waste Code of Practice.
DWS	Drinking Water Standard.
EA	Environment Agency.
EHO	Environmental health Officer.
EQS	Environmental Quality Standard.
GAC	Generic Assessment Criteria.

GLOSSARY	
Term / Abbreviation	**Definition**
GDR	Geotechnical Design Report.
GFR	Geotechnical Feedback Report.
GIR	Ground Investigation Report.
GSV	Gas Screening Value.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case of human health, including property/structures and water supply pipelines.
Hazard	Inherently dangerous quality of a substance, procedure or event.
HDPE	High Density Polyethylene.
HSV	Hand Shear Vane.
K	Modulus of Subgrade Reaction.
LCRM	Land Contamination: Risk Management (EA guidance).
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene).
LOD	Limit of Detection (for particular method adopted).
MMP	Materials Management Plan.
Mv	Modulus of Volume of Compressibility.
ND	Not Detected.
NHBC	National House Building Council.
NR	Not Recorded.
OS	Ordnance Survey.
PAH	Polycyclic Aromatic Hydrocarbon.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
PCB	Poly-Chlorinated Biphenyl.
PCSM	Preliminary Conceptual Site Model.
pH	Scale used to specify how acidic or basic a water-based solution is.
PHC	Petroleum Hydrocarbons.
PID	Photo Ionisation Detector.
PNEC	Predicted No-Effect Concentration.
Precision	Level of agreement within a series of measurements of a parameter.
PSD	Particle Size Distribution.
PVC	Polyvinyl Chloride.
Receptor	Human health, living organisms, ecological systems, controlled waters (surface waters and groundwater within aquifers), atmosphere, structures and utilities that could potentially be adversely affected by contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk Assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
SOM	Soil Organic Matter.
Source	Location from which contamination is, or was, derived. This could possibly be the location of the highest soil, groundwater or gas concentration of the contaminant(s).
SPT	Standard Penetration Test.
SVOCs	Semi Volatile Organic Compounds.
TOC	Total Organic Carbon.
TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group).

GLOSSARY	
Term / Abbreviation	**Definition**
TVOCs	Total volatile organic compounds.
UCS	Unconfined Compressive Strength.
Uncertainty	Parameter, associated with the result of a measurement that characterises the dispersion of the values that could reasonably be attributed to the measurement.
UST	Underground Storage Tank.
UXO	Unexploded Ordnance.
VCCs	Vibro Concrete Columns.
VSCs	Vibro Stone Columns
VOCs	Volatile Organic Compounds.
WAC	Waste Assessment Criteria.
WFD (in waste context)	Waste Framework Directive.
WFD (in water context)	Water Framework Directive.
Units	**Definition**
°	Degrees
Φ	Phi angle (in degrees)
g/l	Grams per Litre
Km	Kilometres
kPa	Kilo Pascal (Equivalent to kN/m^2)
$KN/m^2/mm$	Kilo Newton per metered squared per millimeter
kN/m^2	Kilo Newtons per metre squared
kPa	Kilo Pascal (Equivalent to kN/m^2)
l/hr	Litres per hour
MJ/kg	Mega joule per kilogram
MN	Mega Newton
M^2/MN	Mega Newton per metre squared
M	Metres
m bgl	Metres Below Ground Level
m OD	Metres Ordnance Datum (sea level)
µg/l	Micrograms per Litre (parts per billion)
µm	Micrometre
mb	Millibars (atmospheric pressure)
mg/kg	Milligrams per kilogram (parts per million)
mg/m^3	Milligram per metre cubed
mm	Millimetre
ppb	Parts Per Billion
Ppm	Parts Per Million

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DRAWINGS

A1

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FOR ELECTRONIC DATA ISSUE
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AREA MEASUREMENT
The areas are approximate and can only be verified by a detailed dimensional survey of the completed building. Any decisions to be made on the basis of these predictions, whether as to project viability, pre-letting, lease agreements or otherwise, should include due allowance for the increases and decreases inherent in the design development and building processes. Existing buildings may present anomalies in relation to surveyed/drawn plans that may also effect the stated areas. All areas are subject to Town Planning and Conservation Area Consent and detailed Rights to Light analysis.
Figures relate to the likely areas of the building at the current stage of the design and are calculated using one of the following (as stated in the accompanying areas schedule) IPMS1, IPMS2, IPMS 3, Gross External Area (GEA), Gross Internal Area (GIA) or Nett Internal Area (NIA) methods of measurement from the RICS Property Measurement 1st edition.

KEY

- INTERIM SECTION OF RAMP TO BE DEMOLISHED (AND PROPPED)
- PROPOSED NEW HV SUBSTATION BASE CONSTRUCTED. (GROUND MADE GOOD LOCALLY ABOVE)

(NOT INCLUDED IN IMPLEMENTATION WORKS)

- EXISTING SUBSTATION WILL BE DEMOLISHED ONCE NEW HV SUBSTATION IS CONSTRUCTED AND COMMISSIONED
- FULL EXTENT OF PROPOSED SUBSTATION(S)

NOTE:

SCOPING AND REFERENCE DRAWING ONLY. PLEASE REFER TO STRUCTURAL ENGINEERS DRAWINGS FOR SETTING OUT AND DIMENSIONS

REV.	DATE	AMENDMENT
P01	19/06/2023	NMA PLANNING ISSUE

Barton Arcade

BARTON ARCADE

5150

3750

4000

1285

CIRCA 40M2 OF RAMP TO BE DEMOLISHED

THE GARDEN BUILDING

12-14 St Mary's Gate

SK-115







KEYPLAN

CLIENT

FOR AND ON BEHALF OF CANDOUR

SHEPPARD ROBSON

77 Parkway Camden Town London NW1 7PU
T: +44 (0)20 7504 1700 E: london@sheppardrobson.com

PROJECT
39 Deansgate

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
As indicated	05/15/23	MM	MM	TOB

