



Supplementary Geoenvironmental and Geotechnical Site Assessment

Crabtree Lane, Manchester
Former Walkers Site
Crabtree Lane
Manchester
M11 4GU

February 2024

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Executive Summary

TRC Companies Limited (TRC) was commissioned by Chancerygate Manchester Limited (the 'Client') to undertake a supplementary Tier 2 (formerly known as Phase II) Geoenvironmental and Geotechnical Site Assessment at Former Walkers Site, Crabtree Lane, Clayton, Manchester, M11 4GU (hereafter referred to as the 'Site'). During the initial Tier 2 Investigation asbestos was encountered in Made Ground and elevated levels of oxidisable sulphides were identified. This supplementary assessment was proposed in order to further assess these risks and determine the mitigation measures required to enable construction works. TRC also undertook a further three rounds of ground gas monitoring as part of the supplementary investigation.

This Executive Summary is part of the complete report; and findings, opinions or conclusions in this Executive Summary are made in context with the complete report. TRC recommends that the user reads the entire report for all supporting information related to findings opinions and conclusions.

Executive Summary	
Site Details	
Client	Chancerygate Manchester Limited
Site Address	Crabtree Lane, Manchester, Former Walkers Site, M11 4GU
Site Area	0.9 hectare (ha)
Proposed Development	The proposed development comprises three warehouse units; a large single unit in the east of the Site, Unit 5 (1,241m ²), and a further two structures in the north and south of the Site, each of which will house four adjoining warehouse units ranging in size from 372m ² to 757m ² . All units will have associated mezzanine floors, loading docks, parking and access roads.
Site Setting	
Current Site Use	The Site is currently an inactive plot of land, which comprises a series of adjoining warehouse buildings, formerly used as a print works.
Background	
Purpose and Scope	During previous exploratory works elevated levels of oxidisable sulphides and asbestos was identified at the Site. The purpose of this report is to delineate areas of asbestos to inform future construction works and to further assess the subsurface soils aggressiveness to concrete. The investigation works were focused on one area of the Site where aggressive soils were identified and two areas where asbestos was previously identified. Three further rounds of gas monitoring were also undertaken to confirm the gassing regime.
Investigation Findings	
Ground Conditions	Surfacing materials were encountered between surface level and 0.60m bgl, recording a maximum thickness of 0.6-m. Made Ground was encountered between surface level and >2.10m bgl. The base of the unit was not encountered.
Groundwater Conditions	Groundwater was not encountered during the investigation. During subsequent monitoring resting levels of between 1.98m and 6.28m bgl were recorded.
Buried Concrete Assessment	
Buried Concrete	Overall, with reference to the BRE Digest SD1 (2005), assuming brownfield and mobile conditions and considering the results of soil samples, a design sulphate class for location of DS-5 and an ACEC class for location of AC-5 is appropriate for Made Ground, and DS-1 and AC-1 is appropriate for Till. Should the Till be exposed to surface conditions then an increase in design sulphate class for location to DS-4 and an ACEC class for location of AC-4 would be required. Further details of the buried concrete assessment are discussed in Section 5.2.
Contaminated Land Assessment	
Asbestos in Soil	Asbestos fibres were identified within ten samples of Made Ground at eight

Executive Summary	
	locations (TP305 – TP312). Asbestos quantification was undertaken on these samples and identified concentrations of between <0.001% and 0.095%. The asbestos identified in the samples tested is considered to pose a low risk to future site users as the Site will be predominantly covered in buildings or hardstanding which will act as a barrier between asbestos in soils and future site users. However, there is a moderate risk to construction workers through inhalation during the construction phase.
Ground Gas	Gas monitoring indicates that the Site would be classified as Characteristic Situation 1 (very low risk) and no gas protection measures would be required as part of the proposed development.
Recommendations	
Due to the presence of asbestos within soils above 0.001%, any works which have the potential to disturb asbestos must be carried out under a Plan of Work in accordance with Control of Asbestos Regulations 2012 (CAR2012). TRC recommends that an asbestos in soils management plan is produced to assess the risks associated with working with asbestos contaminated soils during the construction phase, identify the Health and Safety Executive's (HSE) licensing regime in relation to the proposed works on site, and identify suitable control measures which should be in place to manage risks from asbestos. A remediation strategy and verification plan is likely to be required by the local planning authority. Materials destined for off-site disposal to landfill may require further assessment in accordance with WM3 'Guidance on the classification and assessment of waste' (1st edition version 1.2 GB 2021) to determine their waste classification. If materials are to be re-used on site or imported from another development site, a materials management plan may be required in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice in order to demonstrate that the material is not a waste. From current ground investigation findings it is recommended all buried services should be run in corridors of clean soil, and that the selection of appropriate water supply pipework should be confirmed by the local water supply company. However, due to this supplementary investigation comprising machine dug trial pits, it was not possible to obtain further samples from within the footprint of the existing building. As samples with elevated levels of oxidisable sulphides within Made Ground (TP301, TP302, BH202, and BH203) are confined to the western portion of the Site. It may be possible to zone the site subject to further testing at locations within the footprint of the existing building, post demolition when access is possible. Should further delineation works confirm the high risk areas to be confined to the far western portion of the Site, a reduction in concrete classes to DS-3 and AC-4 would likely be achievable for concrete within Made Ground at other areas of the Site.	

1.0 Introduction

1.1 Appointment and Purpose

TRC Companies Limited (TRC) was commissioned by Chancerygate Manchester Limited (the 'Client') to undertake a supplementary Tier 2 (formerly known as phase II) Geoenvironmental and Geotechnical Site Assessment at Former Walkers Site, Crabtree Lane, Clayton, Manchester, M11 4GU (hereafter referred to as the 'Site').

A Site location plan is presented as Figure 1 in Annex A.

During previous exploratory works, asbestos was identified in soils at the Site. The purpose of this supplementary Tier 2 report is to delineate areas of asbestos in soil, in order to inform future construction works. Further testing of soils at the Site will also be carried out for geotechnical purposes to further assess the subsurface soils aggressiveness to concrete, as aggressive soils were identified during previous exploratory works. Finally, additional ground gas monitoring will be undertaken to increase the amount of ground gas data available for the Site and inform any potential ground gas mitigation measures required at the Site.

This report should be read in conjunction with the following previously issued reports:

- Phase 1 Environmental Due Diligence Report, Report Number 01A704444, March 2007, GVA Grimley LLP
- Report on a Geo-Environmental Investigation at Crabtree Lane, Clayton, Manchester, M11 4GU, Report Number J2314/12/E, January 2013, Rogers Geotechnical Services LTD (RGS LTD)
- TRC, report ref: 546629.0000.0000; Desk Based Geo-environmental and Geotechnical Site Assessment, July 2023
- TRC, report ref: 546629.0001.0000; Intrusive Geoenvironmental and Geotechnical Site Assessment, July 2023

It is expected that this report will support the Client with the design of the redevelopment works for a proposed commercial land use, as discussed in detail in the following Section.

1.2 Proposed Development

The proposed development will comprise three warehouses; a large single warehouse in the east of the Site (1,241m²), and a further two structures in the north and south of the Site, each of which will house four adjoining warehouse units ranging in size from 372m² to 757m². All units will have associated mezzanine floors, loading docks, parking and access roads.

A proposed development plan is presented as Figure 2 in Annex A.

1.3 Available Information & Standards

This report is based on the following information:

- Historical uses of the Site and surroundings;
- Current use and condition of the Site;
- Environmental setting in terms of geology, hydrogeology, hydrology and surrounding land uses;
- Relevant publicly available environmental records;
- Previous reports for the Site; and,
- Intrusive investigation including geoenvironmental and geotechnical sampling and testing.

This report was conducted with due regard to the following guidance and standards:

- The National Planning Policy Framework;

- BS5930:2015 (+A1:2020) Code of Practice for Ground Investigations;
- BS EN 1997 Eurocode 7;
- BS8485:2015 (+A1:2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings;
- BS8576:2013 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs);
- BS10175:2011 (+A2:2017) Investigation of Potentially Contaminated Sites – Code of Practice; and,
- Land Contamination: Risk Management (LCRM) 2020;

1.4 Significant Assumptions

This report presents TRC's observations, findings, and conclusions as they existed on the date that this report was issued. This report is subject to modification if TRC becomes aware of additional information after the date of issue of this report that is material to its findings and conclusions.

