



GROUNDTECH
CONSULTING

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SUMMARY

Site Details	
Site Location	<i>The site is located circa 1.08 miles north of Rochdale Town Centre and is approximately centred on National Grid Reference 389790, 414327.</i>
Site Area	<i>The sites are approximately 0.11 hectares in total area and are roughly rectangular in shape. The site comprises three individual plots of land which are topographically level with some raised areas throughout the southern parcel. Each plot is in a state of disuse with generally poor surfacing conditions, dilapidated sheds and localised litter and fly tipping.</i>
Ground Model	
Made Ground Soils	<i>Made Ground was recorded in all exploratory boreholes to a maximum depth of 2.0m bgl. The surfacing across the site consisted of tarmac to a depth of 0.1m bgl, or dark brown sandy gravelly topsoil to a maximum depth of 0.3m bgl. One main Made Ground population was encountered during the investigation and consisted of dark brown black gravelly sand with constituents of brick, tarmac, sandstone, concrete, ceramics, plastic, glass, wood, metal, fabric, and chert to 2.0m bgl.</i>
Natural Soils	<i>Superficial deposits were encountered in all exploratory holes to a maximum depth of 4.0m bgl and generally comprised firm to stiff orange/grey brown variably gravelly Clay. Silty sandy Gravel was encountered in TP103, TP104 and WS102 from depths of between 2.2m and 2.8m and to depths of between 2.4m and 3.0m bgl.</i>
Bedrock	<i>Sandstone bedrock was encountered at locations WS105 and WS107 from depths between 2.9m and 3.7m bgl.</i>
Groundwater	<i>Groundwater was encountered in WS102 and WS105 at 2.45m bgl and 3.45m bgl respectively. Minimal amounts of seepage were also noted within the trial pits at depths between 2.0m and 2.5m bgl.</i>
Ground Engineering Assessment	
Foundations	<i>The most suitable foundations for Block A are considered to be mini piles, end bearing within the underlying sandstone bedrock encountered from a depth of circa 4.0m bgl. Traditional shallow foundations are not considered suitable due to the soft Clay encountered beneath the southern area of the proposed building footprint. An allowable load of 75kN is provided for ultimate limit state design based on a 225mm square pile 4m in length.</i> <i>A supplementary investigation should be carried out on Block B once the sheds have been demolished, and a watching brief should be maintained for basement structures previously identified. A deeper mini piling solution may be required if deeper Made Ground is encountered in Block B.</i> <i>For Block C, the most suitable foundations are still considered to be trench fill foundations established within the underlying natural firm and stiffer Clay. Obstructions will require grubbing out and foundations will require deepening through the Made Ground which has been observed to a maximum depth of 2.35m bgl.</i>
Highways	<i>CBR values of 2% to 3% are likely to be achieved in undisturbed natural cohesive soils for pavement design purposes. Untreated Made Ground should be assumed to have a CBR value of less than 2.5%, unless proven otherwise.</i>

SuDS	<i>SuDS drainage is not considered feasible at the site due to the deep Made Ground and the natural cohesive strata underlying the site.</i>
Constraints	<i>The main constraints are as follows:</i>
	• <i>Basement structures encountered within Blocks A, B and C.</i> • <i>Limited information on the ground conditions of Block B.</i> • <i>Soft low strength soils recorded on the very southern edge of Block A.</i>
	<i>A supplementary investigation for Block B and a watching brief when excavating Blocks A, B and C will need to be carried out in order to ensure no further constraints are identified.</i> <i>Consideration should be given to the electrical substation in the vicinity of Block C and the billboard in the vicinity of Block A so as to not damage any associated services.</i>
GQRA and Revised (PL) Assessment	
Human Health	<i>Elevated concentrations of lead, PAHs and TPH CWG have been detected by the latest environmental testing as well as asbestos fibres in a single location.</i> <i>Where the proposed buildings or hardstanding cover is present, there will be no pollution linkage to site end users. However, in soft landscaped areas the risk to human health from direct contact with soils is considered to be Moderate and a 600mm clean cover layer underlain by a contamination demarcation layer is recommended to mitigate the risk.</i>
Vapours	<i>The risk is considered to be low due to the tarmac in the Made Ground in WS103 being removed to facilitate the piling matt construction and placement of the cover system.</i>
Controlled Waters	<i>No significant mobile contamination has been identified and the underlying impermeable Clay will have prevented the downward migration of contaminants, therefore the risk to controlled waters is considered to be Low.</i>
Permanent Ground Gas	<i>A previous ground gas risk assessment placed the site within CS1 classification and therefore ground gas precautions are not considered necessary. The site is also not in an area requiring radon precautions within foundations. The risk from ground gases is considered to be Low.</i>
Final Appraisal	

The following work is required before progressing to the construction phase:

- *Demolition Asbestos survey.*
- *Further supplementary investigation of Block B post-demolition.*
- *Design of remedial strategy.*
- *Detailed foundation design.*
- *Tree survey by qualified arboriculturist.*
- *Confirmation of the recommendations of this report with Regulators.*

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Plans		
<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
<i>GRO-22083-P01</i>	-	<i>Project Location Plan</i>
<i>GRO-22083-P102</i>	<i>1.1</i>	<i>Exploratory Hole Location Plan</i>
<i>GRO-22083-P03A/03B</i>	<i>1.1</i>	<i>Generalised Ground Model</i>
<i>GRO-22083-P04</i>	<i>1.1</i>	<i>Revised Illustrative CSM</i>

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by DLP Consultants on behalf of Cornerstone Place and PG Consulting to undertake a Supplementary Geo-Environmental Appraisal for a site at Whitworth Road in Rochdale.

An investigation was previously undertaken at the site by Groundtech Consulting and the findings are presented in the Geo-Environmental Appraisal referenced *GRO-22083-3479_1.1* dated 16th August 2022.

The supplementary investigation was undertaken in accordance with BS 5930:2015, BS 10175:2013, BS 8576 and BS 22475. The Appraisal has been prepared in accordance with current UK Legislation and to discharge Land Quality pre-commencement planning conditions.

1.2 Proposed Development

The proposed development is residential end use comprising the construction of three blocks of one-bedroom apartments with associated areas of hardsurfacing.



Block A is located on the southern plot of land and comprises a two-storey building with eight apartments, Block B is situated on the central area and will contain a two-storey building with four apartments, and Block C is on the northern plot of land and will contain two apartments within a single storey building.



The supplementary investigation was focused on the northern and southern sites.

1.3 Limitations

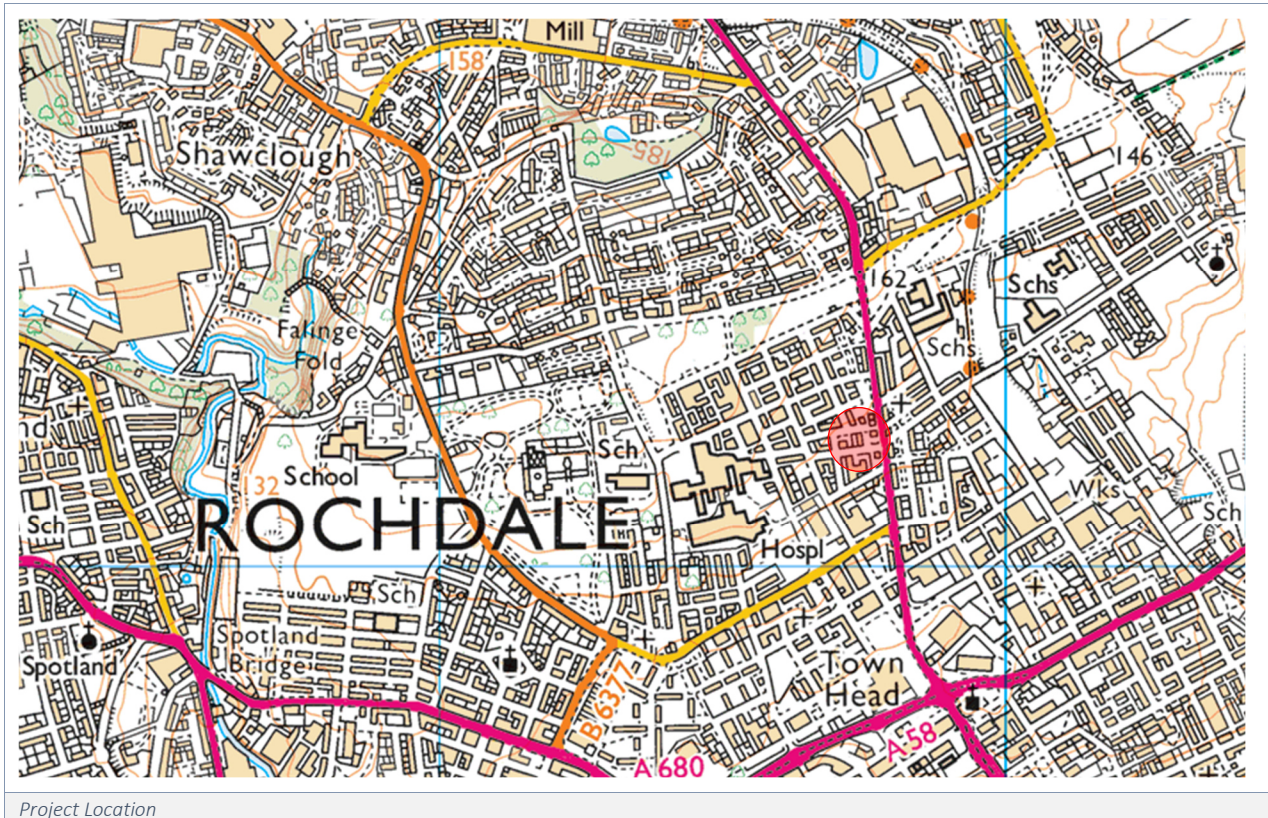
Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report, they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 1.08 miles north of Rochdale Town Centre, as shown on the Project Location Plan GRO-22083-P01. The site is approximately centred on National Grid Reference 389790, 414327.



Access to the site is gained off Whitworth Road to the east.

2.2 Site Description

The site comprises three separate blocks of land located along the western side of Whitworth Road, with each plot being roughly rectangular in shape. The blocks are not adjacent to each other so will therefore be discussed separately below. The total area of the blocks is approximately 0.096 hectares.

Northern Plot (Block C)

The northern plot is located at the intersection between Grasmere Street and Noon Sun Street, covers an area of approximately c.0.0025 hectares, and is topographically level.

The site is currently surfaced by tarmac and an electricity substation is located in the south western corner. It is currently utilised as parking space for surrounding residents and the nearby High Street. The tarmac is in poor condition and there are several small piles of litter spread around the edge of the plot. No vegetation is present on site or within an influencing distance.

The plot is bound by the fence of residential properties to the north and south, Noon Sun Street to the east, and Grasmere Street to the south.

The site is surrounded by following features/land uses:

- *North* - *Residential properties.*
- *East* - *Noon Sun Street, commercial buildings, and Whitworth Road.*
- *South* - *Grasmere Street, Block B, and residential properties.*
- *West* - *Residential properties.*

Central Plot (Block B)

The central plot is located directly south of Grasmere Street, covers an area of approximately c.0.015 hectares, and is topographically level.

The site is currently occupied by four storage sheds which are in very poor condition. Three sheds are located along the southern edge with a fourth in the north west corner. It is possible that this fourth shed has asbestos cement sheeting for its roofing. There is a thin strip of tarmac located along the eastern boundary with the remainder of the Block Being covered by grass and scrub. The deciduous tree noted in the original Ground Investigation in the north east corner is no longer present. Evidence of fly tipping is noted in the northern area of the site due to the presence of general and household waste heaps.

Block B is bound by the wall of the adjacent residential properties to the west, Grasmere Street to the north, and public parking to the west and south.

The site is surrounded by following features/land uses:

- *North* - *Grasmere Street, Block C, and residential properties.*
- *East* - *Public parking and Whitworth Road.*
- *South* - *Public parking and residential properties.*
- *West* - *Residential properties.*

Southern Plot (Block A)

The southern plot is located directly south of Derwent Street and west of Whitworth Road, covers an area of approximately c.0.078 hectares, and slopes gradually upwards from east to west.

The eastern half of the site comprises a maintained soft landscaping area, and the western half of the site comprises a disused children's playground. A tarmac footpath runs through the centre.

The eastern area is largely featureless with the exception of a large electrical billboard in the south east corner with associated concrete surfaced base and electrical junction box. The deciduous tree noted in the original Ground Investigation on the southern boundary is no longer present.

The western area comprises a metal fence and gate surrounding a former children's playground surfaced by tarmac and paving slabs. All of the equipment has since been removed, and a small strip of rough grass is present to the south of the playground.

The plot is bound by timber knee rail fencing to the east, public parking and Derwent Street to the north, and adjacent residential properties to the south and west.

The site is surrounded by following features/land uses:



- North - *Derwent Street, public parking, and residential properties.*
- East - *Whitworth Road and commercial and residential properties.*
- South - *Commercial and residential properties.*
- West - *Residential properties.*

Site photographs are presented in *Appendix 2*.

3.0 PREVIOUS INVESTIGATION SUMMARY

A previous ground investigation was carried out by Groundtech Consulting outlined in Geo-Environmental Appraisal GRO-22083-3479_1.1 dated 16th August 2022. A summary of the report is presented below.

3.1 Site Works

Groundtech Consulting Limited carried out the following site works on 16th March 2022:

- 6 No. trial pits (TP01 to TP06) were excavated to a maximum depth of 3.6m bgl using a JCB 3CX.
- 6 No. windowless sample boreholes (WS01 to WS06) were drilled to a maximum depth of 4.45m bgl using a Dando Terrier rig.