INITIAL WORKS PLAN

Stage 3

STATUS	PURPOSE FOR ISSUE	SR NO.
S2	PLANNING	6145

DRAWING NO. — REV.
6145 - SRA - XX - 00 - SK - A - SK-114 — P01

INITIAL WORKS PLAN
1 : 50

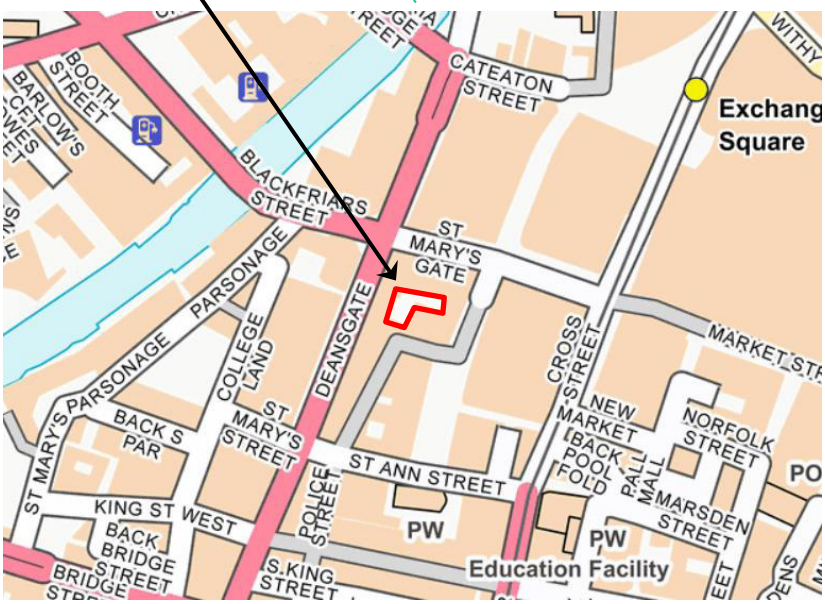
19/06/2023 11:56:51



SITE LOCATION

NEAREST POSTCODE: M3 2BA

SITE ENTRANCE WHAT3WORDS: ///CROWNED.OLDEST.TRUCKS



REV	DATE	DESCRIPTION	BY	CKD

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

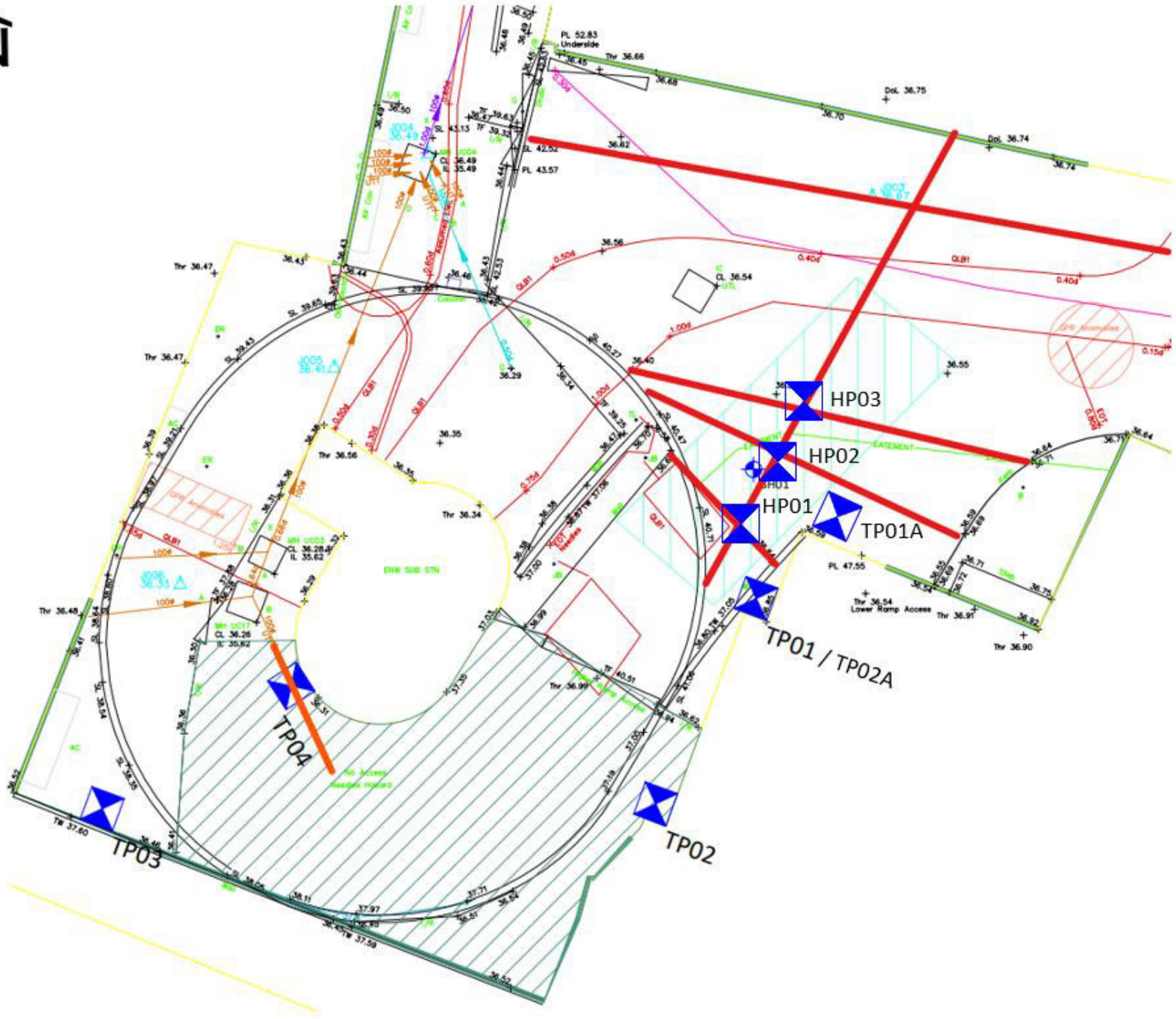
CLIENT
CANDOUR SOLAR PROPCO LTD

PROJECT TITLE
39 DEANSGATE, MANCHESTER

DRAWING TITLE
SITE LOCATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C4293/01	-	NTS	03/10/23

DRAWN BY	CHECKED BY
SD	PH



KEY

- APPROXIMATE SITE BOUNDARY
- HAND EXCAVATED TRIAL PIT

NOTES

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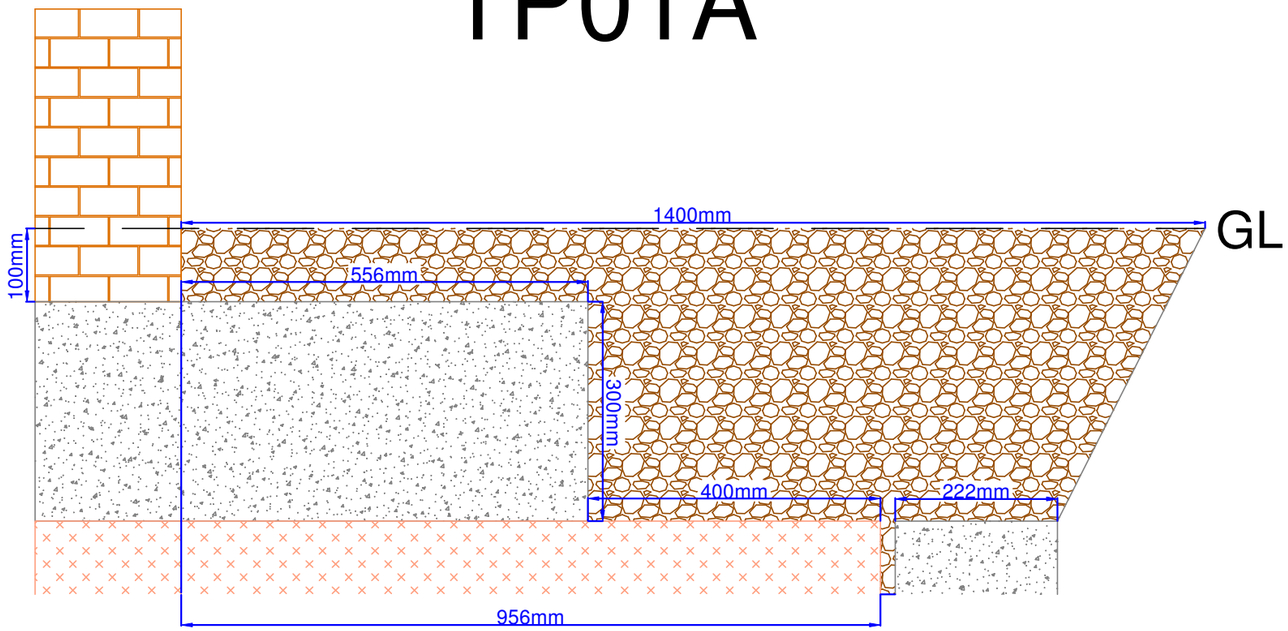
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39 DEANSGATE

DRAWING TITLE
EXPLORATORY HOLE LOCATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C4293/02	-	NTS	05/09/23

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PH	NS

TP01A









KEY:

- BRICK WALL
- CONCRETE
- CONCRETE SCREED
- SUBSTRATE

NOTES

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PROJECT TITLE

39 DEANSGATE

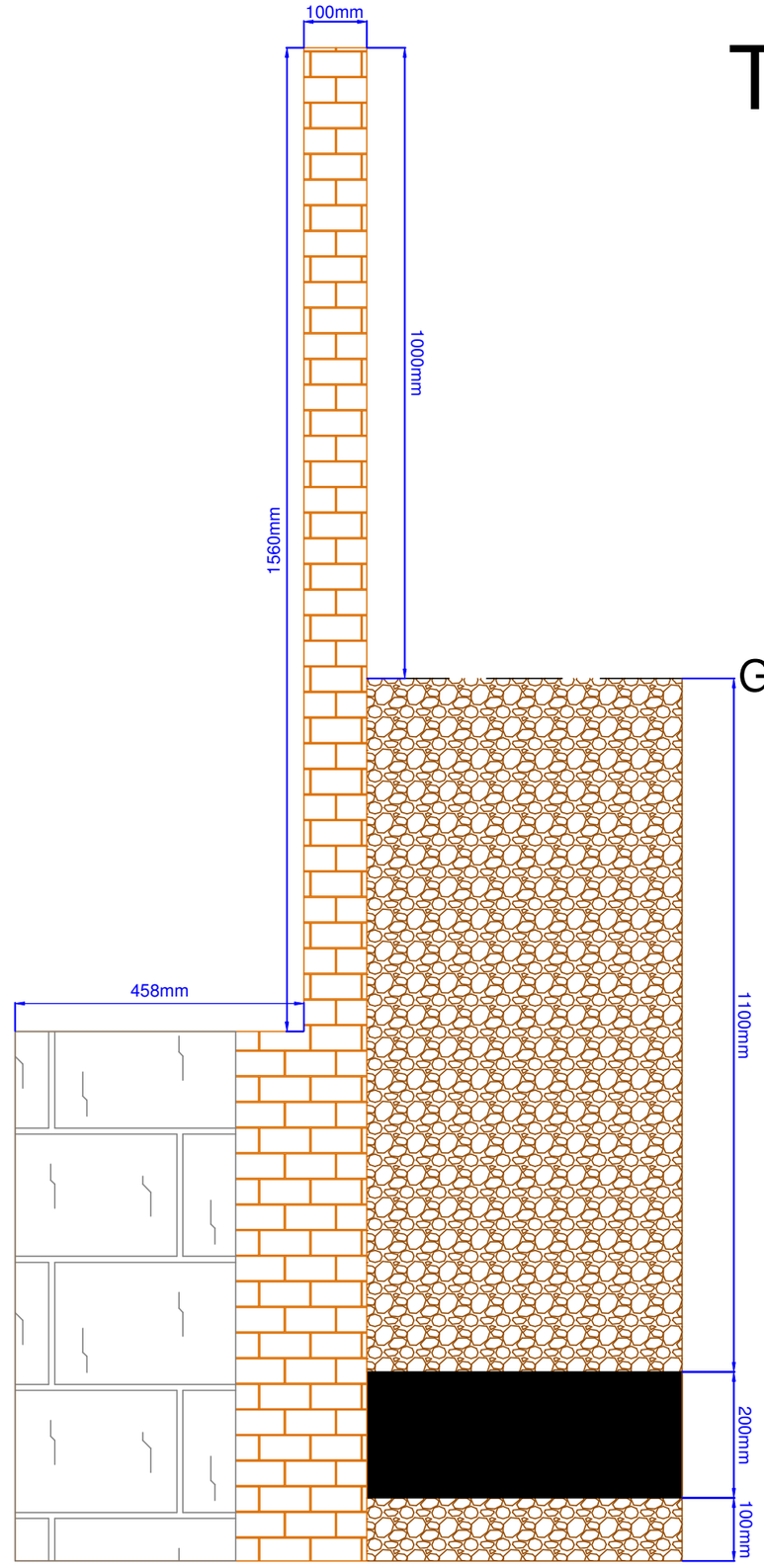
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FOUNDATION PIT DRAWING

DRAWING No.	REVISION	SCALE	DATE
C4293/03	-	NTS	30/08/23

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TP03





KEY:

- BRICK WALL
- VOID
- SUBSTRATE
- CONCRETE BLOCKS

NOTES

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PROJECT TITLE
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DRAWING TITLE
FOUNDATION PIT DRAWING

DRAWING No.	REVISION	SCALE	DATE
C4293/03	-	NTS	30/08/23

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APPENDIX A

BSL Methodology and Guidance

BSL Phase I & II Geo-Environmental Assessment Reports - Methodology and Guidance

This Appendix provides information on the approaches, methods and guidance used by Brownfield Solutions Ltd in the preparation of this report.

The term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential soils and groundwater contamination). The term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements). It should be noted that this is an integrated investigation and these two main aspects are related, unless otherwise specified within the report.

Phase I reports are written in general accordance with the description of a Preliminary Investigation as defined in BS10175:2011+A2:2017 and are also produced in general accordance with the recommendations for a Tier 1 Preliminary Risk Assessment as described in LCRM guidance

The first stage of the investigation and assessment of a site is the Preliminary Investigation/Tier 1 Preliminary Risk Assessment, often referred to as a Phase 1 Desk Study, comprising a desk study and walk-over survey and collation of desk-based searches, which culminates in the Preliminary Risk Assessment and the development of a preliminary/initial Conceptual Site Model (CSM). From this are identified any potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them.

From the geo-environmental perspective, the hazard Identification process uses professional judgement to evaluate all the hazards in terms of possible contaminant linkages (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment as part of Phase II investigations and reports.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include an exploratory, a detailed or/and supplementary Investigations as described in BS 10175:2011+A2:2017. Phase II Assessments are produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance and are also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

Contaminated Land - Legislative Background

Land contamination can be addressed in several ways, e.g. during planning, under Part 2A, following an incident, during an investigation into environmental damages, or during the application of an environmental permit, or its surrender.

For the planning process the key test is **as a minimum the site cannot be determined as contaminated land**, e.g. there is not significant harm, significant possibility of significant harm to human health or that there is not significant harm to, or the significant possibility that the pollution of controlled waters will occur.

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act.
- The Contaminated Land Statutory Guidance, DEFRA – April 2012.
- The Contaminated Land (England) Regulations 2006.
- The Contaminated Land (England) Amendment Regulations 2012.
- Water Resources Act.
- Water Framework Directive.
- Environmental Damage Regulations.
- Environment Agency (EA) - Land Contamination Risk Management (LCRM) 2019.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused.
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

Source - substances that are potential contaminants or pollutants that may cause harm.
Pathway - a potential route by which contaminants can move from the source to the receptor , and the impact of that migration on the source e.g. ;attenuation.
Receptor - a receptor that may be harmed, for example the water environment, humans and water, considering the sensitivity of the receptor

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the S-P-R approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents
This report has been prepared in accordance with the list of guidance below, however the list is not exhaustive:

- DETR: Circular 02/2000: Environmental Protection Act 1990: Part IIA: Contaminated land. 2012.
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
- BS 10175:2011+A2:2017.
- Environment Agency (EA) - Land Contamination Risk Management (LCRM). 2019.

- Groundwater Protection - https://www.gov.uk/government/collections/groundwater-protection.
- UK Technical Advisory Group (UKTAG) - - Water Framework Directive
- Incidents and their classification: the Common Incident Classification Scheme (CICS) – Used by the Environment Agency to classify pollution incidents.

Relevant Legislative Documents
The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
- The Environment Protection Act (1990).
- The Water Resources Act (1991).
- The Environment Act (1995).
- The Contaminated Land (England) Act (2000).
- The Pollution Prevention and Control (England and Wales) Regulations (2000).
- The Landfill Regulations (England and Wales) Regulations (2002).
- The Landfill (England and Wales) (Amendment) Regulations (2004).
- Contaminated Land (England) Regulations (2012).
- The Environmental Damage (Prevention and Remediation) Regulations (2009).
- Environmental Permitting Regulations (England and Wales) Regulations (2010).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- Health and Safety at Work Act.
- National Planning Policy Framework (NPPF)(2021).

Contaminated Land Risk Assessment Approach

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:

Hazard Identification ➡ Hazard Assessment ➡ Risk Estimation ➡ Risk Evaluation.

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under LCRM, three tiers of risk assessment exist – Stage/Tier Preliminary Risk Assessment, Stage 2 Generic Quantitative and Stage 3 Detailed Quantitative.

Further information can be found at the below site:
https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme

(CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report if applied.

The likelihood of a given receptor being impacted is related to a number of factors, e.g. the geology which could inhibit contaminant migration. For example, a site with a significant thickness of clay between it and a receptor may reduce migration of contamination via the subsurface, which will reduce the likelihood of a given receptor being impacted. The geology or drainage for example could offer a preferential pathway e.g. mines shafts/faults increasing the likelihood and potential magnitude of an impact. The depth of contamination will also affect the exposure pathway, for example petroleum hydrocarbons at depth are unlikely to reach a receptor via dermal contact but could via vapour pathways which will influence the likelihood of an impact being felt e.g. if there are no buildings on site.

The terms and definitions used for the assessment of the likelihood are provided below:

High likelihood: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Examples - Extensive areas with concentrations above saturation limits for mobile contamination e.g. petroleum hydrocarbons within the water table.

Likely: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term.
Examples – Localised areas of contaminants with concentrations above saturation limits for mobile contamination e.g. localised petroleum hydrocarbons within the water table; shallow contamination above relevant human health generic assessment criteria is present with little or no hardstanding,

Low likelihood: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term.
Examples - A thickness/distance of low permeability deposits preventing contaminant migration to a receptor is present; a site is mostly covered hard standing preventing exposure to soil contamination.