The reliability of information provided by others to TRC cannot be guaranteed to be accurate or complete. Performance of this supplementary Tier 2 Geoenvironmental and Geotechnical Site Assessment is intended to reduce, but not eliminate, uncertainty of geo-environmental and geotechnical conditions associated with the subject site; therefore, the findings and conclusions made in this report should not be construed to warrant or guarantee the subject site, or express or imply, including without limitation, warranties as to its marketability for a particular use. TRC found no reason to question the validity of information received unless explicitly noted elsewhere in this report.

1.5 User Reliance

This report was prepared for Chancerygate Manchester Limited. Reliance on this report by any other third party is subject to requesting and fully executing a reliance letter between TRC and the third party that acknowledges the TRC Standard Terms and Conditions with the Client, to the same extent as if they were the Client thereunder.

TRC has been provided with information from third parties for information purposes only and without representation or warranty, express or implied as to its accuracy or completeness and without any liability on such third parties part to revise or update the information. Where reliance has been provided by third parties to potential purchasers this is noted in our report.

2.0 The Site

2.1 Location

The Site comprises an approximate 0.9 ha plot of land located on the eastern side of Crabtree Lane, Manchester, centred on National Grid Reference E388756, N398228, approximately 3 miles from Manchester City Centre.

A Site location plan is presented as Figure 1 in Annex A.

2.2 Site Description

The Site is located within an area of predominantly commercial land use.

The Site is located to the east of Crabtree Lane and until recently the Site was occupied by a printworks, which has now been vacated, therefore, the Site is no longer operational. The buildings on Site comprised a relatively modern steel framed warehouse at the south of the Site and four older, brick-built warehouse buildings to the north, all of which are adjoining. A separate building, which appeared to be made from corrugated tin is present at the southeast corner of the Site.

An area of asphalt and concrete hardstanding is present at the west of the Site, with car parking spaces marked out. There is a roadway that occupies the land directly south of the southernmost warehouse, this provides access to the rear of the warehouse buildings, from the Site entrance and car parking spaces.

The Site has an average elevation of approximately 83.5m above Ordnance Datum (aOD). Topographically the Site is generally level however, there is a slight gentle slope downwards from the buildings to Crabtree Lane.

A full summary of the Site's environmental setting is presented in TRC's Tier 1 and Tier 2 reports (issued July 2023).

3.0 Ground Investigation

3.1 Scheduled Scope of Works

The scheduled TRC Tier 2 investigation scope of works comprised the following:

- 14 trial pits (TP301 – TP314) to a maximum depth of 2.5 m;
- In-situ logging, ground sampling and testing;
- Field screening for contamination using a Photo-Ionisation Detector (PID); and,
- Field monitoring of bulk ground gases and groundwater levels on three occasions.

3.2 Investigation Rationale

The ground investigation was designed by TRC on behalf of the Client to gather information on the geoenvironmental and geotechnical ground, groundwater and ground-borne gas conditions at the Site.

The TRC investigation aimed to target areas where asbestos had previously been identified, as well as the area where soils aggressive to concrete were encountered previously. Additional locations were added to give general coverage of the Site.

Table 3.1: Summary of Exploratory Hole Locations

Exploratory Hole	Location
TP301 – TP303	Located in the north-west of the Site close to existing BH203 where soils aggressive to concrete were previously identified
TP304 – TP306	Located in the south-western corner of the Site close to existing BH102 where asbestos was previously identified
TP307 & TP308	Located in the south-east of the Site outside the existing warehouse close to existing WS108 where asbestos was previously identified
TP309 – TP312	Located in the south-east of the Site inside the existing warehouse close to existing WS108 where asbestos was previously identified
TP313	Located in the central-east of the Site for general coverage
TP314	Located in the east of the Site for general coverage

3.3 Investigation Methodology

3.3.1 Ground Investigation

The TRC supplementary Tier 2 investigation was conducted at the Site on 28th and 29th November 2023.

TRC commissioned H&C Plant Hire (plant contractor) to undertake the trial pitting at the Site. Each exploratory hole was advanced using a JCB 3CX. The works were overseen by a TRC engineer who performed field assessment and logging of the exploratory holes.

The works included the following key actions:

- Review of available underground services plans for the Site;
- Each of the proposed exploratory hole locations was cleared using a Cable Avoidance Tool (CAT) and ground penetrating radar (GPR) by an independent utilities surveyor;
- Excavation was performed at each location by the plant contractor;
- A UXO Engineer supported the safe completion of the exploratory holes by use of a magnetometer ahead of excavations.
- On-site ground logging, testing, and assessment of potential indicators of contamination;

- Field screening using a PID;
- Collection of soil samples for environmental and geotechnical laboratory analysis;
- All trial pits backfilled with arisings; and,
- Surveying of the exploratory holes final locations.

The following alterations to exploratory hole depths and positions were made during the course of the ground investigation:

- TP303 was not able to be excavated due to the presence of buried services.
- TP304 and TP306 were converted into a trench due to their close proximity. Samples were taken from either end of the trench and labelled TP304 (east end) and TP306 (west end).
- TP305, TP309, TP310 and TP311 were terminated at depths of between 1.0m and 1.70m due to the presence of the surface concrete limiting the reach of the excavator.

The exploratory hole location plan for the ground investigation undertaken, is presented as Figure 3 in Annex A.

Photographs taken during the investigation are presented in Annex B. The exploratory hole logs are presented in Annex C and include the in-situ sampling and testing undertaken at the Site.

3.3.2 Groundwater and Ground Gas Monitoring

Groundwater and ground gas monitoring was conducted by a TRC technician on three occasions. The dates of the monitoring visits were 29th November and 6th and 13th December 2023. The wells monitored are part of an existing well network at the Site which were installed by TRC in July 2023. These wells are WS101, WS104, WS106, WS108 and BH102.

During each visit, groundwater elevation and potential presence of any free phase oils was measured using an oil/water interface probe. Gas monitoring was undertaken using a portable gas analyser at each monitoring well head. The field assessment gathered data relating to the concentrations of permanent ground gases (e.g. methane, carbon dioxide, carbon monoxide and oxygen).

3.4 Geotechnical Laboratory Testing

Laboratory testing was undertaken for geotechnical purposes.

The geotechnical laboratory testing is summarised in the table below.

Table 3.4: Laboratory Tests (Geotechnical)

Test Type and Standard (BS 1377 unless stated differently)	Number
Water soluble sulphate (BRE SD1 2005)	15
Soil pH (BRE SD1 2005)	15
Total sulphur content (BRE SD1 2005)	15
Acid soluble sulphate content (BRE SD1 2005)	15
Water soluble nitrate content (BRE SD1 2005)	15
Water soluble chloride content (BRE SD1 2005)	15
Water soluble nitrate content (BRE SD1 2005)	15

it is necessary to consider the limitations associated with any laboratory testing and to review any potentially anomalous results. In all geotechnical tests the specimen is selected from a much larger volume of material which may have an inherent degree of variability, particularly in Made Ground.

The full set of laboratory geotechnical results is presented in Annex E.

3.5 Environmental Laboratory Analysis

A total of 13 soil samples were collected for environmental analysis during the investigation works. All soil samples were packed in laboratory provided containers and delivered to i2 Analytical (i2) Ltd for chemical analysis.

All soil samples were collected in order to provide environmental data on the quality of near surface and shallow soils beneath the Site. Representative samples of Made Ground / Fill were collected where feasible. The analytical suite of soils included the following parameters:

- Asbestos identification
- Asbestos quantification (if identified)

The full set of chemical results are presented in Annex E.

4.0 Ground Conditions

4.1 Ground Profile

The table below presents a summary of the ground conditions encountered by TRC during the current site investigation. For full details the reader should refer to the exploratory hole logs appended in Annex C.

Table 4.1: Ground Profile

Stratum	From		To		Thickness (m)
	m bgl	m aOD ¹	m bgl	m aOD ¹	
Made Ground (Surfacing Materials)	0.00	84.00	0.60	83.40	0.60
Made Ground	0.00	84.00	> 2.10	81.90	> 2.10

1. Assuming a ground level of 84.00m aOD across the site.

The previous investigation recorded locally cohesive deposits of Made Ground to a maximum recorded depth of 4.20m, underlain by cohesive and granular deposits of Till, encountered to the base of all exploratory holes, and a maximum depth of 15.45m bgl. The base of Till was not confirmed during the investigation and bedrock geology was not encountered.

The ground conditions encountered correspond with the publicly available records of ground conditions published by the British Geological Survey (BGS) and reported in previous reports for the Site. Published BGS borehole records within/near the Site area found similar results.

4.2 Made Ground

Made Ground was encountered within all trial pits excavated at the Site from surface level to a maximum depth of 2.10m bgl.