3.2 Ground Model

Surfacing

The surfacing at the site comprised tarmac (WS02, WS05 and TP06), paving slabs, and reworked dark brown clayey sandy gravelly topsoil with brick to a maximum depth of 0.46m bgl.

Made Ground

Made Ground was encountered in all exploratory holes and comprised one main population:

1. Firm dark brown mottled grey sandy gravelly clay with minor constituents of sandstone and brick to depths of between 0.1m and 2.5m bgl.

Locally in TP06, light grey gravelly sand was encountered from a depth of 0.1m to a depth of 0.35m bgl.

Made Ground was not fully penetrated in TP04, TP05 and WS05 due to obstructions.

Natural Strata

Superficial deposits were encountered in all exploratory holes (with the exception of TP04, TP05 and WS05) and generally comprised one main stratification:

2. Firm to stiff medium to high strength brown mottled grey gravelly sandy silty Clay at depths of between 0.8m and 4.4m bgl.

Locally to WS01, soft Clay was encountered at 3.0m bgl.

Bedrock

Bedrock was encountered within the boreholes at depths of between 2.1m and 4.4m and comprised yellow orange residually weathered Sandstone. Bedrock was not encountered within the trial pits.

Groundwater

Groundwater was encountered in WS01, WS02, TP02, TP03 and TP06 from depths of between 2.0m and 3.2m bgl within the natural Clay.

3.3 Watching Brief

No visual or olfactory evidence of contamination was recorded within any of the exploratory holes.

3.4 Ground Engineering

Due to the differing ground conditions and constraints, each plot was given a specific foundation solution.

Northern Plot (Block C)

The most suitable foundation solution was considered to be traditional strip/trench fill foundations constructed within the natural Clay between 0.9m and 2.5m bgl, with a watching brief to be maintained during the excavations due to the unpenetrated Made Ground encountered within WS05 in the east. If no suitable bearing strata is encountered in this location, mini piles within the underlying Sandstone should be considered as an alternative.

Central Plot (Block B)

The most suitable foundation solution was considered to be trench fill foundations constructed within the medium to high strength Clay at 2.0m bgl. Limited information exists for this plot, as further exploratory holes could not be carried out due to the presence of the sheds taking up most of the site. A supplementary investigation post demolition should be carried out to confirm this foundation option. As with Block C, if no suitable bearing strata is encountered then mini piles within the Sandstone should be considered instead.

Southern Plot (Block A)

The most suitable foundation solution was considered to be trench fill foundations within the medium strength Clay encountered between 1.0m and 2.5m bgl. A localised soft spot of natural Clay was noted in WS01 at 3.0m bgl. As with Blocks B and C, if no suitable bearing strata is encountered, mini piles within the underlying Sandstone at 4.0m bgl should be considered as an alternative.

Concrete Classification

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

SuDS

The use of SuDS drainage at the site was not considered feasible due to the presence of deep Made Ground and natural cohesive soils which exhibit low infiltration rates.

3.5 Land Quality

Soils

Geo-environmental testing recorded concentrations of target contaminants that were below the screening values for residential end use. In addition, no asbestos fibres have been detected in the screened samples. The majority of the site will be covered in hardstanding with limited areas of soft landscaping, therefore the risk to site end users was considered to be *Low*.

Groundwater

Groundwater testing was outside the scope of the investigation, but the generic quantitative risk assessment stated that the site is not within a source protection zone, and there are no nearby potable water abstractions. In addition, the proposed development will predominantly be covered in hardsurfacing with a new drainage system installed. As there are no surface water features within 500m of the site, no pollution linkages are considered to exist, and the risk is *Very Low*.



Ground Gas

Ground gas monitoring placed the site within CS1, therefore ground gas precautions within foundations are not required. The site is also not in an area where radon precautions are required within foundations.

The Ground Gas Assessment produced by Groundtech Consulting referenced *GRO-22083-3813* confirmed the above findings.

3.6 Required Supplementary Investigation

A supplementary investigation was recommended following the demolition of the sheds on the proposed site for Block B to investigate the area fully and to inform detailed foundation design.

4.0 SCOPE OF INVESTIGATION AND RATIONALE

4.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site.
Maintain a watching brief for visual and olfactory evidence of contamination.
Obtain samples using methodology in current guidance for contamination analysis.
Identify realistic pollution linkages to groundwater.
Obtain relevant geotechnical parameters for preliminary foundation design to address both ULS and SLS conditions.
Delineate area of soft Clay encountered in vicinity of proposed Block A.
Delineate extent of Made Ground/obstructions encountered in vicinity of Block C.
Assess the identified pollution linkages in the CSM.

4.2 Scope of Works

The following scope of works was completed between the dates of 7th and 8th February 2023:

- 5 No. trial pits (TP101 to TP105) were excavated to depths of between 2.3m and 3.0m bgl using a JCB 3CX.
- 7 No. windowless sample boreholes (WS101 to WS107) were drilled to depths of between 1.2m and 4.0m bgl using a Dando Terrier rig.

The exploratory hole locations are presented on Groundtech Plan GRO-22083-P02_1.1, and the exploratory hole logs are presented in Appendix 3.

The exploratory holes were positioned to establish the stratification beneath the site, and target any areas of concern as summarised in the table below:

Location	Target Rationale
TP101, TP105	Previous Obstruction (Block C Area)
WS106, WS107	Block C
TP104, WS102, WS103	Block A
WS101, WS104, WS105, TP102 and TP103	Vicinity of soft Clay (Block A Area)

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

- BS 5930 'Code of Practice for Site Investigations' 2015.
- BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil'.
- BS EN ISO 14689:2002 'Geotechnical investigation and testing – Identification and classification of rock'.

4.3 Soil Sampling

During the intrusive investigation, representative samples were taken at regular intervals, changes of strata and where evidence of contamination existed. Laboratory analysis was scheduled on the samples obtained.

The samples obtained are summarised in the table below:

Soil Sample	Number
<i>Environmental Sample</i>	<i>33</i>
<i>Disturbed Sample</i>	<i>40</i>

The samples have been obtained in accordance with current environmental and geotechnical guidance. The sampling plan has been designed to obtain samples from all required strata using the correct methodology.

Disturbed samples of soil for chemical analysis were placed in the correct sampling containers as required by the laboratory in accordance with their MCERTS and UKAS Accreditation. Transportation was arranged in a timely manner and the samples were at the correct temperature.

The sample locations and depths are recorded on the exploratory logs.

4.4 Geo-Environmental Analysis

The following geo-environmental testing was scheduled to assess the risk from contamination on the site. The testing is based on observations during the ground investigation.

Contaminants of Concern	Matrix	Number
<i>Arsenic, cadmium, chromium (total and hexavalent), copper, nickel, mercury, lead, selenium, zinc.</i>	<i>Soil</i>	<i>7</i>
<i>Speciated PAHs</i>	<i>Soil</i>	<i>7</i>
<i>Asbestos Screen</i>	<i>Soil</i>	<i>7</i>
<i>Asbestos Quantification</i>	<i>Soil</i>	<i>1</i>
<i>TPH CWG</i>	<i>Soil</i>	<i>1</i>

The Geo-Environmental Laboratory Testing Results are presented in *Appendix 4*.

Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' 1990. The following tests were scheduled:

British Standard	Test Method	Number
<i>BRE</i>	<i>BRE Full Suite</i>	<i>2</i>
<i>Part 2</i>	<i>Moisture Content</i>	<i>3</i>
<i>Part 2</i>	<i>Plasticity Index Analysis</i>	<i>3</i>

The Geotechnical Laboratory Testing Results are presented in *Appendix 5*.



4.5 Gas and Groundwater Monitoring

Gas monitoring has previously been undertaken and a ground gas risk assessment *GRO-22083-3813* has placed the sites within the CS1 classification. Gas/groundwater installations and monitoring were outside the scope of the supplementary investigation.

5.0 GROUND MODEL

5.1 Made Ground

Made Ground was recorded in all exploratory holes to depths of between 0.5m and 2.0m bgl.

The surfacing across the site consisted of tarmac (TP101, TP105, WS102, WS103, WS106 and WS107) from ground level to a depth of 0.1m bgl, and dark brown sandy gravelly topsoil (TP102, TP103, TP104, WS101, WS104 and WS105) from ground level to depths of between 0.2m and 0.3m bgl.

One main Made Ground population was encountered during the investigation. Dark brown black gravelly sand with constituents of brick, tarmac, sandstone, concrete, ceramics, plastic, glass, wood, metal, fabric, and chert was encountered in all exploratory holes from depths between 0.1m and 0.3m bgl to depths between 0.5m and 2.0m bgl.



5.2 Natural Ground

The natural strata encountered generally confirmed the published geological records. Three main natural stratification were encountered during the investigation and are described below:

1. *Firm orange/grey brown sandy gravelly cobbly Clay with minor constituents of sandstone, coal, and quartzite was encountered in all exploratory holes from depths of between 0.5m and 2.0m bgl to depths of between 1.1m and 2.8m bgl.*

2. *Firm to stiff dark grey silty sandy gravelly Clay with constituents of sandstone, coal and quartzite was present in TP101, TP102, TP103, TP104, WS105, and WS107 from depths of between 1.1m and 3.0m bgl to depths of between 2.2m and 4.0m bgl.*
3. *Dark grey clayey silty sandy Gravel of sandstone, quartzite, and coal was encountered in TP103, TP104, and WS102 from depths of between 2.2m and 2.8m and to depths of between 2.4m and 3.0m bgl.*

Locally to TP101, grey brown silty Sand was observed from a depth of 2.2m to 2.5m bgl.

5.3 Bedrock

Bedrock was present in WS105 and WS107 from depths of 3.7m and 3.0m bgl respectively and comprised Sandstone recovered as clayey gravel.

5.4 Groundwater

Groundwater was encountered in WS102 and WS105 at 2.45m bgl and 3.45m bgl respectively. Minimal amounts of seepage were also noted within the trial pits at depths between 2.0m and 2.5m bgl.

5.5 Watching Brief

A watching brief was maintained during the Ground Investigation for visual and olfactory evidence of contamination.

Visual evidence of potential contamination was noted at locations TP101 and WS106 where ash was present in the Made Ground.

Olfactory evidence of contamination was noted in the form of a faint hydrocarbon odour in WS103 at 0.3m bgl and a moderate organic odour in WS105 at 1.9m bgl.

5.6 Excavation Stability

Evidence of spalling was noted in TP05 in the deep Made Ground, where a backfilled basement structure appeared to be present.

5.7 Excavation/ Borehole Progress

Slow progress while excavating the trial pits was experienced when encountering a brick wall and suspected basement structures in TP102 and TP105.

SPT refusals were recorded in all locations at the base of the boreholes where either Clay with high cobble content or Sandstone was encountered.

6.0 GROUND ENGINEERING

6.1 Geotechnical Testing Results

Comparison of water content and the value of 0.4 times the Liquid Limit in accordance with BRE Digest 412 'Desiccation in Clay Soils' suggests significant desiccation has taken place when 0.4 times the Liquid Limit is greater than the actual water measured water content. This is a rudimentary method but also a good guide.

Results of the PI analysis and the volume change potential of the clays is summarised in the table below:

Reference	Depth	Modified PI	Volume Change Potential	Desiccated Y/N
TP104	1.00	22.6	Medium	Y
WS102	1.50	14.1	Low	Y
WS106	1.00	17.3	Low	N

6.2 Assessment Background

The ground engineering investigation has been undertaken to formulate an accurate ground model in order to undertake preliminary foundation design. The ground model has been constructed with a moderate level of confidence and has developed from the findings of the previous investigation.

The main limitation on the site is the areas of deep Made Ground encountered in both ground investigations. Made Ground was originally encountered to a maximum depth of 2.5m bgl. Made Ground was not fully penetrated in TP04, TP05 and WS05 due to obstructions in the previous investigation and therefore the depth of Made ground was unknown. Made Ground was penetrated in all locations during the latest investigation.

Additionally, relic foundations and a basement have been encountered in the vicinity of Block C and Block A which will require grubbing out.

Soft low strength clay was recorded in the previous investigation along the southern edge of the southernmost plot. Soft to firm Clay has been recorded in the latest investigation at depths between 2.6m and 4.0m bgl on the southern corner of Block A.

Further investigation of the central plot has not been undertaken as the sheds have not yet been demolished. Further investigation will be required post-demolition.

It is advised that a watching brief be maintained during demolition and removal of the sheds in Block B and for basement structures within Blocks A and C to determine the ground conditions beneath these areas.

Additionally, consideration should be given to the nearby billboard and associated electrical junction to ensure the construction activities do not damage any services associated with it.

Desk based information suggests the site is within a Low Flood Risk Zone I and allowances should be made for possible future flood events.

The topsoil across the site should be stripped and stockpiled separately, and any structures encountered such as the basement structures in Block A and Block C should be grubbed up.

6.3 Geotechnical Parameters

The geotechnical test results have been evaluated to derive geotechnical parameters for the soils underlying the site. An updated 'depth to SPT N value' graph is presented on Groundtech Plan GRO-22083-P03A_1.1 and an updated 'depth to cu value' graph is presented on Groundtech Plan GRO-22083-P03B_1.1 to provide a generalised ground model for the sites.

Characterisation of the geotechnical parameters above has been undertaken to select a characteristic value, which is a cautious estimate of the value affecting the occurrence of the limit state. The values below have been updated based on the latest investigation.

Stratum	Parameter	Selected Characteristic Value
Southern Plot (Block A)		
<i>Soft Clay</i>	<i>Undrained Shear Strength (C_u)</i>	<i>15kN/m²</i>
<i>Firm medium strength Clay</i>	<i>Undrained Shear Strength (C_u)</i>	<i>50kN/m²</i>
<i>Residually weathered Sandstone</i>	<i>Drained angle of friction (ϕ')</i>	<i>30°</i>
Northern Plot (Block C)		
<i>Firm medium strength Clay</i>	<i>Undrained Shear Strength (C_u)</i>	<i>60kN/m²</i>
<i>Residually weathered Sandstone</i>	<i>Drained angle of friction (ϕ')</i>	<i>30°</i>

From empirical data and published values, a magnitude of consolidation (m_v) of the underlying clays 0.20m²/MN has been selected.