Unlikely: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.
Examples – A site is underlain by a substantial thickness of low permeability clays, between the source and potential receptors which will inhibit significantly, but not completely rule out migration to sensitive receptors.

The severity is also classified using a system based on CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report, if applied. The terms and definitions are:

Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse.

Medium: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve.

Mild: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment.
Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

Minor: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.
Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low
	No Linkage	Negligible			

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

Very high: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required.

High: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term.

Moderate: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.

Low: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Very Low: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Some linkages may be identified which constitutes a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'no linkage' in the summary table, which give rise to a **negligible** risk category and no further action is required.

Ground Gas Risk Assessment Guidance

BS8485:2015+A1:2019, BS 8576:2013, CIRIA C665 and CL:AIRE RB17 are the current guidance which gives up-to-date advice on all aspects of ground gas. They outline good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to ground gas contamination.

Within BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665, two semi-quantitative methods are set out for the assessment of risk:

1 For low rise housing with a ventilated under floor void at minimum 150 mm (Boyle and Witherington).
2 For all other development types (Wilson and Card).

Both methods use the concept of Gas Screening Values (GSVs) to identify levels of risk. The mitigation and management of potentially unacceptable risk is described with reference to both passive and active systems of gas. Source removal is also discussed as an option. A sperate approach is discussed under the RB17 header further below.

The aim of the guidance is for a consistent approach to decision making, particularly relating to the scope of protective design measures on a site-specific basis.

Legislative Framework
BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665 provides technical guidance, however they also recognise the context into which the guidance has to be employed. Government policy is based upon a "suitable for use approach", which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the "source" in a "pollutant linkage" which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be "contaminated land" under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land.*

Generation Potential of Sources
BS 8576:2013 Figure 6 provides a basis for assessing the generation potential from sources identified as part of the Phase I Assessment. These are summarised below:

Generation Potential	Typical Sources
Very Low	• Natural carbonate soil and strata, e.g. chalk and limestone. • Natural soil strata with a low degradable organic content, e.g. alluvium, peat. • In-filled pond less than 15 m diameter, in-filled before 1930s to 1940s. • Made ground with low degradable organic content (e.g. up to 5% organic material such as pieces of wood, pieces of paper, rags, etc. with a high proportion of ash and no food or other easily degradable waste). • Mine workings shallow or shaft (where there is clear evidence that they are flooded). • Inert landfill sites.
Low	• Natural soil strata with a high degradable organic content (DOC). • Made ground with total organic carbon (TOC) up to 6% (e.g. dock silt, no food or other easily degradable waste). • Foundry sand (includes phenolic binders, rags and wood that decay, albeit at low rates). • Landfill 1945 to mid 1960s (see also Moderate below).
Moderate	• Sewage sludge. • Mine workings – unflooded, more than 50 years since last worked (gas is liberated from coal when mine workings are excavated; this continues for up to about 50 years). • Landfill 1945 to mid 1960s (this could also be "low" or, if disturbed, "high").

Generation Potential	Typical Sources
High	• Landfill mid 1960s to early 1990s. • Mine workings – unflooded – less than 50 years since last worked.
Very High	• Municipal landfill sites. • Landfill early 1990s onward.

Frequency and Duration of Monitoring

The monitoring period for a specific site covers the "worst case" scenario. A "worst case" scenario will typically occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of the additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with soil gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection. CL:AIRE publication TB17 "Ground Gas Monitoring and 'Worst-Case' Conditions" provides further guidance.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

Typical/idealised periods of monitoring

		Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	1 month	2 months	3 months	6 months	12 months
	Moderate (Apartments)	2 months	3 months	6 months	12 months	24 months
	High (Low rise Residential)	3 months	6 months	6 months	12 months	24 months

Typical/idealised frequency of monitoring/Number of Visits Required

		Gas Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	4	6	6	12	12
	Moderate (Apartments)	6	6	9	12	24
	High (Low rise Residential)	6	9	12	24	24

Note

1 NHBC guidance also recommends this period of monitoring (Boyle and Witherington, 2007).
2 Generation potential of sources based on descriptions within BS 8576:2013.
3 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

RB17 Approach

CL:AIRE RB17 (Card et al 2012) is a pragmatic approach to ground gas risk assessment and was developed because gas concentration, pressure and flow rate measured in a well headspace may not be representative of the conditions in the surrounding formation.

In these low-risk situations, the approach is to use the conceptual site model and the estimation of the likely gas generation from a source to identify where or if gas monitoring is required to better define the risks.

Under this approach, for sites with natural soils only with no credible methane source, then no action is required (no monitoring or gas protection measures) as this represents Characteristic Situation 1 (CS1).

Unexploded Ordnance (UXO) Guidance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681.

BSL carry out non-specialist UXO screening exercises by considering any evidence of UK defence activities on or near the site evident from gathered desk study information and the unexploded aerial delivered bomb (UXB) online risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available online Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced and considered competent in the assessment of UXO.

Contaminated Land Screening Values

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

General
The current recommended method for assessing contamination is on the basis of:

Source-Pathway-Receptor

Where any one of these "pollution linkages" is absent there is deemed to be no risk.

Fundamentally, receptors can be considered as humans (human health) and controlled waters (surface and ground waters).

The purpose of using generic Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake clean up based on the data to hand is cost effective.

Human Health
Current UK guidance is provided by DEFRA and the Environment Agency (EA). Publications forming part of the guidance include the CLEA Mode and toxicological reports collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values for soil contamination based on standard land uses and soil assumptions.

CLEA guidance has gone through a number of revisions over time. Tier 1 generic S4UL values have been published using the CLEA 1.06 Model by CIEH/LQM. These are the third set of generic assessment criteria generated by CIEH and replace the previous two sets of GACs (Generic Assessment Criteria). The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

C4SL values for six determinands including lead was published by DEFRA/CL:AIRE in December 2014 and they represent a low risk as opposed to minimal risk. These screening values were published by DEFRA for Part 2A use, although with the dual purpose for use under planning. However, S4ULs remain the first reference due to the broader range of end uses and soil organic content.

The preference from the EA is that site specific screening levels are used wherever possible. Due to numerous factors it is not always possible to utilise site specific values. In these instances the following data sources are used in the order of preference given below:

- CIEH S4UL values (derived by CIEH/LQM).
- DEFRA/CL:AIRE C4SL's.
- CL:AIRE GAC values.
- Guidance from other European countries.
- Guidance from the outside Europe.

Controlled Waters
The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations). The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

The chemical standards used in the UK to control impaction of contamination on controlled waters are Environmental Quality Standards (EQS). The EQS's cover a large number of compounds.

Where certain compounds are not covered by the EQS these are commonly compared to the UK Drinking Water Standards (DWS).

Further Assessment
When screening values are exceeded then further consideration is required. This could include the use of simple measures to break the pollution pathway and mitigate the risk, further additional detailed investigation, including the deriving of site-specific values to better define the risk, and to design appropriate remedial measures.

Re-Use Of Waste - Guidance Note

Definition of Waste
The Environment Agency considers waste to be "*...any material that is discarded, or intended to be discarded*..." This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

CL:AIRE: Code of Practice
Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE DoWCoP), also commonly referred to as a "Materials Management Plan".

The developer/contractor is advised to complete all works under the DoWCoP.

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment.
- Material capable of being used in another place on the same site following ex-situ treatment on site.
- Material capable of being used in another development site without treatment (Direct Transfer).
- Material capable of being used in another development site following ex-situ treatment on another site eg Hub site.

The Code of Practice requires 4 No. Factors to be addressed:

1) Protection of human health and protection of the environment.
2) Suitability of use, without further treatment.
3) Certainty of use.
4) Quantity of material.

In order to satisfy these requirements the following are required:

i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
v) Volume calculations.
vi) Planning permission for the development.
vii) Contractual details to be clear, regarding who steps in is a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (eg bioremediation, stabilisation) will require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.
Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Waste Classification for Soils

Introduction
Waste producers have a duty of care to classify the waste they are producing:

- Before it is collected, disposed of or recovered.
- To identify the controls that apply to the movement of the waste.
- To complete waste documents and records.
- To identify suitably authorised waste management options.
- To prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

Background for Landfill Disposal
In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets his permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

Key Points:

- Not all waste can be landfilled
- Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.
- Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
- Most wastes must be treated before you can send them to landfill.
- There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

Classification
Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e the hazard assessment. The most common EWC waste codes related to soil are:

17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

Soils may contain certain contaminants (eg asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

Waste Definitions

Inert	• Will not undergo any significant physical, chemical or biological transformations. • Will not dissolve. • Will not burn. • Will not physically or chemically react. • Will not biodegrade. • Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. • Has insignificant total leachability and pollutant content. • Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
Non-Hazardous	Is not inert (see above) Is not hazardous (see below)
Hazardous	Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance)
Stable Non-reactive hazardous waste#	Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).