The Made Ground was heterogeneous in nature but generally comprised of either dark brown clayey sandy gravel or clayey gravelly sand. TP313 and TP314 in the east of the Site encountered dark brown slightly sandy very gravelly clay. Sand was fine to coarse grained. Gravel was angular to rounded, fine to coarse grained and generally comprised of brick and concrete. There was a high cobble and boulder content of brick and concrete across the majority of trial pits. Pieces of metal, wood and glass were observed in multiple trial pits across the Site.

Made ground was locally mantled by bituminous surfacing and sandstone paving blocks (TP301 & TP302 up to a maximum depth of 0.50mbgl), concrete hardstanding and subbase (TP304 to TP312 to a maximum depth of 0.60mbgl). No surfacing materials were present at locations TP313 or TP314.

4.3 Groundwater

During the previous and subsequent ground investigations, groundwater was not encountered during drilling.

During both rounds of monitoring, groundwater was typically encountered at between 1.87m (82.13m aOD) and 6.48m bgl (77.52m aOD) within Made Ground and Till.

The groundwater monitoring data are presented in Annex D.

Groundwater may be subject to seasonal variations especially after periods of prolonged rain or drought.

4.4 Visual and Olfactory Evidence of Contamination

Visual and olfactory evidence of contamination was encountered during the ground investigation, as detailed in Table 4.3 below.

It must be noted that visible fragments of suspected asbestos were observed during the investigation.

Table 4.3: Evidence of Contamination

Exploratory Hole	Depth (m bgl)	Stratum	Contamination
TP301	0.50 – 2.00	Made Ground	Strong organic odour
TP302	0.25 – 2.00	Made Ground	Organic odour
TP307	0.60 – 2.00	Made Ground	Frequent pieces of metal
TP308	0.60 – 1.90	Made Ground	Frequent pieces of metal
TP310	0.60 – 1.00	Made Ground	Frequent pieces of glass and clinker
TP314	0.20 – 1.90	Made Ground	Organic odour

5.0 Buried Concrete Assessment

29 No. soil samples comprising 21 No. Made Ground samples and eight from the Till (both phases of Ground Investigation; June 2023, and November 2023), were subjected to pH and water soluble sulphate determinations to identify variations in sulphate content both laterally and vertically across the Site.

The characteristic value of water soluble sulphate was 1503 mg/l for Made Ground, and 480 mg/l for Till. With reference to the BRE Digest SD1 (2005), the results on soil samples indicate a design sulphate classification of DS-3 is appropriate for Made Ground and DS-1 for Till.

20 No. soil samples, 15 No. Made Ground from the current investigation, 2 No. Made Ground and 3no. Till samples from the previous investigation were subjected to total sulphur and acid soluble sulphate content testing to allow an assessment to be made in relation to the potential thaumasite form of concrete attack. Six of the oxidisable sulphides values calculated for Made Ground (0.43% - 4.26%) and two for Till (0.43% - 1.32%) were in excess of 0.3%. Consequently, the results are considered indicative of significant risk from this form of concrete attack.

In accordance with BRE Digest SD1 (2005), given the size of the data set for the Made Ground, it was possible to calculate a characteristic value for total potential sulphate (TPS) as the mean of the highest 20% of results. This yielded a characteristic TPS value for Made Ground of 9.57%. The characteristic TPS value for Till was 1.5%. A modification to DS class is therefore proposed to DS-5 for Made Ground and DS-4 for Till, should the latter be exposed to surface conditions. However with reference to BRE Digest SD1 (2005), as the characteristic water soluble sulphate values for the strata do not indicate a design sulphate class in excess of DS-3, it is possible to limit DS-Class to DS-4.

The characteristic value of pH, considering the results from both investigations, was 5.7 for Made Ground, and 6.8 for Till.

Overall, with reference to the BRE Digest SD1 (2005), assuming brownfield and mobile conditions and considering the results of soil samples, a design sulphate class for location of DS-5 and an ACEC class for location of AC-5 is appropriate for Made Ground, and DS-1 and AC-1 is appropriate for Till. Should the Till be exposed to surface conditions then an increase in design sulphate class for location to DS-4 and an ACEC class for location of AC-4 would be required.

It should be noted the samples with elevated levels of oxidisable sulphides within Made Ground (TP301, TP302, BH202, and BH203) are confined to the western portion of the site. Therefore, it may be possible to zone the site subject to further testing at locations within the footprint of the existing building, post demolition when access is possible. Should further delineation works confirm the high risk areas to be confined to the far western portion of the Site, a reduction in classes to DS-3 and AC-4 would likely be achievable for concrete within Made Ground at other areas of the Site. In addition, as the characteristic water soluble sulphate values for the strata do not indicate a design sulphate class in excess of DS-3, it may possible to limit DS-Class to DS-4. In order to confirm a limit to DS-4 is applicable at the site, groundwater samples would need to be obtained during future SI and tested for Sulphate content. if the groundwater results do not indicate a class in excess of DS-3 is required, then a limit of DS-4 would be appropriate for the Site.

6.0 Human Health Risk Assessment

6.1 Soil Assessment

During previous exploratory works, asbestos was identified within Made Ground at the Site. The purpose of this supplementary Tier 2 report is to delineate areas of asbestos in order to inform future construction works. 13 soil samples from the Site were collected and sent for asbestos identification and quantification (if identified).

6.2 Asbestos

During the initial investigation, asbestos fibrous debris with quantification above 0.001% was detected within Made Ground at two locations (BH102 and WS108). Asbestos fibres in soil were encountered within ten samples encompassing BH102 and WS108 as part of this supplementary assessment. Details of the analysis are presented in the table below. No visible fragments of suspected asbestos were observed during the investigation.

Table 6.1: Asbestos Identification

Exploratory Hole	Depth (m bgl)	Type	Material	Quantification (%)
BH102	0.80	Chrysotile & Crocidolite	Loose Fibrous Debris	8.33
WS108	1.60	Chrysotile & Amosite	Loose Fibrous Debris	0.031
TP305	1.0	Chrysotile & Crocidolite	Loose Fibrous Debris	0.095
TP306	2.0	Chrysotile	Loose Fibrous Debris	0.002
TP307	1.40	Chrysotile	Loose Fibres	< 0.001
TP308	1.70	Amosite	Loose Fibrous Debris	0.003
TP308	0.80	Chrysotile	Loose Fibres	0.003
TP309	1.0	Chrysotile & Amosite	Loose Fibrous Debris	0.002
TP309	1.10	Chrysotile & Amosite	Loose Fibres & Loose Fibrous Debris	0.006
TP310	0.80	Chrysotile & Amosite	Loose Fibres & Loose Fibrous Debris	0.07
TP311	1.60	Chrysotile & Amosite	Loose Fibres	< 0.001
TP312	1.20	Amosite	Loose Fibres	< 0.001

The full set of analysis results from the supplementary investigation are presented in Annex E. The asbestos analysis results from the initial investigation for BH102 and WS108 are presented in TRC's Tier 2 report (issued July 2023). A figure showing the locations of asbestos detects is presented as Figure 5 in Annex A.

6.3 Discussion

The asbestos identified in the samples is considered to pose a low risk to future site users as the Site will be predominantly covered in hardstanding, which will act as a barrier between asbestos in soils and future site users. However, there is a moderate risk to construction workers through inhalation during the construction phase. The Site is also expected to undergo a cut and fill operation which will involve the excavation and transportation of soils, increasing the potential of disturbing asbestos in soils.

Due to the presence of asbestos within soils above 0.001%, any works which have the potential to disturb asbestos must be carried out under a Plan of Work in accordance with Control of Asbestos Regulations 2012 (CAR2012). It is generally accepted that soils containing certain amounts of asbestos can be reused, dependent on the nature of the development and where they are proposed to be re-used and placed on Site. An asbestos in soils management plan should be produced to assess the risks posed to construction workers and any other identified receptors from the asbestos containing materials present in the soils on site. The assessment will

confirm the risk ranking of work activities and licensing status as well as identifying appropriate control measures which should be adopted and incorporated into a Plan or Works which is to be prepared by the contractor.

Further guidance on managing risks from asbestos in soil can be found in the following guidance documents:

- CIRIA (2014). Asbestos in soil and made ground: a guide to understanding and managing risks. CIRIA C733
- CL:AIRE (2016) CAR-SOILTM Control of Asbestos Regulations 2012 Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry Guidance.
- CIRIA (2017) Asbestos in soil and made ground good practice site guide. CIRIA C765.