6.4 Preliminary Foundation Design

As each of the plots have distinct ground conditions and development constraints, they will be discussed separately below, excluding the central plot which was not accessible during this supplementary investigation.

Northern Plot (Block C)

The proposed development is for two flats across a detached single storey building. Four exploratory holes have been undertaken in this area during the supplementary investigation, TP101, TP105, WS106 and WS107. Made Ground was recorded to a maximum depth of 2.0m across this plot and natural strata in the form of firm medium to high strength sandy gravelly Clay to a maximum depth of 3.0m bgl. Previously Made Ground was encountered to a maximum depth of 2.35m bgl in WS05 where the base was not proven.

TP101, TP105 and WS107 were excavated in the vicinity of WS05. A basement structure was encountered in TP105 with brick walls present on three sides of the pit between depths of 0.1m and 2.0m bgl. Firm medium strength Clay was encountered from 2.0m bgl. No obstructions were encountered in the remaining exploratory holes.

It is still considered that the most suitable foundation solution is strip/trench fill foundations constructed within the medium to high strength natural Clay soils which has been encountered from between 0.7m and 2.0m bgl. The recommendations remain the same as the previous investigation, where a safe allowable bearing capacity of 125kN/m² was calculated for ultimate state limit design for a 0.6m wide strip footing foundation in the medium strength Clay at 2.5m bgl. Using the above pressures, settlement criteria of 25mm will not be exceeded and serviceability limit state (SLS) conditions will be satisfied.

Basement structures will require grubbing out.

If bedrock or both cohesive and granular founding strata are encountered in foundation excavations, the foundations should be reinforced to mitigate the risk of differential settlement or deepened to a uniform stratum.

Southern Plot (Block A)

The proposed development is a block of eight flats across a detached two storey building. Eight exploratory holes have been undertaken in this area during the supplementary investigation (TP102, TP103, TP104, WS101, WS102, WS103, WS104 and WS105). Made Ground was recorded to a maximum depth of 1.2m bgl in WS101 located on the area of soft landscaping in the east. The Made Ground was generally underlain by firm medium strength sandy gravelly Clay to a maximum depth of 4.0m. Locally, this was underlain by stiff high strength Clay. A soft spot was recorded in WS105 between 2.6m and 3.7m bgl on the southern corner of the proposed plot. Soft Clay was previously recorded in this area in WS01 between 3.0m and 4.0m bgl.

The supplementary investigation has identified soft clay within the footprint of the proposed building and therefore a shallow foundation solution is not considered suitable for the proposed Block A.

Mini Piles

Mini piles are considered to be the most suitable foundation solution for the proposed residential development. Piles should be a minimum of 3m in length and therefore should be driven into the bedrock to achieve this length. The pile type should be suitable to allow hard driving. Good workmanship will be required when installing the piles to ensure the assumptions in the design by calculation are met. The type of pile should provide sufficient lateral stability due to the poor ground conditions observed locally in WS105.

Obstructions have been recorded including former basement walls. These will require grubbing out prior to the piling works.

The driven piles will transfer loads through the Made Ground and natural Clay to the underlying Sandstone bedrock encountered at circa 4.0m bgl. At this stage, the loadings are not available, pile caps and reinforced ring beam should be constructed to span between piles and support loadings from walls.

Design by Calculation

Preliminary design by calculation has been carried out using due skill and care using the global factor of safety method. The preliminary design by calculation is based on a combined skin friction/end bearing piles where Clay is present overlying the Sandstone. The design has been based on the worst-case conditions encountered in WS105 where soft Clay was recorded between 2.6m and 3.7m bgl.

For a single driven concrete pile 0.225m in diameter and 4.0m in length end bearing in the weathered Sandstone bedrock, an allowable load of 75kN has been calculated. If greater loads are required, the piles should be installed in groups. The above should be considered when the loadings are confirmed.

The ground conditions and the below ground construction indicate downdrag is potentially an issue where soft Clays are present. Downdrag is dependent on finished site levels and surcharge causing the ground to settle relative to the pile, this should be taken into consideration by the detailed final design.

An appropriate working platform should be constructed in accordance with BR470 guidance.

If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during the Ground Investigation, work should cease and Groundtech Consulting contacted for further advice.

During the construction phase, supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring.

Design Validation

Static load testing on working piles is recommended as a minimum to validate the design for ULS and SLS conditions in accordance with Eurocode 7. Due to the size of the development and the associated loadings, static load testing is not economical. A global factor of safety of 2.5 has been used and if required should be increased in the detailed design to preclude the requirement for static load testing. The piles will likely be driven to sett using pile driving formulae. The warranty provider should be contacted to discuss whether they require deeper Ground Investigation if piles are the preferred option.

The piling type, length, depth of reinforcement and design should be discussed with a specialist piling contractor. They can then undertake the detailed design including drawings and specifications to provide fitness for purpose design.

Construction Recommendations

The recommendations in this appraisal are preliminary and the detailed design should be developed in advance and during the construction phase. If the ground conditions or groundwater regime encountered during the construction phase differ significantly to the conditions encountered during the Ground Investigation, work should cease and Groundtech Consulting contacted for further advice.

During the construction phase, supervision by a suitably qualified geotechnical engineer should be on a continuous basis to check the design assumptions are correct and construction conforms to design in accordance with EC7. Supervision should include inspections, Control Ground Investigations and monitoring by a suitably qualified geotechnical engineer.

6.5 Building Near Trees

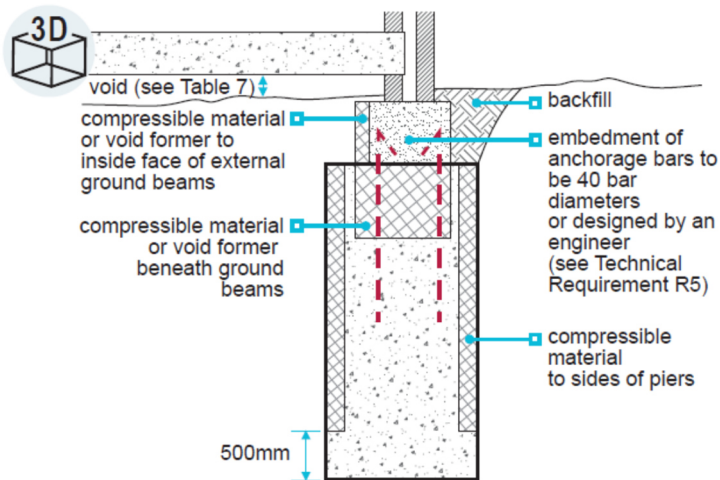
If foundation excavations encounter cohesive strata in the vicinity of existing, proposed or recently removed trees, foundations should be adjusted in full accordance with NHBC Standards Chapter 4.2. Trees encountered in the previous investigation along site boundaries and on Block B have subsequently been removed.

All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings. The clay is of a medium volume change potential.

A survey of all trees and hedges on the site and within 30m of the site boundary should be undertaken to identify tree species, locations and heights. This information will be required in order to assess the effects of trees on the cohesive strata and inform a foundation schedule.

Guidance states that where Clay is of a medium volume change potential, a void former of 25mm is required against the side of the foundations and ground beam.

Void formers should be provided to the external ground beams if the pile foundations are to be utilised as shown below:



Pad and ring beam excavations should be a minimum of 0.90m deep outside the influence of trees for the medium volume change potential Clay. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

6.6 Floor Slabs

Due to the depth of the Made Ground soils recorded across much of the site, it is recommended that suspended floor slabs are adopted for the proposed residential apartment blocks. Suspended floor slabs will be compatible with the proposed pile foundation solution for Block A.

A 100mm void should be incorporated beneath ground beams and suspended in-situ concrete ground floors, while a 250mm void should be incorporated under suspended precast concrete floors if they are utilised.

6.7 Construction

The trial pits indicate that instability of excavations is anticipated where deep Made Ground is present associated with former basement structures. This should be considered in the groundworks method statements and shoring of deeper construction related excavations may be required.

Tracked high specification plant is recommended to maintain the build programme. Breaking equipment may also be required locally to penetrate obstructions identified by the site investigation such as the basement structures in Block A, B and Block C.

Groundwater was encountered at depths of between 2.45m and 3.45m bgl and is not anticipated to be a significant issue during construction. Seepage was noted in the trial pits locally and some localised dewatering of excavations may be required.

6.8 Concrete Classification

Previous Investigation

In the previous investigation, water soluble sulphate testing was undertaken on seven of the Made Ground samples. The range of soluble sulphate (SO_4) recorded was 11.3mg/l to 73.2mg/l and associated pH values ranged between 6.7 and 9.0 indicating slightly acidic to slightly alkaline conditions. For the Made Ground, the characteristic water soluble sulphate concentration was 71.75mg/l and the pH value was 7.2.

Water soluble sulphate testing was also undertaken on four samples of the natural strata. The range of soluble sulphate (SO_4) recorded was 28.9mg/l to 36mg/l and associated pH values ranged between 6.4 and 7.3 indicating slightly acidic to slightly alkaline conditions. For the natural ground, the characteristic water soluble sulphate concentration was 36mg/l and the pH value was 6.4.

The results of laboratory pH and sulphate content indicated that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

Made Ground

In the supplementary investigation, water soluble sulphate testing was undertaken on six samples of the Made Ground. The range of soluble sulphate (SO_4) recorded is 12.0mg/l to 50.2mg/l and associated pH values ranged between 7.22 and 8.59, indicating slightly alkaline conditions.

For a dataset containing five to nine results, the mean of the highest two of the sulphate test results and the lowest two pH results should be taken as the characteristic value. For the Made Ground, the characteristic water soluble sulphate concentration is 37.4mg/l and the pH value is 7.22.

Natural Strata

Water soluble sulphate testing was also undertaken on three samples of the natural strata. The range of soluble sulphate (SO_4) recorded is 9.6mg/l and 45.3mg/l and associated pH values ranged between 6.78 and 7.76, indicating slightly acidic to slightly alkaline conditions.

For a dataset containing less than five results, the highest sulphate testing result should be taken as the characteristic value along with the lowest pH result. For the natural ground, the characteristic water soluble sulphate concentration is 45.3mg/l and the characteristic pH value is 6.78.

As the underlying strata is mainly cohesive, groundwater is considered to be static. However, if the founding strata is the underlying weathered Sandstone bedrock, then groundwater is considered to be mobile.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005. The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site-specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

6.9 Pavement Design

Made Ground is likely to be present at formation level across the site areas, natural Clay may be present locally. Natural cohesive soils are likely to achieve CBR values between 2% to 3% for pavement design purposes. Untreated Made Ground should be assumed to have a CBR value of less than 2.5% unless proven otherwise by in-situ testing at sub-base level by a specialist geotechnical engineer. As a minimum, the subgrade should be proof rolled prior to construction. Some reengineering of the subgrade is required prior to highway construction to achieve the required design CBR value.

Untreated Made Ground should be assumed to have a CBR value of less than 2.5%, unless proven otherwise. Highways Agency document HD25 'Interim Advice Note 73/06 Revision 1' (2009) states that where a subgrade has a CBR value lower than 2.5%, it is considered unsuitable support for a pavement foundation since it would tend to deform under construction traffic and must be improved.



The soils are considered to be frost susceptible due to the fines content and highway construction should be a minimum thickness of 450mm to mitigate the risk.

6.10 Sustainable Urban Drainage System (SuDS)

Soil percolation testing was outside the scope of this investigation, however the use of SuDS drainage within the natural ground is not considered feasible at the site due to the presence of deep Made Ground and cohesive soils which are capable of low soil infiltration rates.

6.11 Slope Stability/Retaining

The three blocks are generally level, however Block A has a gentle slope in an east to west direction. Before any construction begins, the former children's playground should be grubbed up and the ground made level without disturbing the nearby billboard and associated utilities. Furthermore, in Blocks A, B and C, a watching brief should be maintained when excavating the basement structures to ensure no deeper Made Ground or further retaining structures not encountered in either of the investigations result in collapse.

7.0 LAND QUALITY

7.1 Geo-Environmental Testing Results - Soils

Samples of Made Ground and natural strata have been tested for a range of relevant Contaminants of Concern. In accordance with LCRM, a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the concentrations as derived through Geo-Environmental analysis.

The GQRA process comprises the comparison of the actual concentrations measured on site with Generic Assessment Criteria (GACs) for the protection of human health.

The GACs used for the assessment of soil concentrations have been derived using the CLEA model. The GACs used are listed below:

- *Soil Guideline Values (SGVs) which demonstrate minimal risk.*
- *LQM/CIEH S4ULs which use the same toxicological data as the SGVs but different exposure criteria.*
- *C4SLs which demonstrate low risk.*

In deriving the GACs for use on Brownfield sites, we have assumed a 1.0% Soil Organic Matter unless the results indicate otherwise.

The proposed end-use for the site is a residential development comprising 14 No. individual apartments. We have therefore undertaken the GQRA on the basis that the proposed development site falls under the Residential (without Plant Uptake) land-use scenario as defined in SR3 (EA, 2009b).