This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) the WAC is not relevant. Furthermore, the WAC limits **cannot** be used to make an assessment of whether a waste is hazardous. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

Classification based on Total Concentrations[1]	**Non-Hazardous Waste**		**Hazardous Waste**	
WAC testing	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	Above hazardous WAC limit values
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill[2]	HAZARDOUS landfill	PRE-TREATMENT[3]

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
2 Individual sites may have certain limit values pre-determined in their licence.
3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However, hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

Known Oils

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer's or supplier's REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Unknown Oils

Where hydrocarbons are contaminating soils, it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

> For contaminated land specific consideration must be given to the following before proceeding;
>
> - The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
> - The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of marker compounds is optional; however, it is recommended that where possible the marker compounds should be used. WM3 states:

> If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:
>
> - The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
> - This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
> - The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

TPH Concentration (mg/kg)	Petrol or Diesel	BaP (mg/kg)	Classification
10,000	No	0.9	Non- Hazardous
1,000	No	Not available	Hazardous
1,000	Yes	Not relevant	Hazardous

References

1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
7. 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

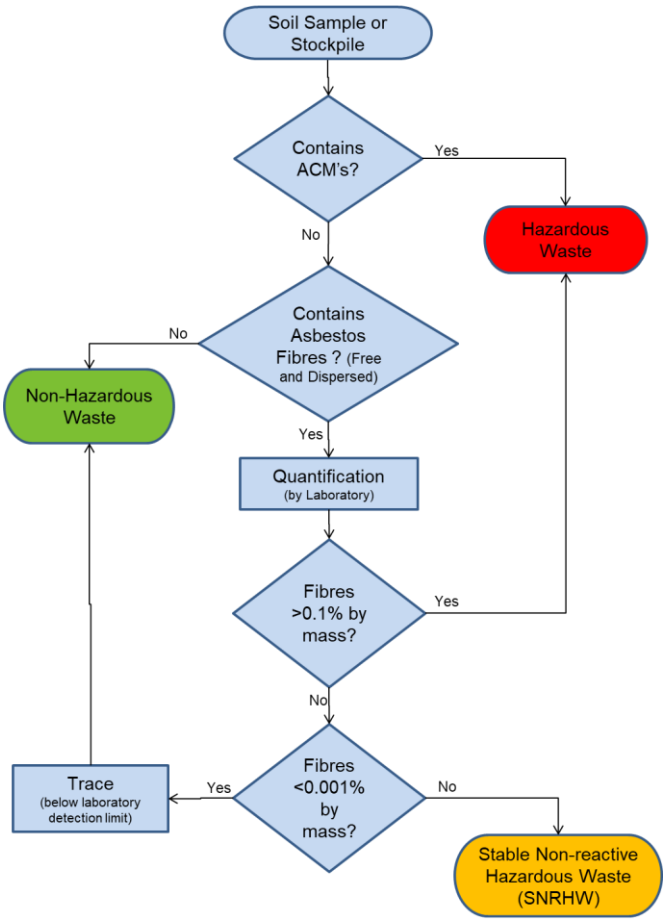
Additional Asbestos Guidance Notes

Disposal

The 1st Edition of WM3 "Guidance on the classification and assessment of waste", details the way in which Asbestos is assessed within soils.

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's)



Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site[1]. These levels are often termed "trace" by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)[1]. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

17 06	**Insulation materials and asbestos-containing construction materials**
17 06 01	Insulation materials containing asbestos
17 06 03	Other insulation materials consisting of or containing hazardous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05	Construction material containing asbestos

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and "*other suitable materials*" may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

Construction
Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However, where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether or not the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However, it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four-hour period. The control limit is not a '*safe*' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 "the release of dispersed asbestos fibres from soil" 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m^3.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (e.g. by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation. There is currently a Joint Industry Working Group (JIWG) tasked with producing a Code of Practice for Asbestos in Soil, Made Ground and Construction & Demolition Material that will clarify in due course the position of the various government agencies.

Asbestos containing materials can remain in situ under a suitable cover system which may be hardsurfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Preliminary publications from JIWG (April 2015) provide guides for decision making in relation to construction.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk . There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However, the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required.

The re-use of soils containing asbestos at concentrations above hazardous waste levels is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

Asbestos in Soil as Free Fibres

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recyc	Inert	SNR	Hazardo		Suitable for re-use on site	Precautions
Not detected	√	√			No precautions necessary, however on a brownfield site asbestos not previously identified may be found during works and a statement within the contractors method statement for how they will deal with this unforeseen asbestos would be good practice to ensure compliance with CAR2012.	Yes	None
Trace (<0.001%)		√ [2]			Precautions are unlikely to be required, however a detailed method statement may be required to ensure compliance with CAR2012. Basic asbestos management good practice will be required. Typically precautions would include: • Ensuring soils do not dry out to become dusty. • Site personnel have the risk communicated at induction stage.	Yes Soils can be re-used under CL:AIRE CoP with the correct precautions in place.	Generally clean cover or hardstanding cover required.
0.001% – 0.099%			√		Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: • Site personnel have the risk communicated at induction stage. • Ensuring personnel have suitable training. • Task monitoring to inform PPE requirements. • Ensuring soils do not dry out to become dusty and that misting is available during groundworks. • Separate stockpiling. • Clean haulage routes.	Possibly Soils may be able to be re-used under CL:AIRE CoP, subject to a satisfactory Risk Assessment and regulatory agreement with the correct precautions in place.	Clean cover or hardstanding cover required.
0.1+%				√	Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: • Site personnel have the risk communicated at induction stage. • Ensuring personnel have suitable training. • Task monitoring to inform PPE requirements. • Site wide and or perimeter monitoring. • Ensuring soils do not dry out to become dusty and that misting is available during groundworks. • Separate stockpiling. • Clean haulage routes. • Decontamination unit	Unlikely [3] Re-use of soils containing asbestos within an earthworks scheme will involve significant engineering and the Risk for generating dusts will be significantly increased with	Clean cover and a hard dig layer. A plan should be in place for future excavations as part of the Health and Safety File.

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recyc	Inert	SNR	Hazardo		Suitable for re-use on site	Precautions
						repeated handling and compaction.	

1. The standard laboratory detection limit is normally 0.001%. Below 0.001% is trace and currently regarded as not containing asbestos for the purposes of disposal off site. However the waste producer has a duty to fully classify the waste and the presence of trace asbestos should be declared. Consequently it is unlikely that a waste treatment site will take this soil and an inert landfill may make a commercial decision to only take it under some circumstances.

2 The re-use of soils containing asbestos at concentrations above hazardous waste is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be warranted where there a long program for implementation.