7.0 Ground Gas Risk Assessment

A preliminary ground gas risk assessment has been undertaken in accordance with British Standard BS 8485:2015+A1:2019 to assess the impact of permanent ground gases upon the proposed development. The data obtained during this scope of works has been combined with data from the previous monitoring period at the Site to provide a comprehensive overview of the ground gas regime.

7.1 Ground Gas Assessment

Field monitoring for permanent ground gases was performed at five monitoring well locations on three occasions on the 29th November and 6th and 13th December 2023 as part of this scope of works. Ground gas monitoring was performed within the same five monitoring wells on four occasions on 7th, 13th and 27th June and 4th July 2023 as part of the previous scope of works. The maximum concentrations recorded across both sets of monitoring are summarised in the table below. The complete set of June/July data is presented in TRC's Tier 2 report (issued July 2023), and the November/December data is presented in this report in Annex D.

Table 7.1: Summary of Gas Monitoring Results

Location	Maximum Methane Concentration (%v/v)	Maximum Carbon Dioxide Concentration (%v/v)	Minimum Oxygen Concentration (%v/v)	Maximum Flow Rate (l/hr)
BH102	0.2	3.1	14.7	0.6
WS101	<0.1	4.4	15.4	0.1
WS104	0.1	8.8	10.7	0.3
WS106	0.1	4.4	16.7	0.6
WS108	<0.1	3.4	17.6	0.3

Methane was detected at low concentrations within BH102, WS104 and WS106. During the seven monitoring visits methane was detected three times with a maximum concentration of 0.2%.

Carbon dioxide was detected in all monitoring wells with concentrations ranging from 2.1% to 8.8%. The only location where carbon dioxide levels exceeded 5% was WS104. The levels at WS104 decreased during each monitoring visit, decreasing from 8.8% to 4.7%. No carbon dioxide was detected within any of the wells during the final monitoring round.

Minimum oxygen concentrations ranged from 17.6% to 10.7%. The lowest values recorded were in WS104, where elevated levels of carbon dioxide were identified. Depleted oxygen concentrations were generally confined to the location of WS104.

Flow rates at the Site varied over the monitoring period. Each borehole sporadically produced flow rates of between 0.1l/hr and 0.6l/hr. These flow rates are considered to be low.

Barometric pressure ranged between 1005 – 1015 mbar for the seven monitoring rounds and monitoring visits were undertaken during periods of rising and falling atmospheric pressure.

TRC has assessed the permanent ground gas concentrations in accordance with current guidance (BS8485:2015). Based on the results, a gas screening value (GSV) of 0.0528 l/hr was calculated for methane and carbon dioxide, which would classify the Site as Characteristic Situation 1 (very low risk). The GSV calculation is presented in Annex D.

It has previously been reported that, due to the carbon dioxide concentrations exceeding 5% in WS104, consideration should be given to increasing the risk classification to Characteristic Situation 2 (low risk). This

would mean that ground gas protection are required to be incorporated into future development proposals. However, three further rounds of gas monitoring have been carried out which show carbon dioxide concentrations decreasing within WS104 and negligible flow at the Site. This additional data provides evidence that gas risk at the Site is very low and should be classified as CS1, therefore no ground gas protection measures are recommended for future proposed developments. It should also be considered that the scheme is of low sensitivity and concentrations only marginally exceeded 5% at one location.

8.0 Contaminated Land Risk Assessment

The methodology of this risk assessment uses the source-pathway-receptor pollutant linkage to provide a qualitative appraisal of environmental risks and potential liabilities associated with soil and groundwater contamination at the Site. The conceptual site model (CSM) has been prepared considering the proposed end use as light industrial/commercial use.

8.1 Sources of Contamination

The ground investigation performed at the Site by TRC identified the following sources of contamination:

- Asbestos fibres in Made Ground soils in TP305 – TP312
- Carbon dioxide ground gas in WS104

8.2 Pathways

Based on the information presented in this report the following potentially active pathways have been identified. Consider both construction phase and operational phase.

- Dermal contact or ingestion with soil and groundwater
- Inhalation of soil dust or respirable fibres of asbestos
- Migration of ground gas/organic vapour and ingress into buildings

8.3 Receptors

Based on the information presented in this report the following receptors have been identified.

- Future site users could come into contact with ground gas in indoor air
- Neighbouring site users could come into contact with soil dust during construction works
- Construction and maintenance workers could be exposed to contamination during groundworks and future maintenance works
- Construction materials could come into contact with contamination in the ground

8.4 Revised Conceptual Site Model

The following CSM has been prepared to take into consideration the findings from the intrusive investigation.

Table 8.1: Revised Conceptual Site Model

Source	Pathway	Receptor	Risk
Asbestos identified in Made Ground at two locations (BH102 and WS108) during initial investigation, and at an additional eight locations (TP305 – TP312) during supplementary investigation	Dermal contact, ingestion and inhalation pathways	Future site users	Low The proposed development will be covered by buildings or hardstanding which will act as a physical barrier between the contamination and future site users.
		Neighbouring site users	Low Neighbouring site users could be exposed to contaminated soil dust and/or respirable fibres of asbestos, particularly during the construction phase. Mitigation measures could include construction site management solutions such as dust control.

Source	Pathway	Receptor	Risk
		Construction and maintenance workers	Moderate Any works which may disturb asbestos must be undertaken in accordance with the Control of Asbestos Regulations (CAR) 2012 and a Plan of Work will be required to manage risks from asbestos.
Carbon dioxide concentrations above 5% in WS104.	Migration of ground gases within granular strata and ingress into buildings/confined spaces	Future site users	Low The Site is classified as CS1 (very low risk), as although carbon dioxide concentrations have been recorded above 5% in WS104, concentrations have been observed to be decreasing over time, and flow rates at the Site are very low.
		Construction workers	Low Pathway to be managed through good construction practices and mitigation of risks when working in confined spaces.

9.0 Summary and Conclusions

9.1 Findings

The Site comprises an approximate 0.9 ha plot of land located on the eastern side of Crabtree Lane, Manchester. The Site was previously occupied by a printworks and comprises of a steel framed warehouse at the south of the Site and four brick warehouse buildings to the north, all of which are adjoining. A separate building of corrugated tin construction is present at the southeast corner of the Site.

Ground conditions encountered at the Site as part of this phase of supplementary investigation comprised of surfacing materials underlain by Made Ground. Surfacing materials were variable and comprised of either bituminous surfacing, concrete with rebar, or crushed aggregate to a maximum depth of 0.60m bgl. The Made Ground was heterogeneous in nature but generally comprised of either dark brown clayey sandy gravel or clayey gravelly sand. TP313 and TP314 in the east of the Site encountered dark brown slightly sandy very gravelly clay. Groundwater was not encountered during the investigation.

Asbestos fibres in soil were encountered within ten samples analysed in the Made Ground. Chrysotile, crocidolite and amosite were observed as loose fibres or loose fibrous debris. Quantification of the asbestos ranged from <0.001% to 0.095%.

An additional three rounds of ground gas monitoring were carried out at the Site, bringing the total to seven rounds. A GSV of 0.0528 l/hr was calculated for methane and carbon dioxide, classifying the Site as Characteristic Situation 1 (very low risk).

9.2 Summary of Buried Concrete Assessment

Overall, considering the results of the current and previous investigation, with reference to the BRE Digest SD1 (2005), assuming brownfield and mobile conditions and considering the results of soil samples, a design sulphate class for location of DS-5 and an ACEC class for location of AC-5 is appropriate for Made Ground, and DS-1 and AC-1 is appropriate for Till. Should the Till be exposed to surface conditions then an increase in design sulphate class for location to DS-4 and an ACEC class for location of AC-4 would be required.

It should be noted the samples with elevated levels of oxidisable sulphides within Made Ground (TP301, TP302, BH202, and BH203) are confined to the western portion of the site. Therefore, it may be possible to zone the site subject to further testing at locations within the footprint of the existing building, post demolition when access is possible. Should further delineation works confirm the high risk areas to be confined to the far western portion of the Site, a reduction in classes to DS-3 and AC-4 would likely be achievable for concrete within Made Ground at other areas of the Site.

In addition, as the characteristic water soluble sulphate values for the strata do not indicate a design sulphate class in excess of DS-3, it may possible to limit DS-Class to DS-4. In order to confirm a limit to DS-4 is applicable at the Site, groundwater samples would need to be obtained during future SI and tested for Sulphate content. if the groundwater results do not indicate a class in excess of DS-3 is required, then a limit of DS-4 would be appropriate for the Site.