The strata or sources of contamination targeted by the laboratory testing scheduled is summarised in the table below:

Strata	Number of Samples Tested	Locations
<i>Granular Made Ground</i>	6	<i>TP104, TP105, WS102, WS103, WS106, WS107</i>
<i>Natural Clay</i>	1	<i>TP102</i>

A summary of the Geo-Environmental Testing results is presented below and the GQRA Screening Values are presented in *Appendix 6*:

Metals				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
<i>Arsenic</i>	6.9 – 25.6	40	0	-
<i>Cadmium</i>	<0.1 – 4.6	85	0	-
<i>Chromium</i>	40.6 – 844.7	910	0	-
<i>Hexavalent Chromium</i>	<0.3	21	0	-
<i>Copper</i>	32 – 303	7100	0	-
<i>Lead</i>	33 – 345	310	1	WS106 0.3m
<i>Mercury</i>	0.2 – 0.7	1.2	0	-
<i>Nickel</i>	17.0 – 63.1	180	0	-
<i>Selenium</i>	<1.0 – 2.0	430	0	-
<i>Zinc</i>	65 – 462	40000	0	-

Polycyclic Aromatic Hydrocarbons (PAHs)				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
<i>Naphthalene</i>	<0.04 – 21.14	2.3	1	WS103 0.3m
<i>Acenaphthylene</i>	<0.03 – 0.09	2900	0	-
<i>Acenaphthene</i>	<0.05 – 20.09	31000	0	-
<i>Fluorene</i>	<0.04 – 13.14	2800	0	-
<i>Phenanthrene</i>	0.06 – 107.61	1300	0	-
<i>Anthracene</i>	<0.04 – 20.86	31000	0	-
<i>Fluoranthene</i>	0.08 – 122.20	1500	0	-
<i>Pyrene</i>	0.07 – 97.91	3700	0	-
<i>Benzo(a)anthracene</i>	<0.06 – 42.44	11	1	WS103 0.3m
<i>Chrysene</i>	0.06 – 52.16	30	1	WS103 0.3m
<i>Benzo(b)fluoranthene</i>	0.06 – 51.72	3.9	1	WS103 0.3m
<i>Benzo(k)fluoranthene</i>	0.02 – 20.11	110	0	-
<i>Benzo(a)pyrene</i>	<0.04 – 39.38	3.2	1	WS103 0.3m
<i>Indeno(123cd)pyrene</i>	<0.04 – 26.75	45	0	-
<i>Dibenzo(ah)anthracene</i>	<0.04 – 4.58	0.31	1	WS103 0.3m
<i>Benzo(ghi)perylene</i>	<0.04 – 22.36	360	0	-
TPH CWG - Aliphatics				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
>C5-C6	<0.1	42	0	-
>C6-C8	<0.1	100	0	-
>C8-C10	0.1	27	0	-
>C10-C12	3.2	130	0	-
>C12-C16	16	1100	0	-
>C16-C35	25 – 63	65000	0	-
<i>Total aliphatics C5-35</i>	107	-	-	-
TPH CWG - Aromatics				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
>C5-EC7	<0.1	370	0	-
>EC7-EC8	<0.1	860	0	-
>EC8-EC10	<0.1	47	0	-
>EC10-EC12	49.3	250	0	-
>EC12-EC16	504	1800	0	-
>EC16-EC21	3194	1900	1	WS103 0.3m
>EC21-EC35	4294	1900	1	WS103 0.3m
<i>Total aromatics C5-35</i>	8041	-	-	-
<i>Total aliphatics and aromatics(C5-35)</i>	8148	-	-	-
<i>MTBE</i>	<0.005	49	0	-
<i>Benzene</i>	<0.005	0.38	0	-
<i>Toluene</i>	<0.005	880	0	-
<i>Ethylbenzene</i>	0.007	83	0	-
<i>m/p-Xylene</i>	0.016	79	0	-

<i>o</i> -Xylene	0.015	88	0	-
Others				
Moisture Content: 14.8% – 27.6%				
pH: 6.78 – 8.59				
Organic Matter: 2.1% – 18.2%				
Asbestos Screen				
Position	Depth (m bgl)	Result	Asbestos Type	Quantification (mass%)
TP102	0.80	None Detected	-	-
TP104	0.50	None Detected	-	-
TP105	1.00	Detected	Chrysotile fibre bundles	TBC
WS102	0.50	None Detected	-	-
WS103	0.30	None Detected	-	-
WS106	0.30	None Detected	-	-
WS107	0.30	None Detected	-	-

7.2 Generic Quantitative Risk Assessment - Soils

Made Ground has been encountered to a maximum depth of 2.0m bgl during the supplementary investigation and the Made Ground soils are predominantly granular. Visual evidence of potential contamination was recorded in the Made Ground at TP101 and WS106 where ash was present. Olfactory evidence of potential contamination was noted in WS103 at 0.3m bgl in the form of a faint hydrocarbon odour.

Previous Investigation

The previous investigation encountered Made Ground to a maximum depth of 2.5m bgl and did not record any elevated contaminants of concern, and no asbestos was detected in any of the screened samples.

Metals

All metals tested for were below the relevant screening values, with the exception of Lead in WS106 at 0.3m bgl with a slightly elevated concentration of 345mg/kg compared to the screening value of 310mg/kg.

WS106 is located centrally on Block C, and found granular Made Ground of dark brown black gravelly sand containing brick, sandstone, tarmac, ash and glass beneath a layer of tarmac and sandstone slabs. WS106 is located immediately to the west of TP105, where the basement structure was encountered. The source of the elevated lead is likely ash and tarmac content of the Made Ground soils.

While not above the screening value, a high value of chromium has been recorded in TP104 at 0.5m with a value of 844.7 mg/kg, while the indicative screening value is 910 mg/kg.

Polycyclic Aromatic Hydrocarbons (PAHs)

Several PAHs were recorded above the screening values in the Made Ground in WS103 at 0.3m bgl. Elevated concentrations of Naphthalene (21.14 mg/kg), Benzo(a)anthracene (42.44 mg/kg), Chrysene (52.16 mg/kg), Benzo(b)fluoranthene (51.72 mg/kg), Benzo(a)pyrene (39.38 mg/kg) and Dibenzo(ah)anthracene (4.58 mg/kg) were encountered within grey brown gravelly sand with brick, tarmac, concrete, and chert beneath a layer of tarmac.

A faint hydrocarbon odour was noted at 0.3m bgl and the source of the odour and elevated PAHs is likely to be tarmac fragments encountered within the granular Made Ground. Statistical analysis has not been undertaken with respect to elevated PAHs as the concentrations are significantly elevated.

TPH (Total Petroleum Hydrocarbons) CWG

A faint hydrocarbon odour was noted in WS103 at 0.3m bgl. No olfactory evidence of potential contamination has been recorded in any other location during the two phases of investigation. The source of the odour is likely to be fragments of tarmac which were recorded in the Made Ground at this location.

Elevated concentrations of aromatic hydrocarbon bands EC16-EC21 and EC21-EC35 have been recorded with concentrations of 3194mg/kg and 4294mg/kg recorded respectively, compared to a screening value of 1900mg/kg.

Generally, the concentrations of lighter hydrocarbon fractions recorded in WS103 are low or below laboratory limits of detection. The elevated heavy end hydrocarbons are likely to be associated with tarmac and its constituents encountered at this location. These heavy end hydrocarbons are not considered to be volatile, and no exceedance of vapour saturation limits has been noted.

Asbestos

Samples from seven locations have been screened for asbestos, and asbestos was not detected within any of the samples with the exception of TP105 at 1.0m where Chrysotile fibre bundles were detected. The material comprised brown to black gravelly sand and appeared to be in the locality of a backfilled basement. The source of the asbestos is likely from demolition of the previous buildings.

Asbestos appears to be localised as none has been detected in the other thirteen samples screened from across the three sites.

7.3 Groundwater Analysis

Groundwater sampling and testing was outside the scope of this investigation.

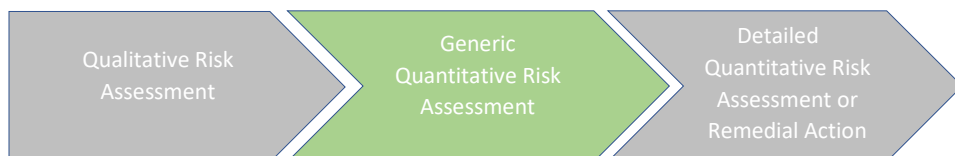
7.4 Permanent Ground Gases

Gas well installation and monitoring were outside the scope of this investigation. The previous investigation and subsequent ground gas assessment classifies the site as CS1 classification and therefore no gas measures are required. The site is in an area where radon precautions are not required within foundations.

7.5 Revised Pollution Linkage Assessment

The pollution linkage assessment has been revised based on the findings of the Ground Investigation and testing in accordance with CIRA C552 to identify any realistic pollution linkages in order to quantify the risks to human health and controlled waters.

Human Health Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process - **the Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
PL1	Contaminated Soils	Ingestion of soil and dust. Dermal contact with soil.	Low Likelihood	Medium	Moderate	<i>Pollution Linkage 1 refers to proposed site users coming into contact with contaminated soils on the site.</i> <i>The northernmost site currently comprises a tarmac surfaced car park with substation in the south east. The southernmost site comprises a soft landscaped grassed area in the east and a tarmac surfaced area to the west.</i> <i>Made Ground has been encountered in all locations to a maximum depth of 2.0m bgl, and generally comprised dark brown black gravelly sand with constituents of brick, tarmac, sandstone, concrete, ceramics, plastic, glass, wood, metal, fabric, and chert. Visual evidence of potential contamination was noted at locations TP101 and WS106 where ash was present within the Made Ground. Olfactory evidence of potential contamination was noted in WS103 at 0.3m bgl where a faint hydrocarbon odour was noted.</i>

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
						Previously, no olfactory or visual evidence of potential contamination was noted and no elevated contamination or asbestos was detected based on the site having a residential end use without plant uptake. A single elevated concentration of lead was recorded in the granular Made Ground in WS106 at 0.3m bgl. The source is likely to be associated with ash and tarmac within the Made Ground soils. Elevated concentrations of several PAHs including naphthalene were recorded in WS103 at 0.3m bgl, associated with the granular Made Ground where a faint hydrocarbon odour was noted. Two elevated concentrations of TPH CWG were also recorded in this location for Aromatic hydrocarbon bands EC16-EC21 and EC21-EC35. The source of the faint odour, elevated PAHs and TPH CWG is likely to be the tarmac constituents within the Made Ground at this location. No elevated PAHs or hydrocarbons were recorded anywhere else across the three sites and no evidence of free phase has been recorded. Asbestos was encountered in the form of loose Chrysotile bundles in TP105 at 1.0m, likely associated with the backfilled basement structure with the asbestos source being previously demolished buildings. Asbestos appears to be localised as it was not detected in any other samples from both phases of investigation. The proposed development is for new build apartments with associated hardsurfaced driveways, patios and soft landscaped yards. Where hardsurfacing or the proposed buildings are present, there is not considered to be a risk as the surfacing will break the pathway to contaminated soils.

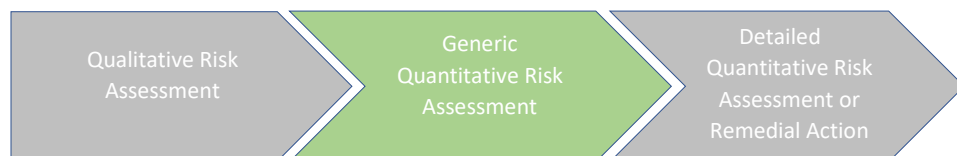
Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
						However, a pollution linkage is considered to exist in any areas of soft landscaping as elevated lead, PAHs and TPH CWG have been recorded as well as asbestos in a single location.
PL2	Contaminated Soils	Inhalation of vapour.	Low likelihood	Medium to Severe	Low	Pollution Linkage 2 refers to volatile vapours migrating into confined spaces within the proposed development. Olfactory evidence of hydrocarbon contamination was recorded in WS103 at 0.3m bgl where a faint hydrocarbon odour was noted. No other visual or olfactory evidence of hydrocarbon contamination has been recorded. Elevated concentrations of aromatic hydrocarbon bands EC16-EC21 and EC21-EC35 have been recorded in WS103 at 0.3m bgl. These heavy end fractions are not considered volatile, and the source is considered to be tarmac within the Made Ground at this location. Lighter hydrocarbon fractions at this location recorded low concentrations or were below laboratory detection limits. Exceedances of vapour saturation limits have not been recorded for TPH CWG. A single significantly elevated concentration of Naphthalene was also recorded in WS103 at 0.3m bgl with a concentration of 21.14mg/kg, as well as other elevated PAHs. Naphthalene is a volatile PAH and WS103 is located on the edge of the building footprint for Block A. However, the source of the concentrations is solid tarmac gravel locally in the Made Ground. It is proposed to strip the Made Ground and removed as part of the proposed development in order to reduce site levels. The Made Ground in WS103 was encountered to a maximum depth of 0.5m bgl, therefore all of the Made Ground and source is to be removed.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
PL3	Contaminated Soils	Inhalation of soil dust by adjacent site users.	Unlikely	Medium	Low	<i>Pollution Linkage 3 relates to contamination on the subject site affecting adjacent site users. Significant mobile contamination has not been identified as the hydrocarbon concentrations recorded are likely to be associated with tarmac within the Made Ground as no free phase hydrocarbons were noted. A plausible pollution linkage has not been identified.</i>
PL4	Contaminated Soils	Attacking potable water supply pipe.	Low likelihood	Medium	Moderate	<i>Pollution Linkage 4 refers to the possible contaminants permeating potable water supply pipes and consumption by the future site end users of the tainted water supply.</i> <i>Made Ground is present to depths up to 2.5m bgl therefore, it will be present at water supply pipe installation depth. Organic contamination has been recorded in WS103 adjacent to Block A where elevated concentrations of TPH CWG have been recorded.</i> <i>New water supply pipes will be included as part of the proposed development, and it is recommended that a local water company risk assessment is carried out to ensure the correct water supply pipes are installed.</i>
PL5	Ground Gas	Migration and accumulation of ground gas in internal spaces.	Unlikely	Medium to Severe	Low	<i>Made Ground was encountered beneath the site up to a maximum depth of 2.5m bgl when considering both phases of investigation.</i> <i>A ground gas risk assessment was carried out by Groundtech Consulting and placed the site in Characteristic Situation 1 / Green Traffic Light Zone and gas protection</i>



Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
						measures are not considered necessary. In addition, the site is not located in an area requiring radon precautions.