APPENDIX B

Exploratory Hole Logs

BROWNFIELD SOLUTIONS LTD

Trial Pit Log

No.
HP01
Sheet 1 of 1

PROJECT NO:	C4293	**CO-ORDS:**	**Hole Type** TP
PROJECT NAME:	39 DEANSGATE, MANCHESTER	**LEVEL:**	**Scale** 1:25
CLIENT:	RENAISSANCE ASSOCIATES LTD	**DATES:** 29/08/23	**Logged** PH / **Checked** NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.20	ES		0.05			MADE GROUND: Black tarmacadam.
				0.30			MADE GROUND: Yellowish brown slightly gravelly sand. Sand is fine to coarse. Gravel is sub-angular fine to coarse of sandstone.
							Grey concrete obstruction encountered at 0.30m bgl.
							End of Trial Pit at 0.30m

1.0
2.0
3.0
4.0
5.0

Remarks

1. Utility clearance undertaken utilising EM and GPR techniques by GeoUK engineer. Hole also scanned out with CAT & Genny.
2. GPR detected anomaly at both 0.30m and 1.00m bgl.
3. Hand pit undertaken to confirm presence of services.
4. Hole terminated at 0.30m bgl due to concrete obstruction.
5. Reinstated with tarmacadam upon completion.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

BROWNFIELD SOLUTIONS LTD

Trial Pit Log

No.
HP02
Sheet 1 of 1

PROJECT NO:	C4293	**CO-ORDS:**	**Hole Type** TP
PROJECT NAME:	39 DEANSGATE, MANCHESTER	**LEVEL:**	**Scale** 1:25
CLIENT:	RENAISSANCE ASSOCIATES LTD	**DATES:** 29/08/23	**Logged** PH / **Checked** NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
				0.05			MADE GROUND: Black tarmacadam.
	0.30	ES					MADE GROUND: Dark grey gravelly sand with low ash content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick, slag, metal, wood, sandstone and mudstone.
				0.50			*Grey concrete obstruction encountered at 0.50m bgl.*
							End of Trial Pit at 0.50m

1.0
2.0
3.0
4.0
5.0

Remarks

1. Utility clearance undertaken utilising EM and GPR techniques by GeoUK engineer. Hole also scanned out with CAT & Genny.
2. GPR detected anomaly at both 1.10m and 1.00m bgl.
3. Hand pit undertaken to confirm presence of services.
4. Hole terminated at 0.50m bgl due to concrete obstruction.
5. Reinstated with tarmacadam upon completion.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

BROWNFIELD SOLUTIONS LTD

Trial Pit Log

No.
HP03
Sheet 1 of 1

PROJECT NO:	C4293	**CO-ORDS:**	**Hole Type** TP
PROJECT NAME:	39 DEANSGATE, MANCHESTER	**LEVEL:**	**Scale** 1:25
CLIENT:	RENAISSANCE ASSOCIATES LTD	**DATES:** 29/08/23	**Logged** PH / **Checked** NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
				0.05			MADE GROUND: Black tarmacadam.
	0.50	ES					MADE GROUND: Dark grey gravelly sand with low ash content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick, slag, metal, wood, sandstone and mudstone.
				1.00			*Orange ceramic pipe encountered at 1.00m bgl.*
							End of Trial Pit at 1.00m

1.0
2.0
3.0
4.0
5.0

Remarks

1. Utility clearance undertaken utilising EM and GPR techniques by GeoUK engineer. Hole also scanned out with CAT & Genny.
2. GPR detected anomaly at both 0.40 and 1.00m bgl.
3. Hand pit undertaken to confirm presence of services.
4. Top of orange ceramic pipe encountered at 1.00m bgl. Terminated at 1.00m bgl and not progressed further to avoid damage to service.
5. Reinstated with tarmacadam upon completion.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

BROWNFIELD SOLUTIONS LTD

Trial Pit Log

No.
TP01
Sheet 1 of 1

PROJECT NO:	C4293	**CO-ORDS:**	**Hole Type** TP
PROJECT NAME:	39 DEANSGATE, MANCHESTER	**LEVEL:**	**Scale** 1:25
CLIENT:	RENAISSANCE ASSOCIATES LTD	**DATES:** 29/08/23	**Logged** PH / **Checked** NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.20	ES		0.10			MADE GROUND: Black tarmacadam.
				0.40			MADE GROUND: Dark grey gravelly sand with low ash content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick, slag, metal, wood, sandstone and mudstone.
							End of Trial Pit at 0.40m

1.0
2.0
3.0
4.0
5.0

Remarks

1. Utility clearance undertaken utilising EM and GPR techniques by GeoUK engineer. Hole also scanned out with CAT & Genny.
2. Pit undertaken to investigate foundation of adjacent building.
3. Hole terminated at 0.40m bgl, unable to excavated beneath foundation due to concrete extending 1.40m away from building wall.
4. Reinstated with tarmacadam upon completion.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

BROWNFIELD SOLUTIONS LTD

Trial Pit Log

No.
TP03
Sheet 1 of 1

PROJECT NO:	C4293	**CO-ORDS:**	**Hole Type** TP
PROJECT NAME:	39 DEANSGATE, MANCHESTER	**LEVEL:**	**Scale** 1:25
CLIENT:	RENAISSANCE ASSOCIATES LTD	**DATES:** 29/08/23	**Logged** NA / **Checked** NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.20-0.50	ES		0.17			MADE GROUND: Black tarmacadam.
				0.40			MADE GROUND: Brownish grey gravelly sand. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of brick, coal, slag, clinker, concrete and rare metal.
				0.50			*Grey concrete sub-angular cobble 350mm in diameter encountered from 0.30m to 0.40m bgl.*
							MADE GROUND: Red sandy gravel with moderate cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of brick. Cobbles are angular of brick up to 220mm in diameter.
	1.00-1.10	ES					MADE GROUND: Greyish brown slightly clayey gravelly sand with low ash content. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of slag, coal, clinker and sandstone.
				1.10			VOID
				1.30			MADE GROUND: Greyish brown slightly clayey gravelly sand with low ash content. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of slag, coal, clinker and sandstone.
				1.40			End of Trial Pit at 1.40m

1.0
2.0
3.0
4.0
5.0

Remarks

1. Utility clearance undertaken utilising EM and GPR techniques by GeoUK engineer. Hole also scanned out with CAT & Genny.
2. Pit undertaken to investigate retaining wall on the south boundary of the site.
3. Hole terminated at 1.40m bgl, unable to excavate further due to reach of hand digging tools.
4. Reinstated with concrete upon completion.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

APPENDIX C

Chemical Testing Results

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Analytical Report Number : 23-55331

Replaces Analytical Report Number: 23-55331, issue no. 1
Additional analysis undertaken.
Asbestos Quantification added as per clients request

Project / Site name:	39 Deansgate, Manchester	**Samples received on:**	07/09/2023
Your job number:	C4293	**Samples instructed on/ Analysis started on:**	07/09/2023
Your order number:	PO 4562	**Analysis completed by:**	20/09/2023
Report Issue Number:	2	**Report issued on:**	22/09/2023
Samples Analysed:	4 soil samples		

Signed:

Adam Fenwick
Technical Reviewer
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 23-55331
Project / Site name: 39 Deansgate, Manchester
Your Order No: PO 4562

Lab Sample Number				2804825	2804826	2804827	2804828
Sample Reference				HP01	HP03	TP01	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	1.00-1.10
Date Sampled				29/08/2023	29/08/2023	29/08/2023	29/08/2023
Time Taken				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
Moisture Content	%	0.01	NONE	12	20	13	11
Total mass of sample received	kg	0.001	NONE	0.9	0.8	0.9	0.9
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	0.046
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	0.046
Asbestos Analyst ID	N/A	N/A	N/A	PDO	PDO	PDO	PDO
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	11.1	8.8	9.8	8.5
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	130	650	480	120
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0649	0.327	0.239	0.0605
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	64.9	327	239	60.5
Organic Matter (automated)	%	0.1	MCERTS	0.6	3.5	4.7	11
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.45	0.57	5.9
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	6.1
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.09	4.3	58
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.07	2.7	37
Phenanthrene	mg/kg	0.05	MCERTS	0.07	0.64	20	310
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.14	5	79
Fluoranthene	mg/kg	0.05	MCERTS	0.14	0.86	23	470
Pyrene	mg/kg	0.05	MCERTS	0.14	0.87	20	420
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.08	0.47	9.9	210
Chrysene	mg/kg	0.05	MCERTS	0.07	0.47	11	220
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.09	0.52	12	260
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.23	4.1	95
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.09	0.42	8.7	210
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.05	0.23	4.6	110
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.5	34
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.05	0.26	5.6	130
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	5.72	132	2650
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.4	40	17	44
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	6.7	25	27	27
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	6.7	25	27	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	63	52	100
Lead (aqua regia extractable)	mg/kg	1	MCERTS	13	53	60	280
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.7	42	38	39
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	44	67	110	350
Monoaromatics & Oxygenates							
Total BTEX & MTBE	mg/kg	0.007	NONE	-	< 0.007	-	-

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 23-55331
Project / Site name: 39 Deansgate, Manchester
Your Order No: PO 4562