9.3 Asbestos in Soil

Asbestos fibres were identified within ten samples of Made Ground at eight locations (TP305 – TP312) as part of this supplementary assessment and the two locations (BH102 and WS108) around which these exploratory holes were targeted as part of the original ground investigation. Asbestos quantification was undertaken on both the initial and supplementary samples and identified concentrations of between <0.001% and 8.33%. The asbestos identified in the samples tested is considered to pose a low risk to future site users as the Site will be predominantly covered in buildings or hardstanding. However, asbestos in soil is considered as a risk to future construction workers if not adequately addressed.

Due to the presence of asbestos within soils above 0.001%, any works which have the potential to disturb asbestos must be carried out under a Plan of Work in accordance with Control of Asbestos Regulations 2012 (CAR2012). TRC recommends that an asbestos in soils management plan is produced to assess the risks associated with working with asbestos contaminated soils during the construction phase, identify the Health and Safety Executive's (HSE) licensing regime in relation to the proposed works on site, and identify suitable control measures which should be in place to manage risks from asbestos.

9.4 Ground Gas

Based on the results of this assessment the Site would be classified as Characteristic Situation 1 and no ground gas protection measures would be required for the proposed development. Although carbon dioxide concentrations have been recorded above 5% in WS104, concentrations have been observed to be decreasing over time, and flow rates at the Site are very low, meaning ground gas risk remains very low.

9.5 Remediation and Mitigation Measures

Based on the results of the results of the generic risk assessments undertaken remediation is not considered necessary. However, the following mitigation measures will be necessary to protect construction and future maintenance workers.

- Any works which have the potential to disturb asbestos must be undertaken in accordance with CAR 2012 and a Plan of Work will be required. An asbestos in soils management plan should be prepared to further assess risks associated with the asbestos in soils identified.
- All buried services should be run in corridors of clean soil.

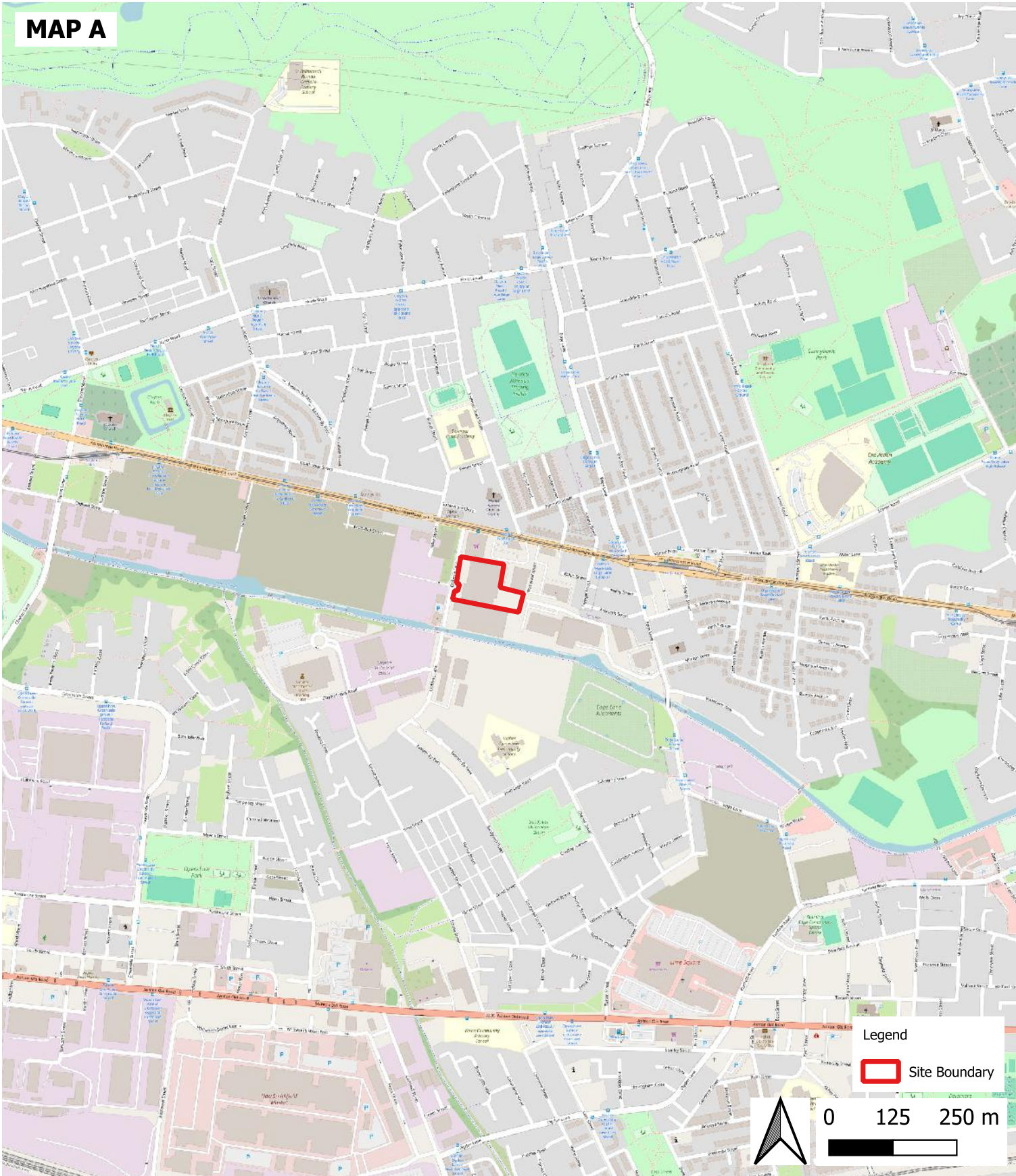
The selection of appropriate water supply pipework should be confirmed by the local water supply company.

A remediation strategy and verification plan is likely to be required by the local planning authority.

Materials destined for off-site disposal to landfill may require further assessment in accordance with WM3 'Guidance on the classification and assessment of waste' (1st edition version 1.2 GB 2021) to determine their waste classification.

If materials are to be re-used on site or imported from another development site, a materials management plan may be required in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice in order to demonstrate that the material is not a waste.

Annex A: Figures



NOTES	COPYRIGHT NOTES				REVISIONS		 Arkwright House Manchester M3 2LF		TITLE	
	Google imagery June 2018 © OpenStreetMap contributors- data is available under the Open Database License. Cartography licensed as CC BY-SA.								SITE LOCATION PLAN	
					TRC PROJECT NO.	SCALE				
					546629	MAP A - 1:10,000 @ A3 MAP B - 1:750 @ A3				
					P01	FIRST ISSUE			CLIENT CHANCERYGATE MANCHESTER LIMITED	
Initials	NJ	NJ	31/01/24							
REV.	REVISION NOTES/COMMENTS				PROJECT CRABTREE LANE, MANCHESTER		DRAWING NO 546629.0004.FIG01	REVISION PO1		
	Initials									



NOTES	COPYRIGHT NOTES Google imagery June 2018				REVISIONS				 Arkwright House Manchester M3 2LF			TITLE EXPLORATORY HOLE LOCATION PLAN	
												TRC PROJECT NO. 546629	SCALE 1:500 @ A3
									PROJECT CHANCERYGATE MANCHESTER LIMITED			PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS FINAL
									PROJECT CRABTREE LANE, MANCHESTER			DRAWING NO 546629.0004.FIG03	REVISION PO1

P01	FIRST ISSUE			
	Initials	NJ	NJ	31/01/23
REV.	REVISION NOTES/COMMENTS			
	Initials			



NOTES	COPYRIGHT NOTES Google imagery June 2018				REVISIONS				 Arkwright House Manchester M3 2LF		TITLE MONITORING WELL LOCATION PLAN					
											TRC PROJECT NO. 546629		SCALE 1:500 @ A3			
					P01		FIRST ISSUE				CLIENT CHANCERYGATE MANCHESTER LIMITED		PURPOSE OF ISSUE		STATUS	
							Initials		NJ				NJ		01/12/23	
									REV.		REVISION NOTES/COMMENTS				PROJECT CRABTREE LANE, MANCHESTER	
Initials													546629.0004.FIG04			



TRC May 2023 - Asbestos Detects

Location	Depth (m)	Type	Material	Quantification (%)
BH102	0.80	Chrysotile & Crocidolite	Loose Fibrous Debris	8.33
WS108	1.6	Chrysotile & Amosite	Loose Fibrous Debris	0.031