Controlled Waters Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process – **Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	Rationale
PL6	Contaminated Soils	Impaction of groundwater from soil contamination (diffuse and point). Impaction of groundwater from groundwater plume.	Unlikely	Medium	Low	Made Ground has been encountered to a maximum depth of 2.5m bgl and generally comprised dark brown gravelly sandy topsoil or tarmac surfacing underlain by brown to black gravelly sand. Elevations of several PAHs have been recorded in WS103 at 0.3m bgl, and elevated concentrations of Lead have been recorded in WS106 at 0.3m bgl. Elevated concentrations of TPH CWG bands EC16-EC21 and EC21-EC35 have also been recorded in WS03 at 0.3m bgl where a faint hydrocarbon odour was noted. The odour and elevated concentrations are likely to be associated with tarmac in the Made Ground soils. No free phase has been observed and evidence of hydrocarbon contamination was not recorded across the remainder of the sites. Groundwater was encountered at depths of 2.45m bgl in WS102 and at 3.45m bgl in WS105, within the natural Clay, during the supplementary investigation. Groundwater was only encountered within the natural Clay during the previous investigation, indicating it is not in contact with the Made Ground soils. The Made Ground across the site is underlain by impermeable natural clay deposits which will have prevented the downward migration of any mobile contamination.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	Rationale
						Geological maps indicate that the site is underlain by the Old Lawrence Rock (Secondary Aquifer). Hardsurfacing will be included as part of the proposed development and a new drainage system will be installed which will reduce the infiltration and potential leaching of localised contaminants. The localised elevated hydrocarbon concentrations are not considered to be a significant source and are likely associated with tarmac in the Made Ground, which is underlain by impermeable Clay, so no pathway exists for downward migration, therefore the risk is considered to be Low.
PL7	Contaminated Soils	Migration of soil and groundwater contamination impacting surface waters.	Unlikely	Medium	Low	Pollution Linkage 7 refers to the impaction of surface waters. The nearest named watercourse is the Hey Brook located c.687m to the east of the site. A significant source of mobile contamination has not been identified and a receptor is not considered to exist in close proximity to the site. No realistic pollution linkage is considered to exist.

7.6 Outline Remedial Strategy

Soils

Elevated concentrations of lead have been recorded in WS106 at 0.3m bgl in the vicinity of Block C and asbestos has been recorded in TP105 at 1.0m bgl in the vicinity of Block C. Elevated concentrations of PAHs and TPH CWG have been recorded in WS103 at 0.3m bgl in the vicinity of Block A.

The development will be largely covered in hardsurfacing or the proposed buildings, effectively acting as a cover system which would break the pathway to the underlying contaminated soils. Where soft landscaped areas are proposed, it is recommended that a clean cover layer is installed to mitigate the risk from lead, PAHs, TPH CWG and asbestos.

A 600mm thick, clean cover system overlying a contamination warning membrane or demarcation layer is recommended for areas of soft landscaping where Made Ground is present at formation level. Where natural soils are encountered, it is recommended that a nominal 150mm of clean suitable topsoil is provided in soft landscaped areas to provide a suitable medium for plant growth.

Vapours

The Made Ground in WS103 recorded elevated concentrations of naphthalene due to tarmac which may pose a vapour risk to the residents of Block A, however unlikely due to the solid nature of the tarmac gravel locally in the Made Ground. The Made Ground in WS103 was a maximum depth of 0.5m and will be stripped to accommodate the cover system and piling matt removing the potential source. The piling matt to be installed in Block A comprises clean imported 6F2 crush material, and no further action is required.

Topsoil

The topsoil can be reused in areas of soft landscaping, based on the testing undertaken to date or removed from the site if there is a surplus. The topsoil may need sorting to remove any anthropogenic constituents such as glass and brick. It is not however suitable to be used as a growing medium for home produce as the development has been assessed against the residential screening criteria without plant uptake. Further testing of the topsoil is recommended prior to reuse at the site as only a limited number of samples have been tested.

Further Investigation

No further investigation was undertaken on the central parcel of land and further investigation and environmental testing is required in this area once the sheds have been demolished.

Obstructions associated with former basements will require grubbing out as part of the enabling works.

Groundwater

No remediation with respect to controlled waters is required due to lack of significant mobile contamination recorded and underlying impermeable clay soils.

Ground Gas

The Ground Gas Risk Assessment placed the site within CS1 classification, meaning no gas measures will be required within foundations for the proposed development. The site is not in an area requiring radon precautions.

Watching Brief

A watching brief should be in place during ground works and construction. If previously unidentified contamination is encountered, work should cease in that area and Groundtech Consulting contacted for advice.

Regulatory compliance should be obtained pre-commencement to avoid delays during the construction phase which will have cost implications.

7.7 Asbestos in Soils

Asbestos has been encountered in TP105 at 1.0m bgl, within the granular Made Ground beneath Block C in the form of Chrysotile fibre bundles. The asbestos quantification results are currently outstanding and will be assessed upon receipt. The cover system implemented where Made Ground soils are present will break the pollution linkage to this material.

Where soils will be disturbed as part of the ground works, in accordance with the Joint Industry Working Group (JIWG) decision support tool for CAR2012 work categories, the combined hazard and exposure ranking is *Low* for the asbestos detected at trace levels. The work is classified as non-licensed, and CAR does not apply. RPE, dust suppression and decontamination are not required.

The JIWG tables are presented in *Appendix 7*. This should be used as an aid to classify risk and recommend the level of protection required, the final decision on how asbestos within the soils should be managed should be made by the contractor.

7.8 Health and Safety - Construction and Ground Workers

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:

Pollution Linkage Ref	Potential Source	Pollution Linkage	Likelihood	Severity	Level of Risk
PL8	Made Ground	Ingestion, direct inhalation of dusts.	contact, Low likelihood to Likely	Medium	Moderate
PL8	Asbestos	Ingestion, direct inhalation of dusts.	contact, Unlikely	Medium	Low

The risk from metals, speciated PAHs, TPH CWG and asbestos should be communicated to ground workers through a site induction and information made available on noticeboards.

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.*

7.9 Waste Classification by Assessment

We have reviewed the testing results and inputted them into the HazWasteOnline model which allows users to code and classify waste as defined in the EWC (European Waste Catalogue 2002) 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 (1st edition 2015)-Technical Guidance”).

This is a useful tool as waste producers have the legal responsibility to classify any waste they produce.

Seven samples were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3. The results are in the Waste Classification Report presented in *Appendix 8*.

Sample Name	Depth (m bgl)	Classification Result	Hazardous Properties
TP102	0.80	Non-Hazardous	-
TP104	0.50	Non-Hazardous	-
TP105	1.00	Non-Hazardous	-
WS102	0.50	Non-Hazardous	-
WS103	0.30	Non-Hazardous	-
WS106	0.30	Non-Hazardous	-
WS107	0.30	Non-Hazardous	-

Based on the HazWasteOnline assessment tool, the Made Ground soils have been classified as Non-Hazardous for waste disposal purposes.

A single sample of the natural soils was tested from TP102 and also classified as Non-Hazardous.

In the previous investigation, WS05 at 0.3m bgl was classified as Hazardous, with high levels of Copper and Zinc detected. WS05 was located near the basement structure in Block C, however TP105 at 1.0m bgl has not detected any hazardous material, indicating this material is localised.

Asbestos fibre bundles were encountered in TP105 at 1.0m bgl and quantification will confirm whether it is Non-Hazardous.

7.10 Waste Acceptance Criteria (WAC) Results

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste) led to the establishment of a methodology for classifying wastes. Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. There are three different WAC, these are for:

- *Inert waste*
- *Non-hazardous waste*
- *Hazardous waste*

Wastes should first be classified based on their total concentrations as detailed in the previous section. WAC testing is then required if the end disposal route is a landfill.

Waste Acceptance Criteria (WAC) testing was outside the scope of this investigation and the guidance given below is general.

The possibility of automatic inert classification of the natural 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 their disposal in other classes of landfill.*

If any organic 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.

Materials should be segregated and where necessary, sufficient time is allowed to further classify the material properly, including discussion with landfill sites and waste transfer stations to find the best disposal route. It is recommended that where possible, the soils could be recycled at a suitable local waste treatment plant or transfer station rather than a landfill disposal route.

The reuse of soils on the site this should be done in accordance with the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE CoP). Any re-use scheme should be designed to minimise disposal costs.

After a cut and fill balance plan/volume calculation has been carried out, a U1 and T5 exemption could be registered. This will allow the use of the following soils without a waste permit or under Dow CoP MMP:

- *1,000 tonnes (c. 600m³) of non-hazardous soil.*
- *5,000 tonnes (c. 3,000m³) of natural sand and gravels.*
- *50,000 tonnes (c. 25,000m³) of bituminous material to be used in roadways.*
- *5,000 tonnes (c. 3,000m³) of crushed concrete/stone.*

8.0 FINAL APPRAISAL

8.1 Land Quality

Made Ground of variable thickness was encountered beneath the site to a maximum depth of 2.5m bgl, when considering both phases of investigation, and generally comprised dark brown sandy gravelly topsoil or tarmac surfacing overlying dark brown to black gravelly sand. The underlying natural strata generally consisted of firm sandy gravelly Clay was encountered to a maximum depth of 4.0m bgl. Sandstone bedrock was encountered in both phases of investigation from depths between 2.1m and 3.7m bgl. Visual evidence of potential contamination was recorded in the Made Ground soils of TP101 and WS106 where ash was present. Olfactory evidence of potential contamination was noted in WS103 at 0.3m bgl in the form of a faint hydrocarbon odour.

Geo-environmental testing indicates there are elevated concentrations of lead in TP104 at 0.5m, and elevated concentrations of varying PAHs in WS103 at 0.3m bgl when compared to residential screening values (without plant uptake). Elevated TPH CWG bands EC16-EC21 and EC21-EC35 have also been recorded in WS103 at 0.3m bgl where a hydrocarbon odour was noted. Asbestos was detected in TP105 at 1.0m bgl in the form of Chrysotile fibre bundles.

The proposed development includes areas of soft landscaping and a pollution linkage is currently considered to exist. The risk is considered *Moderate*. A 600mm clean cover layer with a contamination demarcation layer is recommend in soft landscaped areas where Made Ground soils are present at formation level.

The Made Ground in WS103 will be removed as part of the enabling works to accommodate the cover system and piling matt, effectively removing the potential source.

Made Ground was recorded at typical potable water supply pipe installation depth and exceedances have been recorded when compared to residential screening values (without plant uptake). There is considered to be a *Moderate* risk to potable water supply pipes. A local water company risk assessment should be undertaken to determine to correct specification of water pipe to be used.

No mobile contamination has been observed and the risk to controlled waters is considered to be *Low*.

The previously completed Ground Gas Risk Assessment places the site in CS1 and gas precautions are not required for the proposed development. The site does not require any radon protective measures. The risk from permanent ground gases is considered to be *Low*.

The topsoil is considered suitable for reuse based on the limited testing undertaken to date. The textural suitability of the topsoil should be confirmed once stripped and stockpiled and further chemical testing is recommended to confirm the suitability.

All soils screened from the supplementary investigation have been classified as Non-Hazardous for waste disposal purposes.

Suitable measures should be in place during the removal of the existing sheds in Block B to ensure that the postulated asbestos cement sheeting does not release fibres and impact the surrounding area and surface soils. Further investigation is required on the central plot once the sheds have been demolished.

8.2 Ground Engineering

The most suitable foundations for Block C are considered to be trench fill foundations constructed within the underlying natural medium to high strength Clay. Basement structures will require grubbing out and foundations will require deepening through the Made Ground encountered up to 2.35m bgl.

Due to the soft Clay encountered beneath the southern corner of Block A to 3.7m bgl, the most suitable foundations are considered to be mini piles, end bearing within the Sandstone bedrock encountered at circa 4.0m bgl.

No further investigation of the central parcel has been undertaken and the previous recommendations are still relevant and supplementary investigation is required.

Consideration will be required for the basement structures encountered beneath all three areas of the site.

Foundations should be altered in accordance with appropriate guidance when building near trees.

SuDS drainage is unlikely to be feasible at the site due to the deep Made Ground and underlying cohesive strata which will exhibit poor soil infiltration rates.

Block A slopes gently upwards in an east to west direction, and foundations should be adjusted to finished site levels once the former children's playground has been grubbed and removed.

CBR values between 2% and 3% are likely to be achieved in undisturbed natural cohesive soils for pavement design purposes. Untreated Made Ground should be assumed to have a CBR value of less than 2.5%, unless proven otherwise.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

8.3 Required Supplementary Investigation

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

Demolition Asbestos survey.

Further supplementary investigation of Block B post-demolition.

Design of remedial strategy.

Detailed foundation design.

Tree survey by qualified arboriculturist

Confirmation of the recommendations of this report with Regulators.