Lab Sample Number				2804825	2804826	2804827	2804828
Sample Reference				HP01	HP03	TP01	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	1.00-1.10
Date Sampled				29/08/2023	29/08/2023	29/08/2023	29/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Monoaromatics & Oxygenates							
Benzene	mg/kg	0.005	MCERTS	-	< 0.005	-	-
Toluene	mg/kg	0.005	MCERTS	-	< 0.005	-	-
Ethylbenzene	mg/kg	0.005	MCERTS	-	< 0.005#	-	-
p & m-xylene	mg/kg	0.005	MCERTS	-	< 0.005#	-	-
o-xylene	mg/kg	0.005	MCERTS	-	< 0.005	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.005	NONE	-	< 0.005	-	-
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	-	1.2	-	-
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	-	18	-	-
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	-	74	-	-
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	-	63	-	-
TPH-CWG - Aliphatic >EC16 - EC35 $_{EH_CU_1D_AL}$	mg/kg	10	MCERTS	-	140	-	-
TPH-CWG - Aliphatic >EC35 - EC40 $_{EH_CU_1D_AL}$	mg/kg	10	NONE	-	17	-	-
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	-	160	-	-
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.1	NONE	-	< 0.10	-	-
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	-	7.8	-	-
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	-	36	-	-
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	-	70	-	-
TPH-CWG - Aromatic >EC35 - EC40 $_{EH_CU_1D_AR}$	mg/kg	10	NONE	-	32	-	-
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	-	110	-	-
TPH Total C5 - C40 $_{EH_CU+HS_1D_TOTAL}$	mg/kg	10	NONE	-	320	-	-
TPH (C5 - C10) $_{HS_1D_TOTAL}$	mg/kg	1	NONE	-	< 1.0	-	-
TPH (C10 - C16) $_{EH_CU_1D_TOTAL}$	mg/kg	10	NONE	-	27	-	-
TPH (C16 - C40) $_{EH_CU_1D_TOTAL}$	mg/kg	10	NONE	-	290	-	-
PCBs by GC-MS							
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001
Total PCBs by GC-MS							
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	-	< 0.007

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

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Analytical Report Number: 23-55331
Project / Site name: 39 Deansgate, Manchester
Your Order No: PO 4562

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2804828	TP03	1.00-1.10	145	Loose Fibrous Debris	**Chrysotile**	0.046	**0.046**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 23-55331
Project / Site name: 39 Deansgate, Manchester

* 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 *
2804825	HP01	None Supplied	0.2	Brown sand with gravel.
2804826	HP03	None Supplied	0.5	Black sand with gravel.
2804827	TP01	None Supplied	0.2	Brown clay and sand with gravel.
2804828	TP03	None Supplied	1.00-1.10	Brown clay and sand with gravel.

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Analytical Report Number : 23-55331
Project / Site name: 39 Deansgate, Manchester

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
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
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
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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
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
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	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. Refer to CoA for band specific accreditation.	In-house method with silica gel split/clean up.	L088/76-PL	D	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
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
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. Refer to CoA for analyte specific accreditation	L073B-PL	W	MCERTS
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.

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 23-55331
Project / Site name: 39 Deansgate, Manchester

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

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

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

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APPENDIX D

Waste Assessment Report

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Analytical Report Number : 23-55332

Project / Site name:	39 Deansgate, Manchester	**Samples received on:**	07/09/2023
Your job number:	C4293	**Samples instructed on/ Analysis started on:**	07/09/2023
Your order number:	PO 4562	**Analysis completed by:**	14/09/2023
Report Issue Number:	1	**Report issued on:**	14/09/2023
Samples Analysed:	10:1 WAC sample		

Signed: Szwagrak

Joanna Szwagrzak
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
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Waste Acceptance Criteria Analytical Results

Report No:	**23-55332**						
					Client:	**BSL**	
Location	**39 Deansgate, Manchester**						
Lab Reference (Sample Number)	2804829 / 2804830				**Landfill Waste Acceptance Criteria**		
					Limits		
Sampling Date	29/08/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	HP03						
Depth (m)	0.50						
Solid Waste Analysis							
TOC (%)**	2.0				3%	5%	6%
Loss on Ignition (%) **	8.0				--	--	10%
BTEX (µg/kg)#	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	180				500	--	--
Total PAH (WAC-17) (mg/kg)	5.47				100	--	--
pH (units)**	8.1				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	8.6				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0504			0.504	0.5	2	25
Barium *	0.0258			0.258	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0013			0.013	0.5	10	70
Copper *	0.012			0.12	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0030			0.0296	0.5	10	30
Nickel *	0.0017			0.017	0.4	10	40
Lead *	0.0037			0.037	0.5	10	50
Antimony *	0.0019			0.019	0.06	0.7	5
Selenium *	0.0047			0.047	0.1	0.5	7
Zinc *	0.013			0.13	4	50	200
Chloride *	1.3			13	800	15000	25000
Fluoride*	0.24			2.4	10	150	500
Sulphate *	39			390	1000	20000	50000
TDS*	91			910	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	10.3			103	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.80						
Dry Matter (%)	80						
Moisture (%)	20						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 23-55332
Project / Site name: 39 Deansgate, Manchester

* 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 *
2804829	HP03	None Supplied	0.5	Black sand with gravel.

Analytical Report Number : 23-55332
Project / Site name: 39 Deansgate, Manchester

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
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 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	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	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
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 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	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025

Analytical Report Number : 23-55332
Project / Site name: 39 Deansgate, Manchester

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
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	ISO 17025
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

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

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

BROWNFIELD SOLUTIONS LTD

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

QI35Y-5OPPV-Z9ZNY

Job name

C4293 39 Deansgate

Description/Comments

Project

C4293

Site

39 Deansgate, Manchester

Classified by

Name:
Jack Mather
Date:
26 Sep 2023 07:41 GMT
Telephone:
01606334844

Company:
Brownfield Solutions Limited
173-183 Witton Street
Northwich
CW9 5LP

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	09 Feb 2023

Next 3 year Refresher due by Feb 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

Deansgate, Manchester **Post Code** M3 2AY

SIC for the process giving rise to the waste

41100 Development of building projects

Description of industry/producer giving rise to the waste

The proposed development is for a commercial end use comprising a fourteen-storey steel framed building and basement car park.

Description of the specific process, sub-process and/or activity that created the waste

Waste created during the development of the substation (first phase of works).

Description of the waste

"Made ground comprising gravelly sands with varying amounts of ash as a minor constituent. Gravels consisted of brick, sandstone, mudstone, slag, metal and wood.
No superficial strata encountered during BSL site investigation."

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	HP01	0.20	Non Hazardous		3
2	HP03	0.50	Non Hazardous		5
3	TP01	0.20	Non Hazardous		7
4	TP03	1.00-1.10	Non Hazardous		9

Related documents

#	Name	Description
1	BSL Suite	waste stream template used to create this Job

Report

Created by: Jack Mather

Created date: 26 Sep 2023 07:41 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	11
Appendix B: Rationale for selection of metal species	12
Appendix C: Version	12