TRC Nov 2023 - Asbestos Detects

Location	Depth (m)	Type	Material	Quantification (%)
TP305	1	Chrysotile & Crocidolite	Loose Fibrous Debris	0.095
TP306	2	Chrysotile	Loose Fibrous Debris	0.002
TP307	1.4	Chrysotile	Loose Fibres	< 0.001
TP308	1.7	Amosite	Loose Fibrous Debris	0.003
TP308	0.8	Chrysotile	Loose Fibres	0.003
TP309	1	Chrysotile & Amosite	Loose Fibrous Debris	0.002
TP309	1.1	Chrysotile & Amosite	Loose Fibres & Loose Fibrous Debris	0.006
TP310	0.8	Chrysotile & Amosite	Loose Fibres & Loose Fibrous Debris	0.07
TP311	1.6	Chrysotile & Amosite	Loose Fibres	< 0.001
TP312	1.2	Amosite	Loose Fibres	< 0.001

NOTES	COPYRIGHT NOTES Google imagery June 2018	REVISIONS				 Arkwright House Manchester M3 2LF		TITLE	
								ASBESTOS DETECTS IN SOIL	
		TRC PROJECT NO.		SCALE					
		546629		1:500 @ A3					
		P01	FIRST ISSUE				CLIENT CHANCERYGATE MANCHESTER LIMITED		PURPOSE OF ISSUE
Initials	NJ		NJ	03/01/24	SUITABLE FOR INFORMATION				FINAL
REV.	REVISION NOTES/COMMENTS				PROJECT CRABTREE LANE, MANCHESTER		DRAWING NO		REVISION
	Initials						546629.0004.FIG05		

Annex B: Site Photographs

Photograph Log

Client: Chancerygate Manchester Limited		Site Location: Crabtree Lane, Manchester, M11 4GU	Project No.: 546629.0002.0000
Photo No. 1	Date 28/11/23 - 29/11/23		
Description TP301			

Photo No.	Date	
2	28/11/23 - 29/11/23	
Description		
TP301		

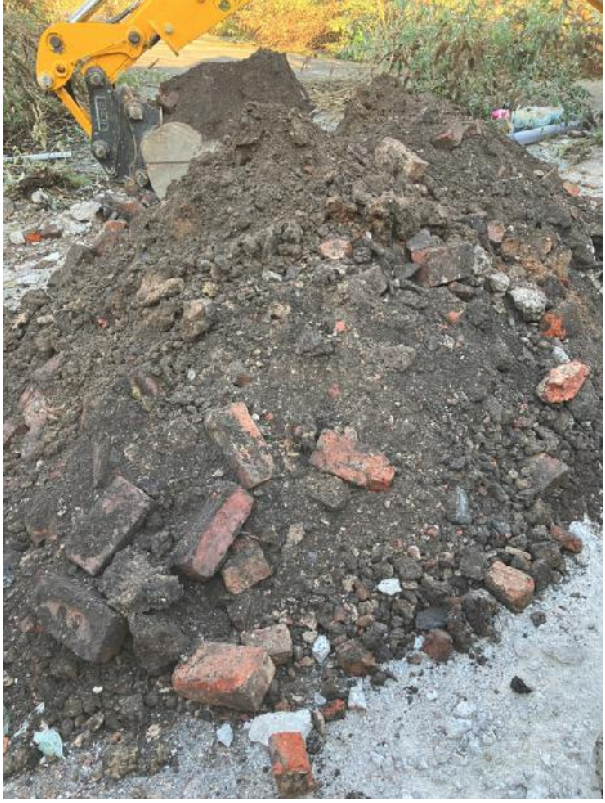
Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
3	28/11/23 - 29/11/23		
Description			
TP302			

Photo No.	Date		
4	28/11/23 - 29/11/23		
Description			
TP302			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
5	28/11/23 - 29/11/23		
Description Trench incorporating TP304 & TP306			

Photo No.	Date		
6	28/11/23 - 29/11/23		
Description Trench incorporating TP304 & TP306			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
7	28/11/23 - 29/11/23		
Description			
TP305			

Photo No.	Date		
8	28/11/23 - 29/11/23		
Description			
TP305			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
9	28/11/23 - 29/11/23		
Description			
TP307			

Photo No.	Date		
10	28/11/23 - 29/11/23		
Description			
TP307			

Photograph Log

Client: Chancerygate Manchester Limited		Site Location: Crabtree Lane, Manchester, M11 4GU	Project No.: 546629.0002.0000
Photo No. 11	Date 28/11/23 - 29/11/23		
Description TP308			

Photo No.	Date	
12	28/11/23 - 29/11/23	
Description		
TP308		

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
13	28/11/23 - 29/11/23		
Description			
TP309			

Photo No.	Date		
14	28/11/23 - 29/11/23		
Description			
TP309			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
15	28/11/23 - 29/11/23		
Description			
TP310			

Photo No.	Date		
16	28/11/23 - 29/11/23		
Description			
TP310			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
17	28/11/23 - 29/11/23		
Description			
TP311			

Photo No.	Date		
18	28/11/23 - 29/11/23		
Description			
TP311			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
19	28/11/23 - 29/11/23		
Description			
TP312			

Photo No.	Date		
20	28/11/23 - 29/11/23		
Description			
TP312			

Photograph Log

Client:		Site Location:	Project No.:
Chancerygate Manchester Limited		Crabtree Lane, Manchester, M11 4GU	546629.0002.0000
Photo No.	Date		
21	28/11/23 - 29/11/23		
Description			
TP313			

Photo No.	Date		
22	28/11/23 - 29/11/23		
Description			
TP313			

Photograph Log

Client: Chancerygate Manchester Limited		Site Location: Crabtree Lane, Manchester, M11 4GU	Project No.: 546629.0002.0000
Photo No. 23	Date 28/11/23 - 29/11/23		
Description TP314			

Photo No.	Date	
24	28/11/23 - 29/11/23	
Description		
TP314		

Annex C: Exploratory Hole Logs



Project Name: Crabtree Lane, Manchester		Client: Chancerygate Ltd		Date: 29/11/2023	
Location: M11 4GU		Contractor: TRC		Co-ords: E388718.80 N398250.49	
Project No. : 546629.0002		Crew Name: H&C Plant Hire		Equipment: JCB 3CX	
Location Number TP301	Location Type TP	Level 83.61m AoD	Logged By James Entwistle	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.40	D		0.25	83.36		MADE GROUND: Bituminous surfacing.	1	
					0.50	83.11		MADE GROUND: Light greyish brown sandstone paving blocks.		
					1.00	D		MADE GROUND: Black slightly clayey slightly sandy gravel. Sand is fine to coarse grained. Gravel is very angular to sub-rounded, fine to coarse grained. Gravel consists of crushed aggregate, brick and concrete. High cobble content of brick and concrete. Strong organic odour.		
		1.90	D							2
		2.00	81.61		End of Pit at 2.000m					3
									4	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.72	0.67	Stable					

Remarks

Terminated at 2.0m due to reaching required depth.
Groundwater not encountered.
Pit backfilled with arisings.

























Trial Pit Log

Project Name: Crabtree Lane, Manchester			Client: Chancerygate Ltd			Date: 28/11/2023		
Location: M11 4GU			Contractor: TRC			Co-ords: E388800.70 N398197.86		
Project No. : 546629.0002			Crew Name: H&C Plant Hire			Equipment: JCB 3CX		
Location Number TP313		Location Type TP		Level 84.65m AoD		Logged By Nyemh Johnson		Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D					MADE GROUND: Dark brown slightly sandy very gravelly clay. Sand is fine to coarse grained. Gravel is angular to rounded, fine to coarse grained. Gravel consists of brick and concrete. High cobble content of brick and concrete. Frequent whole bricks. Infrequent pieces of glass and wood.	
		1.00	D						1
		2.00	D						2
					2.10	82.55		End of Pit at 2.100m	
									3
									4

Dimensions		Trench Support and Comment				Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks		Date	Rate	Remarks
1.73	0.71	Stable						

Remarks

Terminated at 2.10m due to reaching required depth.
Groundwater not encountered.
Pit backfilled with arisings.