9.0 RELEVANT INDUSTRY REFERENCES

- British Standards Institution. *Investigation of Potentially Contaminated sites - code of practice*. BS 10175:2017.
- British Standards Institution '*Code of Practice for Site Investigations*' BS 5930:2020
- British Standards Institution "*Geotechnical investigation and testing – Identification and classification of soil*" BS EN ISO 14688:2002.
- British Standards Institution "*Geotechnical investigation and testing – Identification and classification of rock*" BS EN ISO 14689:2002.
- BRE Report BR211 '*Radon – Guidance on protective measures for new buildings*' 2015 Edition.
- BRE Special Digest 1: "*Concrete in Aggressive Ground*" 3rd Ed 2005.
- CIRIA 552 "*Contaminated Land Risk Assessment – A guide to good practice*" 2001.
- CIRIA C665 "*Assessing Risks Posed by Hazardous Ground Gases to Buildings*" 2007.
- Wilson & Card "*Proposed method classifying gassing sites*" Ground Engineering 1999.
- Card & Steve Wilson in "*A pragmatic approach to ground gas risk assessment for the 21st Century*" - CIRIA/Environmental Protection UK Ground gas seminar 2011
- BS 8576:2013 '*Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)*'
- BS 8485:2015 '*Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings*'
- The Hazardous Waste (England) Regulations 2005.
- Environment Agency Hazardous Waste: "*Guidance on the classification and assessment of waste*" WM3 ver 1 May 2015.
- The National Planning Policy Framework (NPPF) March 2012
- DETR. Circular 02/2000 Contaminated Land.
- Environment Agency, 2009 'Using Soil Guideline Values'.
- Environment Agency, 2009 'Updated Technical Background to the CLEA model'.
- Environment Agency, 2009 'Human health toxicological assessment of contaminants in soil'.
- Department of the Environment, 1994, CLR Report No 1 'A framework for assessing the impact of contaminated land on groundwater and surface water'.
- Department of the Environment, 1994, CLR Report No 2 'Guidance on Preliminary Site Inspection of Contaminated Land'.
- Department of the Environment, 1994, CLR Report No 3 'Documentary research on Industrial Sites'.
- Department of the Environment, 1994, CLR Report No 4 'Sampling Strategies for Contaminated Land'.
- DEFRA and the Environment Agency, 2002-2004, CLR10 'Soil Guideline Value Reports for Individual Soil Contaminants'.
- Land Contamination Risk Management (LCRM), April 2021.
- Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R. C. and Nathanail, J.F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham.
- CL:AIRE, 2014 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'.
- Water Framework Directive.
- Environmental Quality Standards.

UK Drinking Water Standards: Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) and Water Supply (Water Quality) Regulations

UKWIR Report 10/WM/03/21 2010 "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites"

Health & Safety Executive, 1991. 'Protection of Workers & the General Public during the Development of Contaminated Land'.

Environment Agency & NHBC, 2000. R&D Publication 66. Guidance for the Safe Development of Housing on Land Affected by Contamination.

Environment Agency "Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3"

NHBC Standards 2023

CL:AIRE "*The Definition of Waste: Development Industry Code of Practice*" Version 2 March 2011.

CIRIA "*Asbestos in soil and made ground: a guide to understanding and managing risks*" C733 2014

Control of Asbestos Regulations (CAR) 2012

Harris, M R, Herbert, S. M, Smith, M A 'Remedial Treatment for Contaminated Land' (twelve volumes), special publications 101-112, CIRIA 1996.

Department of the Environment. 1995. Industry Profiles - 48 separate publications available from The Stationery Office, London

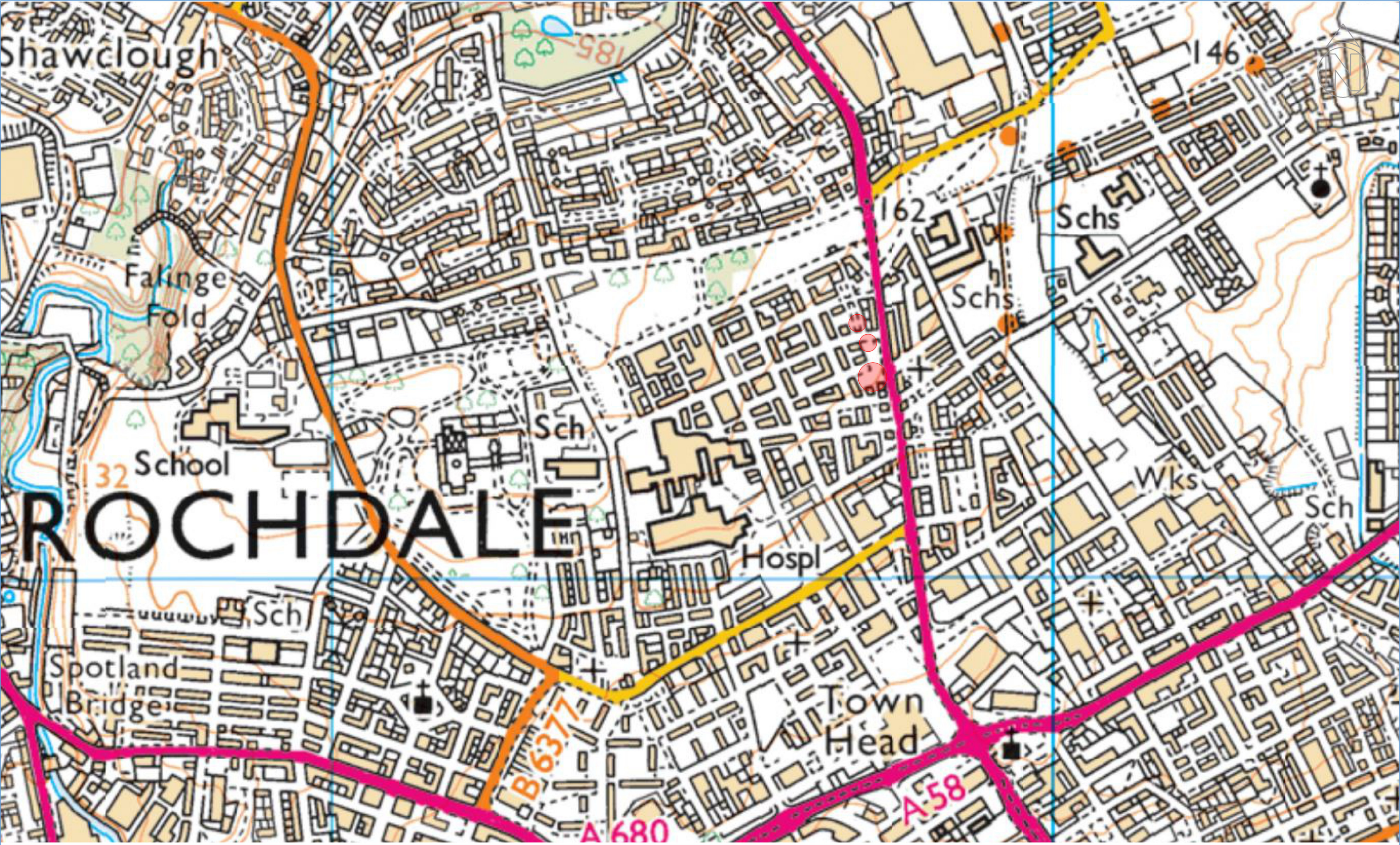
BRE Digest 365 "Soakaway Design" 2015.

Environment Agency. R&D Publication 20. Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources. 1999.

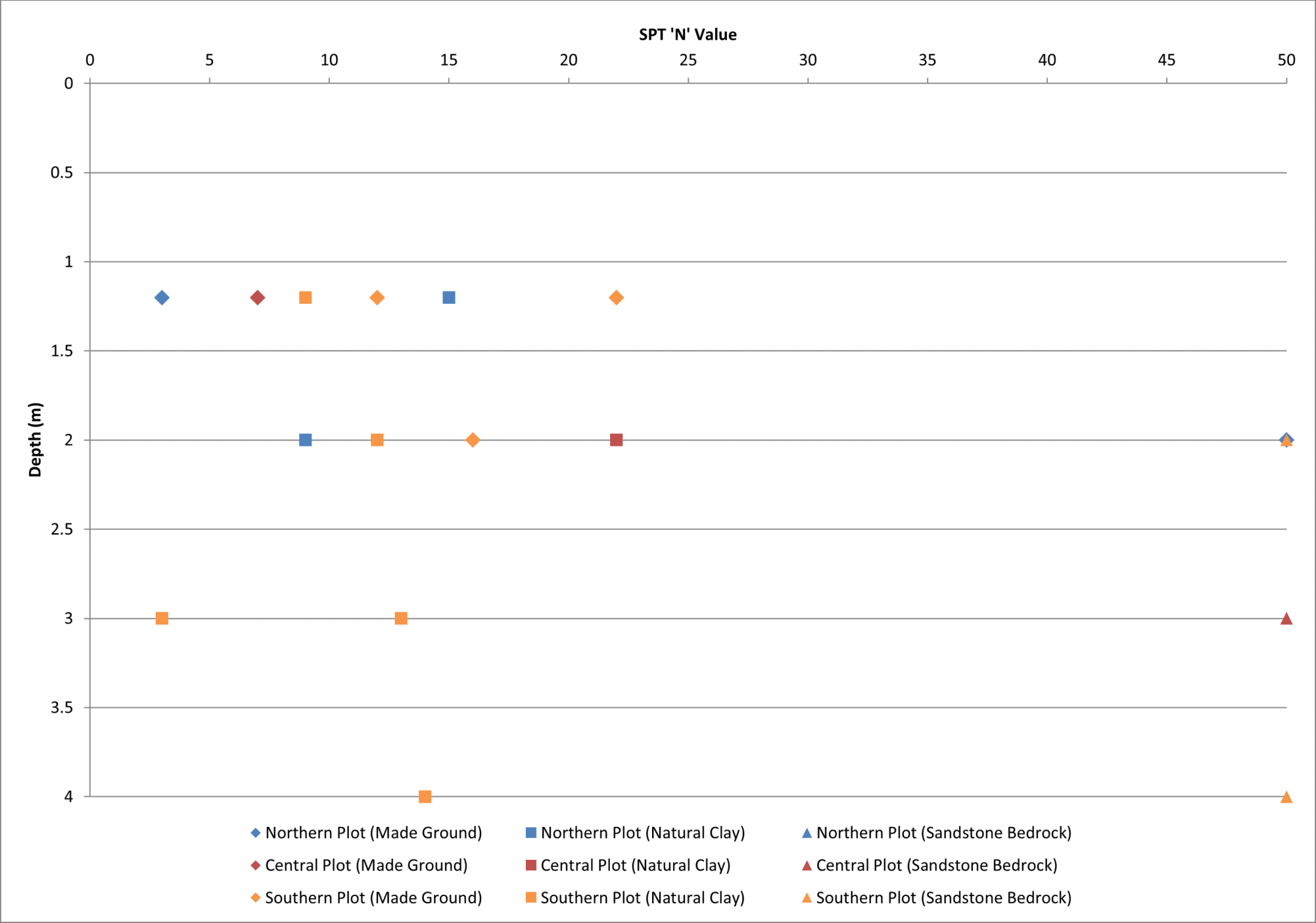
Environment Agency Technical Guidance Note 01. Hydrogeological Risk Assessment for Landfills.

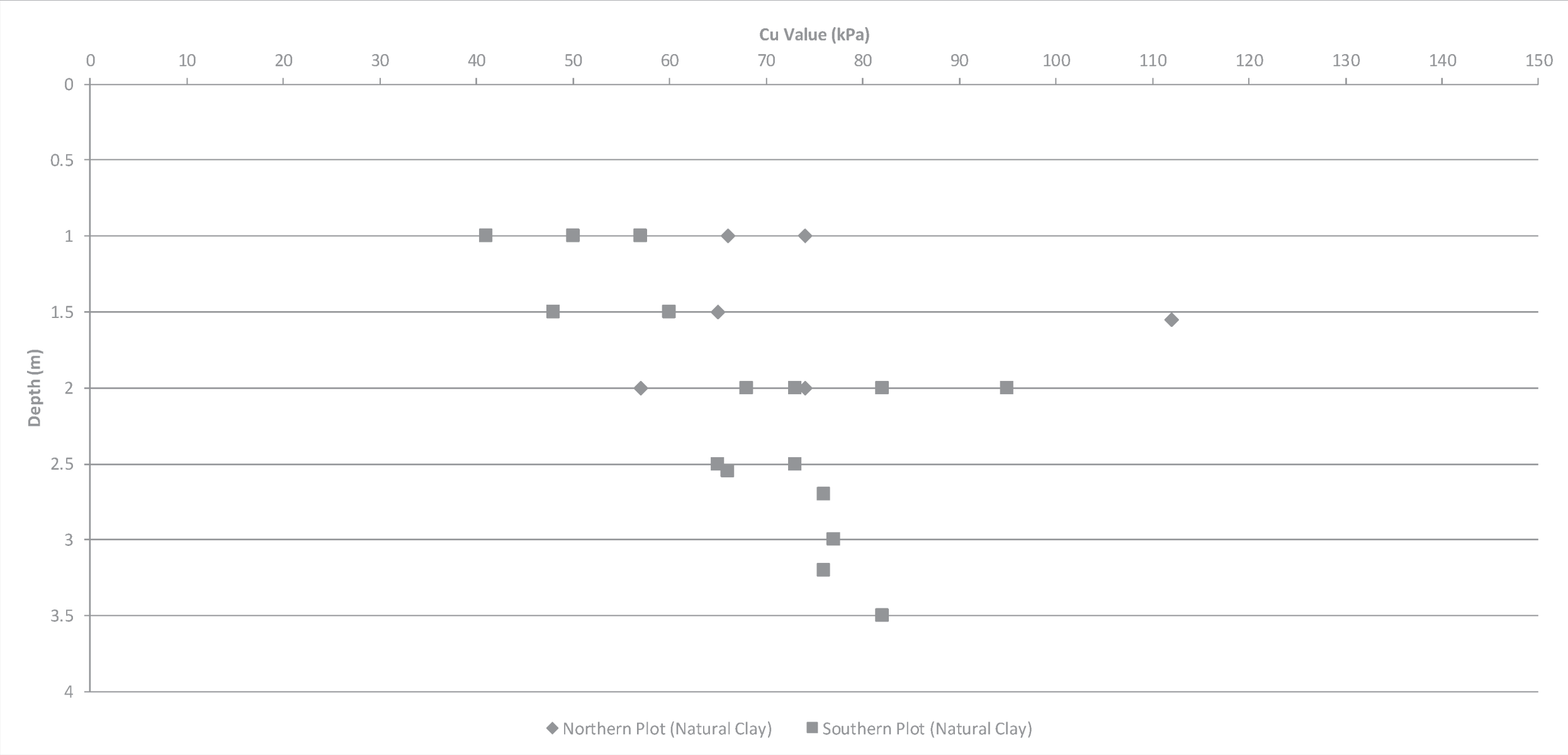
Specification for Highways Works – Series 600 Earthworks November 2017.

APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT	DATE				Status		Notes SITE LOCATION
	CORNERSTONE PLACE	JUNE 2022				Preliminary		
	PROJECT TITLE	SCALE				Draft		
	WHITWORTH ROAD, ROCHDALE	NTS				Issued		
	PLAN TITLE	PLAN NUMBER				For Comment		
	PROJECT LOCATION PLAN	GRO-22083-P01	Rev.	Details	Date	Approved		





SOURCES

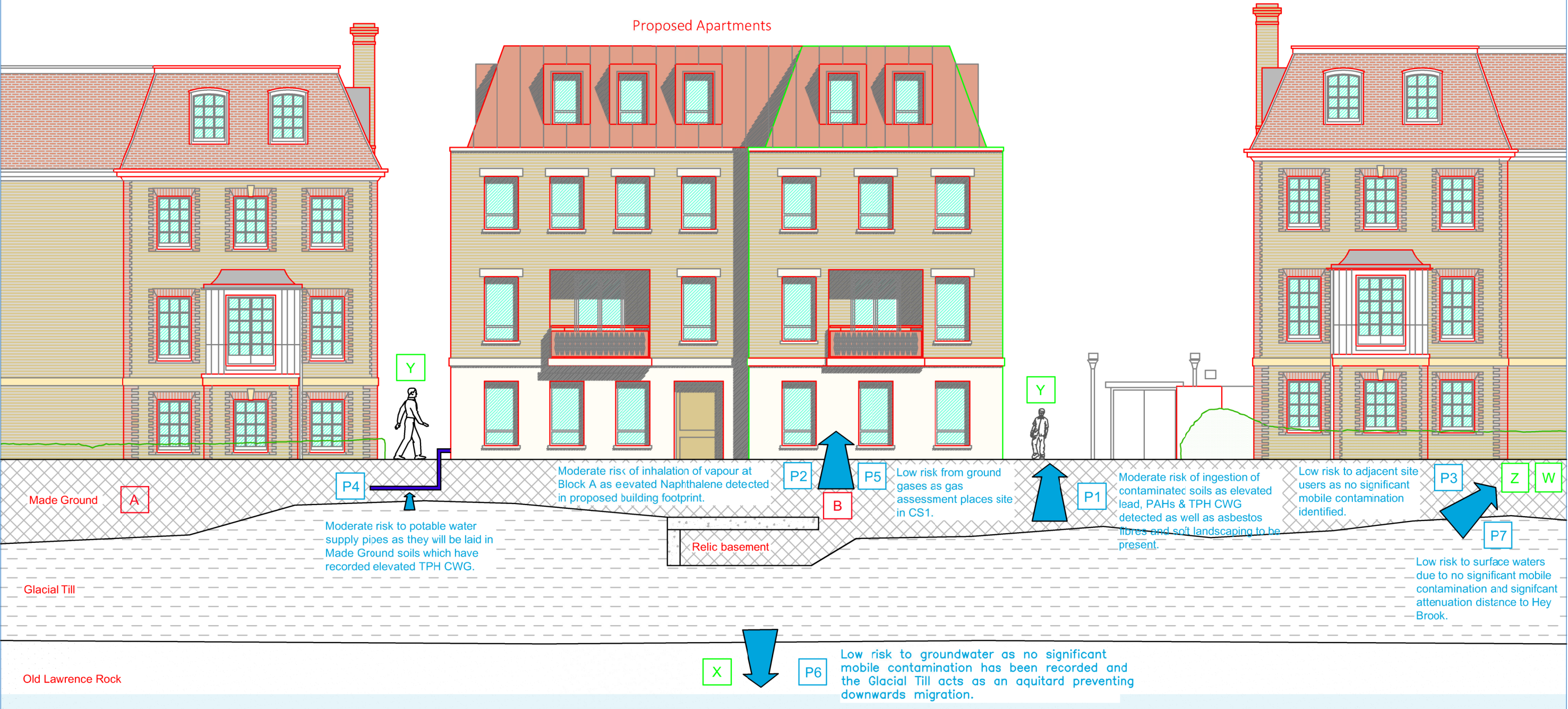
A. Contaminated soils / Made Ground.
B. Ground gas.

POLLUTION LINKAGES

P1. Ingestion of soil and dust.
P2. Inhalation of vapour.
P3. Inhalation of soil dust by adjacent site users.
P4. Attacking of potable water supply pipe.
P5. Migration and accumulation of ground gas in internal places.
P6. Impaction of groundwater from soil contamination.
P7. Migration of soil and groundwater contamination impacting surface waters.

RECEPTORS

W. Hey Brook located c.690m east.
Y. Site end users.
X. Groundwater within the Secondary A Aquifer.
Z. Adjacent site users.



GROUNDTECH CONSULTING	CLIENT	DATE	1.1	Updated following supplementary inv.	March 2023	Status	Notes
	CORNERSTONE PLACE	JUNE 2022				Preliminary	
	PROJECT TITLE	SCALE				Draft	
	WHITWORTH ROAD, ROCHDALE	NTS				Issued	
	PLAN TITLE	PLAN NUMBER				For Comment	
	ILLUSTRATIVE CSM	GRO-22083-P04	Rev.	Details	Date	Approved	



APPENDIX 2 - Site Photographs



Photograph 1 – Sheds currently present on Block B.



Photograph 2 – Block C in the north.



Photograph 3 – The former children's playground on Block A.



Photograph 4 – TP101



Photograph 5 – TP102



Photograph 6 – TP103



Photograph 7 – TP104



Photograph 8 – TP105 Showing basement walls



Photograph 9 – Brick wall in side of TP105

APPENDIX 3 - Exploratory Hole Logs



GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

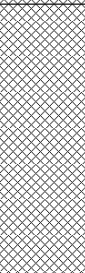
Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.20	ES		0.30			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick.	1		
		0.50	ES					MADE GROUND: Dark brown black gravelly fine to coarse sand with a high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, fabric, and sandstone.			
		1.00	D	N=6 (2,5/2,2,1,1)	1.20			Firm orange brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite.			
		1.20									
		1.50	ES								
		1.70	D	N=50 (6,9/50 for 15mm)	2.00						
		1.90									
End of borehole at 2.00 m									2		
									3		
									4		
									5		

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. No groundwater encountered. 4. Hole terminated due to dense cobbles. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10			MADE GROUND: Tarmac.	
		0.50	ES					MADE GROUND: Dark brown black gravelly fine to coarse sand with a high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, tarmac, concrete, and sandstone.	
		1.00	ES		0.90				
		1.20		N=7 (1,1/1,2,2,2)					
		1.50	D						
		2.00	D						
		2.00		N=12 (4,3/3,3,3,3)					
		2.50	D						
		2.90	D		2.80				
		3.00		N=50 (9,12/50 for 10mm)	3.00			Very dense grey sandy silty clayey angular to subrounded fine to coarse GRAVEL of mixed lithologies including sandstone, siltstone and mudstone. Sand is medium to coarse.	
								End of borehole at 3.00 m	

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 2.45m bgl. 4. Hole terminated due to dense gravels. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			MADE GROUND: Tarmac.	
		0.30	ES					MADE GROUND: Grey brown gravelly medium to coarse sand. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, tarmac, concrete, and chert. <i>Faint hydrocarbon odour at 0.3m bgl.</i>	
					0.50			Firm grey brown sandy gravelly CLAY. Sand is medium to coarse with a low cobble content of sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone, siltstone, mudstone, and chert.	
		0.70	ES						
		1.00	D						1
		1.20		N=16 (1,1/2,3,5,6)					
		1.50	D						
		1.70		N=50 (6,9/50 for 10mm)					
		1.80	D						
					2.00			Becoming very gravelly at 1.8m bgl.	
								End of borehole at 2.00 m	2
									3
									4
									5

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. No groundwater encountered. 4. Hole terminated due to dense cobbles. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.20			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick.	1
		0.50	ES					MADE GROUND: Dark brown black gravelly fine to coarse sand with a high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick and sandstone.	
		1.00	ES		0.90			Firm orange brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone.	
		1.20		N=50 (7,10/50 for 10mm)	1.20			End of borehole at 1.20 m	
									2
									3
									4
									5

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 0.8m bgl. 3. No groundwater encountered. 4. Hole terminated due to dense cobbles. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=9 (9,7/6,1,1,1)	0.20			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick.	1
		0.50	ES					MADE GROUND: Dark brown black gravelly fine to coarse sand with a high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick and sandstone.	
		1.00			1.10				
		1.20	ES	N=10 (2,1/1,2,4,3)				Firm orange brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone.	2
		1.50	D		1.80				
		1.90	ES					Stiff grey sandy gravelly CLAY. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone.	
		2.00	D					Moderate organic odour at 1.9m bgl.	
		2.00							
		2.50	D	N=6 (4,3/2,2,1,1)				Becoming soft at 2.6m bgl.	3
		3.00	D		3.00			Soft to firm grey sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone.	
		3.00							
		3.50	D	N=50 (6,10/50 for 10mm)	3.70			Very weak light brown SANDSTONE residually weathered recovered as sandy angular to subangular fine to coarse gravel.	4
		4.00			4.00			Becoming very gravelly at 3.7m bgl.	
								End of borehole at 4.00 m	5

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 3.45m bgl. 4. Hole terminated due to sandstone bedrock. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			MADE GROUND: Tarmac.	
					0.20			MADE GROUND: Sandstone slab.	
		0.30	ES					MADE GROUND: Dark brown black gravelly medium to coarse sand. Gravel is angular to subangular fine to coarse of mixed lithologies including brick, tarmac, sandstone, ash, and glass.	
		0.80	ES		0.70			Firm grey brown sandy gravelly CLAY with high cobble content of sandstone. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone.	1
		1.00	D						
		1.00		N=12 (1,1/1,3,4,4)					
		1.50	D						
		2.00	D		2.00				2
		2.00		N=50 (6,9/50 for 30mm)					
									3
									4
									5
								End of borehole at 2.00 m	

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. No groundwater encountered. 4. Hole terminated due to dense cobbles. 5. Backfilled with arisings.





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS107

Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -

Hole Type
WS

Location: ROCHDALE

Level:

Scale
1:25

Client: CORNERSTONE PLACE

Dates: 08/02/2023 -

Logged By
JR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			MADE GROUND: Tarmac.	
		0.30	ES					MADE GROUND: Dark brown black gravelly medium to coarse sand. Gravel is angular to subangular fine to coarse of mixed lithologies including brick, tarmac, and sandstone.	
		0.80	ES		0.70			Firm grey brown sandy gravelly CLAY with a high cobble content of sandstone. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite.	1
		1.00	D	N=10 (1,1/2,2,3,3)					
		1.00							
		1.50	D						
		2.00	D	N=29 (5,6/8,8,7,6)	2.00			Firm grey sandy CLAY with a high cobble content of sandstone. Sand is fine to coarse.	2
		2.00							
		2.50	D						
		2.90			2.90				
		3.00	D	N=50 (6,9/50 for 10mm)	3.00			Very weak light brown SANDSTONE residually weathered recovered as sandy angular to subangular fine to coarse gravel.	3
		3.00						End of borehole at 3.00 m	

Remarks

1. Location cleared with CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. No groundwater encountered. 4. Hole terminated due to sandstone cobbles. 5. Backfilled with arisings.



Trial Pit Log

Trialpit No
TP101
Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -
Level:

Date
07/02/2023

Location: ROCHDALE

Dimensions
(m):

Depth
2.50

Scale
1:25

Logged
JR

Client: CORNERSTONE PLACE

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			MADE GROUND: Tarmac.	
				0.20			MADE GROUND: Sandstone slab.	
	0.30	ES					MADE GROUND: Dark brown black gravelly medium to coarse sand. Gravel is angular to subangular fine to coarse of mixed lithologies including brick, tarmac, and sandstone. <i>Pipe encountered on western wall of pit at 0.4m bgl.</i>	
	0.80	ES	HVP=74	0.70			Medium strength firm orange brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to coarse of mixed lithologies including sandstone, coal, and quartzite.	1
	1.00	D		1.10			Medium strength firm dark grey brown sandy silty slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone, coal, and quartzite.	
	1.50	D	HVP=65					
	2.30	D		2.20			Grey brown silty fine to medium SAND.	2
				2.50			End of pit at 2.50 m	3
								4
								5

Remarks: 1. Location cleared with CAT scanner. 2. No groundwater encountered. 3. Hole backfilled with arisings.

Stability: Stable



Trial Pit Log

Trialpit No
TP102
Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -
Level:

Date
07/02/2023

Location: ROCHDALE

Dimensions
(m):

Scale
1:25

Client: CORNERSTONE PLACE

Depth
2.30

Logged
JR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES	HVP=41	0.30			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, sandstone, ceramics, and glass.	1
	0.50	ES		0.60			MADE GROUND: Dark brown black gravelly fine to coarse sand with high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, sandstone, concrete, and ceramics.	
	0.80	ES					Medium strength firm orange brown sandy gravelly CLAY with low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite.	
	1.00	D					Brick wall encountered on southern side of pit from 0.9m to 1.5m bgl.	
	1.50	D	HVP=73	2.00				2
	2.20	D						
	2.20	ES		2.30			Medium strength stiff grey sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, coal, and quartzite.	
							End of pit at 2.30 m	3
								4
								5

Remarks: 1. Location cleared with CAT scanner. 2. No groundwater encountered. 3. Hole backfilled with arisings.