Classification of sample: HP01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
HP01
Sample Depth:
0.20 m
Moisture content:
12%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH			PH		11.1	pH		11.1	pH	11.1 pH		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		4.4	mg/kg	1.32	5.112	mg/kg	0.000511 %	✓	
3	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.2	mg/kg	1.285	0.226	mg/kg	0.0000176 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<**LOD**
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		6.7	mg/kg	1.462	8.617	mg/kg	0.000862 %	✓	
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		16	mg/kg	1.126	15.853	mg/kg	0.00159 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	13	mg/kg		11.44	mg/kg	0.00114 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<**LOD**
9	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		8.7	mg/kg	1.579	12.093	mg/kg	0.00121 %	✓	
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
11	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		44	mg/kg	1.245	48.195	mg/kg	0.00482 %	✓	
12	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
13	acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
14	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
16		phenanthrene				0.07	mg/kg		0.0616	mg/kg	0.00000616 %	✓	
			201-581-5	85-01-8									
17		anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-371-1	120-12-7									
18		fluoranthene				0.14	mg/kg		0.123	mg/kg	0.0000123 %	✓	
			205-912-4	206-44-0									
19		pyrene				0.14	mg/kg		0.123	mg/kg	0.0000123 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.08	mg/kg		0.0704	mg/kg	0.00000704 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.07	mg/kg		0.0616	mg/kg	0.00000616 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.09	mg/kg		0.0792	mg/kg	0.00000792 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				0.09	mg/kg		0.0792	mg/kg	0.00000792 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				0.05	mg/kg		0.044	mg/kg	0.0000044 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				0.05	mg/kg		0.044	mg/kg	0.0000044 %	✓	
			205-883-8	191-24-2									
										Total:	0.0107 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: HP03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
HP03
Sample Depth:
0.50 m
Moisture content:
20%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 20% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH			PH		8.8 pH		8.8 pH	8.8 pH		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		40 mg/kg	1.32	42.25 mg/kg	0.00423 %	✓	
3	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<**LOD**
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<**LOD**
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		25 mg/kg	1.462	29.231 mg/kg	0.00292 %	✓	
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		63 mg/kg	1.126	56.745 mg/kg	0.00567 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	53 mg/kg		42.4 mg/kg	0.00424 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		<**LOD**
9	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		42 mg/kg	1.579	53.071 mg/kg	0.00531 %	✓	
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<**LOD**
11	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		67 mg/kg	1.245	66.717 mg/kg	0.00667 %	✓	
12	naphthalene	601-052-00-2	202-049-5	91-20-3		0.45 mg/kg		0.36 mg/kg	0.000036 %	✓	
13	acenaphthylene		205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
14	acenaphthene		201-469-6	83-32-9		0.09 mg/kg		0.072 mg/kg	0.0000072 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15		fluorene				0.07	mg/kg		0.056	mg/kg	0.0000056 %	✓	
			201-695-5	86-73-7									
16		phenanthrene				0.64	mg/kg		0.512	mg/kg	0.0000512 %	✓	
			201-581-5	85-01-8									
17		anthracene				0.14	mg/kg		0.112	mg/kg	0.0000112 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				0.86	mg/kg		0.688	mg/kg	0.0000688 %	✓	
			205-912-4	206-44-0									
19		pyrene				0.87	mg/kg		0.696	mg/kg	0.0000696 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				0.47	mg/kg		0.376	mg/kg	0.0000376 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				0.47	mg/kg		0.376	mg/kg	0.0000376 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				0.52	mg/kg		0.416	mg/kg	0.0000416 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				0.23	mg/kg		0.184	mg/kg	0.0000184 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				0.42	mg/kg		0.336	mg/kg	0.0000336 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				0.23	mg/kg		0.184	mg/kg	0.0000184 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				0.26	mg/kg		0.208	mg/kg	0.0000208 %	✓	
			205-883-8	191-24-2									
28		TPH (C6 to C40) petroleum group				273	mg/kg		218.4	mg/kg	0.0218 %	✓	
				TPH									
29		benzene				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
30		toluene				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
31		ethylbenzene				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
32		xylene				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0518 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Concentration too low to be considered flammable. Low concentrations of short chain hydrocarbons. Discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0218%)

Classification of sample: TP01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP01
Sample Depth:
0.20 m
Moisture content:
13%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH			PH		9.8 pH		9.8 pH	9.8 pH		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		17 mg/kg	1.32	19.528 mg/kg	0.00195 %	✓	
3	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<LOD
4	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		27 mg/kg	1.462	34.332 mg/kg	0.00343 %	✓	
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		52 mg/kg	1.126	50.935 mg/kg	0.00509 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	60 mg/kg		52.2 mg/kg	0.00522 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		<LOD
9	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		38 mg/kg	1.579	52.218 mg/kg	0.00522 %	✓	
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
11	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		110 mg/kg	1.245	119.119 mg/kg	0.0119 %	✓	
12	naphthalene	601-052-00-2	202-049-5	91-20-3		0.57 mg/kg		0.496 mg/kg	0.0000496 %	✓	
13	acenaphthylene		205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
14	acenaphthene		201-469-6	83-32-9		4.3 mg/kg		3.741 mg/kg	0.000374 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15		fluorene				2.7	mg/kg		2.349	mg/kg	0.000235 %	✓	
			201-695-5	86-73-7									
16		phenanthrene				20	mg/kg		17.4	mg/kg	0.00174 %	✓	
			201-581-5	85-01-8									
17		anthracene				5	mg/kg		4.35	mg/kg	0.000435 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				23	mg/kg		20.01	mg/kg	0.002 %	✓	
			205-912-4	206-44-0									
19		pyrene				20	mg/kg		17.4	mg/kg	0.00174 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				9.9	mg/kg		8.613	mg/kg	0.000861 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				11	mg/kg		9.57	mg/kg	0.000957 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				12	mg/kg		10.44	mg/kg	0.00104 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				4.1	mg/kg		3.567	mg/kg	0.000357 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				8.7	mg/kg		7.569	mg/kg	0.000757 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				4.6	mg/kg		4.002	mg/kg	0.0004 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				1.5	mg/kg		1.305	mg/kg	0.000131 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				5.6	mg/kg		4.872	mg/kg	0.000487 %	✓	
			205-883-8	191-24-2									
										Total:	0.0448 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP03
Sample Depth:
1.00-1.10 m
Moisture content:
11%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#		Determinand EU CLP index number / EC Number / CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		pH PH		8.5 pH		8.5 pH	8.5 pH		
2		arsenic { arsenic trioxide } 033-003-00-0 / 215-481-4 / 1327-53-3		44 mg/kg	1.32	51.704 mg/kg	0.00517 %	✓	
3		cadmium { cadmium sulfide } 048-010-00-4 / 215-147-8 / 1306-23-6	1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<**LOD**
4		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0 / 215-607-8 / 1333-82-0		<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<**LOD**
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) } 215-160-9 / 1308-38-9		27 mg/kg	1.462	35.121 mg/kg	0.00351 %	✓	
6		copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		100 mg/kg	1.126	100.204 mg/kg	0.01 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex } 082-001-00-6	1	280 mg/kg		249.2 mg/kg	0.0249 %	✓	
8		mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		0.9 mg/kg	1.353	1.084 mg/kg	0.000108 %	✓	
9		nickel { nickel dihydroxide } 028-008-00-X / 235-008-5 [1] 234-348-1 [2] / 12054-48-7 [1] 11113-74-9 [2]		39 mg/kg	1.579	54.824 mg/kg	0.00548 %	✓	
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<**LOD**
11		zinc { zinc oxide } 030-013-00-7 / 215-222-5 / 1314-13-2		350 mg/kg	1.245	387.728 mg/kg	0.0388 %	✓	
12		naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		5.9 mg/kg		5.251 mg/kg	0.000525 %	✓	
13		acenaphthylene 205-917-1 / 208-96-8		6.1 mg/kg		5.429 mg/kg	0.000543 %	✓	
14		acenaphthene 201-469-6 / 83-32-9		58 mg/kg		51.62 mg/kg	0.00516 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15		fluorene				37	mg/kg		32.93	mg/kg	0.00329 %	✓	
			201-695-5	86-73-7									
16		phenanthrene				310	mg/kg		275.9	mg/kg	0.0276 %	✓	
			201-581-5	85-01-8									
17		anthracene				79	mg/kg		70.31	mg/kg	0.00703 %	✓	
			204-371-1	120-12-7									
18		fluoranthene				470	mg/kg		418.3	mg/kg	0.0418 %	✓	
			205-912-4	206-44-0									
19		pyrene				420	mg/kg		373.8	mg/kg	0.0374 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene				210	mg/kg		186.9	mg/kg	0.0187 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				220	mg/kg		195.8	mg/kg	0.0196 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				260	mg/kg		231.4	mg/kg	0.0231 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				95	mg/kg		84.55	mg/kg	0.00845 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				210	mg/kg		186.9	mg/kg	0.0187 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				110	mg/kg		97.9	mg/kg	0.00979 %	✓	
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				34	mg/kg		30.26	mg/kg	0.00303 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene				130	mg/kg		115.7	mg/kg	0.0116 %	✓	
			205-883-8	191-24-2									
28		asbestos				460	mg/kg		409.4	mg/kg	0.0409 %	✓	
		650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5									
										Total:	0.366 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

lead compounds with the exception of those specified elsewhere in this Annex

GB MCL index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Absence of hexavalent chromium indicates it unlikely that lead chromate is present within the site soils.

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on hazard statements

zinc {zinc oxide}

Absence of hexavalent chromium indicates it unlikely that zinc chromate is present within the site soils. Furthermore, the presence of ash and clinker suggests oxides of zinc will be present.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2023.265.5753.10619 (22 Sep 2023)
HazWasteOnline Database: 2023.265.5753.10619 (22 Sep 2023)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021

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