Annex D: Field Data



Modified Wilson and Card Classification (GSV Classification Sheet)

Borehole Reference	Date	GAS CONCENTRATIONS				FLOW DATA		Gas screening value (GSV) (l/hr)	0.0528	Comments
		Methane (%v/v)		Carbon dioxide (%v/v)		Flow rate (l/hr)				
		Peak	Steady	Peak	Steady	Peak	Steady			
BH102	07/06/2023	<0.1	<0.1	2.0	2.0	0.6	0.6	Characteristic Situation (CIRIA R149)	1	For Situation 1 the Methane value is typically >1% and CO2 value is >5%. If above these values consider CS2.
WS101	07/06/2023	<0.1	<0.1	4.3	4.3	ND	ND			
WS104	07/06/2023	<0.1	<0.1	8.8	8.8	ND	ND			
WS106	07/06/2023	<0.1	<0.1	3.8	3.8	0.3	0.3	Comparable classification in DETR <i>et al</i> (1999)	A	
WS108	07/06/2023	<0.1	<0.1	3.4	3.4	ND	ND			
BH102	13/06/2023	0.2	0.2	2.1	2.1	0.1	0.1			
WS101	13/06/2023	<0.1	<0.1	3.2	3.2	0.1	0.1			If Situation 2 but flow rate exceeds 70l/hr, consider increase to Situation 3
WS104	13/06/2023	0.1	0.1	6.7	6.7	0.1	0.1			
WS106	13/06/2023	0.1	0.1	3.9	3.9	0.1	0.1			
WS108	13/06/2023	<0.1	<0.1	1.4	1.4	0.1	0.1			
BH102	27/06/2023	<0.1	<0.1	2.0	2.0	ND	ND			
WS101	27/06/2023	<0.1	<0.1	4.4	4.4	ND	ND			
WS104	27/06/2023	<0.1	<0.1	7.3	7.3	ND	ND			
WS106	27/06/2023	<0.1	<0.1	4.4	4.4	0.6	0.6			
WS108	27/06/2023	<0.1	<0.1	0.8	0.8	0.3	0.3			
BH102	04/07/2023	<0.1	<0.1	0.8	0.8	0.6	ND			
WS101	04/07/2023	<0.1	<0.1	4.1	4.1	ND	ND			
WS104	04/07/2023	<0.1	<0.1	6.9	6.9	ND	ND			
WS106	04/07/2023	<0.1	<0.1	4.2	4.2	ND	-0.3			
WS108	04/07/2023	<0.1	<0.1	<0.1	<0.1	ND	ND			
BH102	29/11/2023	<0.1	<0.1	3.1	3.1	0.1	ND			
WS101	29/11/2023	<0.1	<0.1	4.1	4.1	ND	ND			
WS104	29/11/2023	<0.1	<0.1	5.4	5.4	0.3	0.1			
WS106	29/11/2023	<0.1	<0.1	3.6	3.5	ND	ND			
WS108	29/11/2023	<0.1	<0.1	0.8	0.8	0.1	ND			
BH102	06/12/2023	<0.1	<0.1	1.6	1.6	ND	ND			
WS101	06/12/2023	<0.1	<0.1	3.2	3.2	ND	ND			
WS104	06/12/2023	<0.1	<0.1	4.7	4.7	0.1	ND			
WS106	06/12/2023	<0.1	<0.1	2.7	2.7	0.3	0.1			
WS108	06/12/2023	<0.1	<0.1	3.1	3.1	ND	ND			
BH102	13/12/2023	<0.1	<0.1	<0.1	<0.1	-3.3	-3.4			
WS101	13/12/2023	<0.1	<0.1	<0.1	<0.1	-3.4	-3.5			
WS104	13/12/2023	<0.1	<0.1	<0.1	<0.1	-3.4	-3.5			
WS106	13/12/2023	<0.1	<0.1	<0.1	<0.1	-3.3	-3.5			
WS108	13/12/2023	<0.1	<0.1	<0.1	<0.1	-3.3	-3.6			
Max		0.2	0.2	8.8	8.8	0.6	0.6	Risk classification	Very low risk	Refer to Modified Wilson annd Card Classification (Table 8.5) for full details.
Min		<0.1	<0.1	<0.1	<0.1	ND	ND			
Note: For all ground-gas records refer to the project monitoring sheets. Other data such as PID readings should be taking into account before providing recommendations.										

Note: For all ground-gas records refer to the project monitoring sheets. Other data such as PID readings should be taking into account before providing recommendations.

Site: Crabtree Lane, Manchester
Date: 29/11/2023

Visit No: 1 of 3
Operator: Nyemh Johnson

Project Manager: Jonathon Sander

	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA		COMMENTS
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
BH102	<0.1	<0.1	<0.1	<0.1	3.1	3.1	<10	<10	<10	<10	14.7	14.7	0.8	0	0.1	ND	0.00	30	6.28	8.46	
WS101	<0.1	<0.1	<0.1	<0.1	4.1	4.1	<10	<10	<10	<10	15.4	15.4	0.8	0	ND	ND	1.00	0	2.20	2.83	
WS104	<0.1	<0.1	<0.1	<0.1	5.4	5.4	<10	<10	<10	<10	13.7	13.7	0.8	0	0.3	0.1	3.00	30	2.30	2.69	
WS106	<0.1	<0.1	<0.1	<0.1	3.6	3.5	<10	<10	<10	<10	16.7	16.7	0.8	0	ND	ND	-1.00	0	DRY	2.02	
WS108	<0.1	<0.1	<0.1	<0.1	0.8	0.8	<10	<10	<10	<10	19.1	19.1	ND	0	0.1	ND	2.00	30	DRY	1.88	
Max	<LOD	<LOD	<LOD	<LOD	5.4	5.4	<LOD	<LOD	<LOD	<LOD	19.1	19.1	0.8	0	0.3	0.1	3.0	30	6.28	8.46	
Min	<LOD	<LOD	<LOD	<LOD	0.8	0.8	<LOD	<LOD	<LOD	<LOD	13.7	13.7	ND	0.0	ND	ND	-1.0	0	2.20	1.88	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☐ Dry ☐ Moist ☐ Wet ☐ Snow ☒ Frozen
Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☐ Cloudy ☐ Overcast
Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: 09:06 Start 10:19 End
Barometric pressure (mbar): 1007 Start 1005 End
Pressure trend (Daily): ☒ Falling ☐ Steady ☐ Rising

Air Temperature (Deg. C): Before After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GFM436

Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Date of last calibration: 22/08/2023

Date of next calibration: 22/08/2024

Ambient air check: CH₄ CO₂ O₂



Site: Crabtree Lane, Manchester
Date: 06/12/2023

Visit No: 2 of 3
Operator: James Entwistle

Project Manager: Jonathon Sander

	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA		COMMENTS
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
BH102	<0.1	<0.1	<0.1	<0.1	1.6	1.6	<10	<10	<10	<10	17.3	17.3	0.8	0	ND	ND	-9.50	0	6.25	8.47	
WS101	<0.1	<0.1	<0.1	<0.1	3.2	3.2	<10	<10	<10	<10	16.4	16.4	0.8	0	ND	ND	-10.00	0	2.17	2.80	
WS104	<0.1	<0.1	<0.1	<0.1	4.7	4.7	<10	<10	<10	<10	14.4	14.4	0.8	0	0.1	ND	-9.00	30	2.24	2.68	
WS106	<0.1	<0.1	<0.1	<0.1	2.7	2.7	<10	<10	<10	<10	16.8	16.8	0.8	0	0.3	0.1	-15.00	30	2.00	2.00	
WS108	<0.1	<0.1	<0.1	<0.1	3.1	3.1	<10	<10	<10	<10	17.6	17.6	0.8	0	ND	ND	-8.00	0	DRY	1.84	
Max	<LOD	<LOD	<LOD	<LOD	4.7	4.7	<LOD	<LOD	<LOD	<LOD	17.6	17.6	0.8	0	0.3	0.1	-8.0	30	6.25	8.47	
Min	<LOD	<LOD	<LOD	<LOD	1.6	1.6	<LOD	<LOD	<LOD	<LOD	14.4	14.4	ND	0.0	ND	ND	-15.0	0	2.00	1.84	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☐ Dry ☐ Moist ☐ Wet ☐ Snow ☒ Frozen
Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☐ Cloudy ☐ Overcast
Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: 10:04 Start 11:04 End
Barometric pressure (mbar): 1015 Start 1014 End
Pressure trend (Daily): ☐ Falling ☒ Steady ☐ Rising

Air Temperature (Deg. C): Before After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GFM436

Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Date of last calibration: 22/08/2023

Date of next calibration: 22/08/2024

Ambient air check: CH₄ CO₂ O₂



Site: Crabtree Lane, Manchester
Date: 13/12/2023

Visit No: 3 of 3
Operator: James Entwistle

Project Manager: Jonathon Sander

	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA		COMMENTS
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
BH102	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	19.7	19.7	0.9	0	-3.3	-3.4	-10.00	30	6.22	8.41	
WS101	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	19.6	19.7	0.9	0	-3.4	-3.5	-10.00	10	1.98	2.70	
WS104	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	19.6	19.6	0.9	0	-3.4	-3.5	-10.00	30	2.18	2.68	
WS106	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	19.6	19.6	0.8	0	-3.3	-3.5	-10.00	30	DRY	2.00	
WS108	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	20.0	20.0	0.9	0	-3.3	-3.6	-12.00	30	DRY	1.83	
Max	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.0	20.0	0.9	0	-3.3	-3.4	-10.0	30	6.22	8.41	
Min	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.6	19.6	ND	0.0	-3.4	-3.6	-12.0	10	1.98	1.83	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☐ Cloudy ☐ Overcast
Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: 10:17 Start 11:12 End
Barometric pressure (mbar): 1007 Start 1007.5 End
Pressure trend (Daily): ☐ Falling ☐ Steady ☒ Rising

Air Temperature (Deg. C): Before After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GFM436

Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range: +100/-50 l/hour

Differential Pressure: (+/-) 1000 Pa

Date of last calibration: 22/08/2023

Date of next calibration: 22/08/2024

Ambient air check: CH₄ CO₂ O₂



Annex E: Laboratory Data

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e: nyemh.johnson@trccompanies.com

Analytical Report Number : 23-72524

Replaces Analytical Report Number: 23-72524, issue no. 1
Additional analysis undertaken.

Total sulphur & Total sulphate added to samples 2897380, 2897389 - 2897395
& 2897397 - 2897403 as per client's request.

Project / Site name:	Crabtree Lane. Manchester	Samples received on:	30/11/2023
Your job number:	546629.0001	Samples instructed on/ Analysis started on:	01/12/2023
Your order number:		Analysis completed by:	05/01/2024
Report Issue Number:	2	Report issued on:	10/01/2024
Samples Analysed:	24 soil samples		



Signed:

Joanna Szwarzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester

Lab Sample Number				2897380	2897381	2897382	2897383	2897384
Sample Reference				TP310	TP309	TP312	TP311	TP308
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	1.10	1.20	1.60	1.70
Date Sampled				28/11/2023	28/11/2023	28/11/2023	29/11/2023	29/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	-	-	-
Moisture Content	%	0.01	NONE	12	-	-	-	-
Total mass of sample received	kg	0.001	NONE	1.8	-	-	-	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Amosite	Chrysotile & Amosite	Amosite	Chrysotile & Amosite	Amosite
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.07	0.006	< 0.001	< 0.001	0.003
Asbestos Quantification Total	%	0.001	ISO 17025	0.07	0.006	< 0.001	< 0.001	0.003
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	-	-	-	-
Total Sulphate as SO ₄	%	0.005	MCERTS	0.596	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.35	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1350	-	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	41	-	-	-	-
Total Sulphur	%	0.005	MCERTS	0.258	-	-	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	-	-	-	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	39	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	20	-	-	-	-

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester

Lab Sample Number				2897385	2897386	2897387	2897388	2897389
Sample Reference				TP307	TP305	TP304	TP306	TP301
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.40	1.00	1.90	0.80	0.40
Date Sampled				29/11/2023	29/11/2023	29/11/2023	29/11/2023	29/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	-	-	-	-	< 0.1
Moisture Content	%	0.01	NONE	-	-	-	-	18
Total mass of sample received	kg	0.001	NONE	-	-	-	-	1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile & Crocidolite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Not-detected	Not-detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	0.095	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	0.095	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	ASE	ASE	ASE	ASE	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	6.3
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	-	-	5.77
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	-	1.42
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	1420
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	54
Total Sulphur	%	0.005	MCERTS	-	-	-	-	2.16
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	31
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	15

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester

Lab Sample Number				2897390	2897391	2897392	2897393	2897394
Sample Reference				TP301	TP301	TP302	TP302	TP306
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.90	0.50	1.50	0.50
Date Sampled				29/11/2023	29/11/2023	29/11/2023	29/11/2023	29/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	33	18	19	18
Total mass of sample received	kg	0.001	NONE	1	1	1	1	1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6	5.3	6.4	7.1	7.9
Total Sulphate as SO ₄	%	0.005	MCERTS	2.26	6.18	10.2	19.2	0.397
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.49	1.62	1.29	1.48	0.806
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1490	1620	1290	1480	806
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	79	73	34	56	230
Total Sulphur	%	0.005	MCERTS	0.35	2.47	4.82	7.78	0.18
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	7.7

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	34	29	21	25	37
Magnesium (leachate equivalent)	mg/l	2.5	NONE	17	15	10	13	19

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester

Lab Sample Number				2897395	2897396	2897397	2897398	2897399
Sample Reference				TP306	TP306	TP308	TP308	TP309
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	2.00	0.80	1.50	1.00
Date Sampled				29/11/2023	29/11/2023	28/11/2023	28/11/2023	28/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	-	16	22	13
Total mass of sample received	kg	0.001	NONE	1	-	1	1	1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	Chrysotile	-	Chrysotile & Amosite
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	Detected	-	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.002	0.003	-	0.002
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.002	0.003	-	0.002
Asbestos Analyst ID	N/A	N/A	N/A	N/A	PDO	PDO	N/A	PDO

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.5	-	8.6	9	9.3
Total Sulphate as SO ₄	%	0.005	MCERTS	0.198	-	0.405	0.575	0.415
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.27	-	0.754	0.585	0.896
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	270	-	754	585	896
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	82	-	100	270	41
Total Sulphur	%	0.005	MCERTS	0.101	-	0.197	0.244	0.212
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	4.9	-	< 2.0	2.1	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	-	82	35	18
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	-	41	18	8.9

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester

Lab Sample Number				2897400	2897401	2897402	2897403
Sample Reference				TP313	TP313	TP314	TP314
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.00	0.10	1.00
Date Sampled				28/11/2023	28/11/2023	28/11/2023	28/11/2023
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	8.4	20	2.4	12
Total mass of sample received	kg	0.001	NONE	1	1	1	1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	8.7	9.2	8.8
Total Sulphate as SO ₄	%	0.005	MCERTS	0.031	0.321	0.015	0.09
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0206	1.1	0.0149	0.0642
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	20.6	1100	14.9	64.2
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.8	16	3.2	4.1
Total Sulphur	%	0.005	MCERTS	0.029	0.147	0.01	0.068
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	5.3	48	< 5.0	8.7
Magnesium (leachate equivalent)	mg/l	2.5	NONE	2.6	24	< 2.5	4.3

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

Analytical Report Number: 23-72524
Project / Site name: Crabtree Lane. Manchester
Your Order No:

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
2897380	TP310	0.80	126	Loose Fibres & Loose Fibrous Debris & Sheeting/Board Debris	Chrysotile & Amosite	0.070	0.070
2897381	TP309	1.10	120	Loose Fibres & Loose Fibrous Debris	Chrysotile & Amosite	0.006	0.006
2897382	TP312	1.20	138	Loose Fibres	Amosite	< 0.001	< 0.001
2897383	TP311	1.60	112	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
2897384	TP308	1.70	109	Loose Fibrous Debris	Amosite	0.003	0.003
2897385	TP307	1.40	146	Loose Fibres	Chrysotile	< 0.001	< 0.001
2897386	TP305	1.00	128	Loose Fibrous Debris	Chrysotile & Crocidolite	0.095	0.095
2897396	TP306	2.00	127	Loose Fibrous Debris	Chrysotile	0.002	0.002
2897397	TP308	0.80	130	Loose Fibres	Chrysotile	0.003	0.003
2897399	TP309	1.00	140	Loose Fibrous Debris	Chrysotile & Amosite	0.002	0.002

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

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* 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 *
2897380	TP310	None Supplied	0.8	Brown sand with gravel.
2897389	TP301	None Supplied	0.4	Brown sand with gravel.
2897390	TP301	None Supplied	1	Brown sand with gravel.
2897391	TP301	None Supplied	1.9	Brown sand with gravel and clinker
2897392	TP302	None Supplied	0.5	Brown sand with gravel and clinker
2897393	TP302	None Supplied	1.5	Brown clay and sand with gravel.
2897394	TP306	None Supplied	0.5	Brown sand with gravel and brick.
2897395	TP306	None Supplied	1	Brown sand with gravel.
2897397	TP308	None Supplied	0.8	Brown sand with gravel.
2897398	TP308	None Supplied	1.5	Brown sand with gravel.
2897399	TP309	None Supplied	1	Brown sand with gravel and glass.
2897400	TP313	None Supplied	0.1	Brown sand with gravel.
2897401	TP313	None Supplied	2	Brown clay and sand with gravel.
2897402	TP314	None Supplied	0.1	Brown sand with gravel.
2897403	TP314	None Supplied	1	Brown clay and sand with gravel.

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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
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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
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
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
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
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	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.

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.