Stability: Stable



Trial Pit Log

Trialpit No
TP103
Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -
Level:

Date
07/02/2023

Location: ROCHDALE

Dimensions
(m):

Depth
3.00

Scale
1:25

Logged
JR

Client: CORNERSTONE PLACE

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, sandstone, and plastic.	
	0.50	ES		0.80			MADE GROUND: Dark brown black gravelly fine to coarse sand with a high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, sandstone, concrete, and ceramics.	
	1.00	ES	HVP=50	2.00			Medium strength firm orange brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite.	1
	1.50	D	HVP=48					
	2.00	D	HVP=95				High strength stiff grey sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, coal, and quartzite.	2
	2.90	D	HVP=96	2.80			Dark grey brown clayey sandy angular to subrounded fine to coarse GRAVEL of mixed lithologies including chert, sandstone, quartzite, and coal. Sand is medium to coarse.	3
				3.00			End of pit at 3.00 m	

Remarks: 1. Location cleared with CAT scanner. 2. No groundwater encountered. 3. Hole backfilled with arisings.

Stability: Stable



Trial Pit Log

Trialpit No
TP104
Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -
Level:

Date
07/02/2023

Location: ROCHDALE

Dimensions
(m):

Scale
1:25

Client: CORNERSTONE PLACE

Depth
2.40

Logged
JR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.20			MADE GROUND: Dark brown sandy slightly gravelly topsoil. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick.	
	0.50	ES		0.60			MADE GROUND: Dark brown black gravelly fine to coarse sand with high cobble content of brick and sandstone. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, sandstone, and plastic.	
	0.70	ES					<i>Becoming brown and clayey at 0.4m bgl.</i>	
	1.00	D	HVP=57				Medium strength firm orange brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite.	1
	1.50	D	HVP=60	1.50			Medium strength stiff grey sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, coal, and quartzite.	
	2.00	D	HVP=68					2
	2.30	D		2.20			Dark grey brown clayey silty sandy angular to subrounded fine to coarse GRAVEL of mixed lithologies including chert, sandstone, and siltstone. Sand is medium to coarse.	
				2.40			End of pit at 2.40 m	
								3
								4
								5

Remarks: 1. Location cleared with CAT scanner. 2. No groundwater encountered. 3. Hole backfilled with arisings.

Stability: Stable



Trial Pit Log

Trialpit No
TP105
Sheet 1 of 1

Project Name: WHITWORTH ROAD

Project No.
GRO-22083

Co-ords: -
Level:

Date
07/02/2023

Location: ROCHDALE

Dimensions (m):

Scale
1:25

Client: CORNERSTONE PLACE

Depth
2.60

Logged
JR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			MADE GROUND: Tarmac.	
	0.50 0.50	D ES					MADE GROUND: Dark brown black gravelly medium to coarse sand with a high cobble content of brick, sandstone, ceramics, metal, wood, and glass. Gravel is angular to subangular fine to coarse of mixed lithologies including brick, sandstone, ceramics, concrete, metal, wood, and glass. <i>Brick walls encountered on all pit sides from 0.1m to 2.0m bgl.</i>	
	1.00 1.00	D ES						1
	1.50	D						
	2.00 2.00	D ES	HVP=57	2.00			Medium strength firm grey brown sandy gravelly CLAY with a low cobble content of sandstone. Sand is medium to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and coal.	2
	2.50	D		2.60			End of pit at 2.60 m	3
								4
								5

Remarks: 1. Location cleared with CAT scanner. 2. No groundwater encountered. 3. Hole backfilled with arisings.

Stability: Unstable



APPENDIX 4 - Geo-Environmental Testing

Groundtech Consulting Limited
PO Box 499
Manchester
M28 8EE



Attention : Jacob Roby
Date : 24th March, 2023
Your reference : -
Our reference : Test Report 23/2034 Batch 1
Location : Whitworth Road
Date samples received : 10th February, 2023
Status : Final Report
Issue : 1

Thirty three samples were received for analysis on 10th February, 2023 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Liza Klebe

Project Co-ordinator

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: -
Location: Whitworth Road
Contact: Jacob Roby
EMT Job No: 23/2034

Report : Solid

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

EMT Sample No.	13-15	31-33	40-42	52-54	55-57	61-63	88-90	91-93	94-96		Please see attached notes for all abbreviations and acronyms		
Sample ID	TP102	TP104	TP105	WS101	WS102	WS103	WS106	WS106	WS107				
Depth	0.80	0.50	1.00	1.50	0.50	0.30	0.30	0.80	0.30				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	07/02/2023	07/02/2023	07/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1		LOD/LOR	Units	Method No.
Date of Receipt	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023				
Arsenic #	10.0	17.6	6.9	-	18.8	25.6	9.9	-	10.0		<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	4.6	<0.1	-	<0.1	<0.1	<0.1	-	<0.1		<0.1	mg/kg	TM30/PM15
Chromium #	63.7	844.7 ^{AA}	40.6	-	48.4	48.5	53.7	-	41.1		<0.5	mg/kg	TM30/PM15
Copper #	33	154	131	-	303 ^{AA}	188	32	-	38		<1	mg/kg	TM30/PM15
Lead #	33	259	162	-	229	71	345	-	95		<5	mg/kg	TM30/PM15
Mercury #	0.3	0.7	0.2	-	0.3	0.3	0.3	-	0.3		<0.1	mg/kg	TM30/PM15
Nickel #	28.4	63.1	24.7	-	38.9	49.5	18.3	-	17.0		<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	<1	-	1	1	<1	-	<1		<1	mg/kg	TM30/PM15
Sulphur as S	-	-	-	0.03	-	-	-	<0.01	-		<0.01	%	TM30/PM15
Total Sulphate as SO4 BRE	-	-	-	0.02	-	-	-	<0.01	-		<0.01	%	TM50/PM25
Zinc #	79	462	163	-	98	108	65	-	66		<5	mg/kg	TM30/PM15
Magnesium	-	-	-	0.0007	-	-	-	0.0008	-		<0.0001	g/l	TM30/PM25
PAH MS													
Naphthalene #	<0.04	0.09	<0.20 ^{AA}	-	<0.04	21.14 ^{AB}	0.05	-	0.08		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.06	<0.15 ^{AA}	-	<0.03	<0.30 ^{AB}	<0.03	-	0.09		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	0.10	<0.25 ^{AA}	-	<0.05	20.09 ^{AB}	<0.05	-	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	0.08	<0.20 ^{AA}	-	<0.04	13.14 ^{AB}	<0.04	-	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.06	1.01	0.70 ^{AA}	-	0.32	107.61 ^{AB}	0.24	-	0.31		<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	0.23	<0.20 ^{AA}	-	0.06	20.86 ^{AB}	<0.04	-	0.17		<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.08	1.74	1.00 ^{AA}	-	0.31	122.20 ^{AB}	0.31	-	0.65		<0.03	mg/kg	TM4/PM8
Pyrene #	0.07	1.48	0.86 ^{AA}	-	0.31	97.91 ^{AB}	0.26	-	0.59		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.82	0.61 ^{AA}	-	0.23	42.44 ^{AB}	0.23	-	0.45		<0.06	mg/kg	TM4/PM8
Chrysene #	0.06	1.01	0.63 ^{AA}	-	0.23	52.16 ^{AB}	0.19	-	0.38		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.08	1.60	0.98 ^{AA}	-	0.26	71.83 ^{AB}	0.24	-	0.60		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	0.86	0.53 ^{AA}	-	0.16	39.38 ^{AB}	0.13	-	0.33		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	0.65	0.39 ^{AA}	-	0.10	26.75 ^{AB}	0.09	-	0.26		<0.04	mg/kg	TM4/PM8</

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: -
Location: Whitworth Road
Contact: Jacob Roby
EMT Job No: 23/2034

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	13-15	31-33	40-42	52-54	55-57	61-63	88-90	91-93	94-96		Please see attached notes for all abbreviations and acronyms		
Sample ID	TP102	TP104	TP105	WS101	WS102	WS103	WS106	WS106	WS107				
Depth	0.80	0.50	1.00	1.50	0.50	0.30	0.30	0.80	0.30				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	07/02/2023	07/02/2023	07/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023	08/02/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023		LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	-	-	-	-	-	<0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	-	-	-	-	-	<0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	-	-	-	-	-	0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	-	-	-	-	-	3.2	-	-	-		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	-	-	-	-	-	16	-	-	-		<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	-	-	-	-	-	25	-	-	-		<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	-	-	-	-	-	63	-	-	-		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	-	-	-	-	-	107	-	-	-		<19	mg/kg	TM5/PM8/PM16/PM12/PM10
Aromatics													
>C5-EC7 (HS_1D_AR) #	-	-	-	-	-	<0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	-	-	-	-	-	<0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	-	-	-	-	-	<0.1 ^{SV}	-	-	-		<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	-	-	-	-	-	49.3	-	-	-		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	-	-	-	-	-	504	-	-	-		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	-	-	-	-	-	3194	-	-	-		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	-	-	-	-	-	4294	-	-	-		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	-	-	-	-	-	8041	-	-	-		<19	mg/kg	TM5/PM8/PM16/PM12/PM10
Total aliphatics and aromatics (C5-35) (EH+HS_CU_1D_Total)	-	-	-	-	-	8148	-	-	-		<38	mg/kg	TM5/PM8/PM16/PM12/PM10
MTBE #	-	-	-	-	-	<5 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
Benzene #	-	-	-	-	-	<5 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
Toluene #	-	-	-	-	-	<5 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
Ethylbenzene #	-	-	-	-	-	7 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
m/p-Xylene #	-	-	-	-	-	16 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
o-Xylene #	-	-	-	-	-	15 ^{SV}	-	-	-		<5	ug/kg	TM36/PM12
Natural Moisture Content	17.7	26.8	14.8	27.6	20.0	15.0	16.0	17.4	18.3		<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	-	-	1.0	-	-	-	<0.6	-		<0.6	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE) #	-	-	-	0.002	-	-	-	0.004	-		<0.002	g/l	TM38/PM20
Hexavalent Chromium #	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	-	<0.3		<0.3	mg/kg	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE)	-	-	-	<0.0025	-	-	-	<0.0025	-		<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0096	0.0245	0.0502	0.0453	0.0230	0.0157	0.0120	0.0090	0.0157		<0.0015	g/l	TM38/PM20
Organic Matter	2.1	18.2	2.5	-	10.2	12.8	5.9	-	5.8		<0.2	%	TM21/PM24
pH #	7.76	7.22	8.59	7.35	7.68	8.26	7.46	6.78	8.40		<0.01	pH units	TM73/PM11

Client Name: Groundtech Consulting Limited
Reference: -
Location: Whitworth Road
Contact: Jacob Roby

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/2034	1	TP102	0.80	15	Simon Postlewhite	17/02/2023	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	17/02/2023	Asbestos Fibres	NAD
					Simon Postlewhite	17/02/2023	Asbestos ACM	NAD
					Simon Postlewhite	17/02/2023	Asbestos Type	NAD
23/2034	1	TP104	0.50	33	Simon Postlewhite	17/02/2023	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	17/02/2023	Asbestos Fibres	NAD
					Simon Postlewhite	17/02/2023	Asbestos ACM	NAD
					Simon Postlewhite	17/02/2023	Asbestos Type	NAD
23/2034	1	TP105	1.00	42	Catherine Coles	17/02/2023	General Description (Bulk Analysis)	loose brown soil
					Catherine Coles	17/02/2023	Asbestos Fibres	Fibre Bundles
					Catherine Coles	17/02/2023	Asbestos ACM	NAD
					Catherine Coles	17/02/2023	Asbestos Type	Chrysotile
23/2034	1	WS102	0.50	57	Catherine Coles	17/02/2023	General Description (Bulk Analysis)	loose brown soil
					Catherine Coles	17/02/2023	Asbestos Fibres	NAD
					Catherine Coles	17/02/2023	Asbestos ACM	NAD
					Catherine Coles	17/02/2023	Asbestos Type	NAD
23/2034	1	WS103	0.30	63	Catherine Coles	17/02/2023	General Description (Bulk Analysis)	loose brown soil
					Catherine Coles	17/02/2023	Asbestos Fibres	NAD
					Catherine Coles	17/02/2023	Asbestos ACM	NAD
					Catherine Coles	17/02/2023	Asbestos Type	NAD
23/2034	1	WS106	0.30	90	Simon Postlewhite	17/02/2023	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	17/02/2023	Asbestos Fibres	NAD
					Simon Postlewhite	17/02/2023	Asbestos ACM	NAD
					Simon Postlewhite	17/02/2023	Asbestos Type	NAD
23/2034	1	WS107	0.30	96	Simon Postlewhite	17/02/2023	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	17/02/2023	Asbestos Fibres	NAD
					Simon Postlewhite	17/02/2023	Asbestos ACM	NAD
					Simon Postlewhite	17/02/2023	Asbestos Type	NAD

Matrix : Solid

—

Whitworth Road

Jacob Roby

[illegible]

5 of 11

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/2034

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/2034

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec.1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec.1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec.1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes

EMT Job No: 23/2034

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.			AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

APPENDIX 5 - Geotechnical Testing



LABORATORY REPORT



Contract Number: PSL23/0951

Report Date: 22 February 2023
Client's Reference: GRO-22083
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Jacob Roby

Contract Title: Whitworth Road, Rochdale

Date Received: 16/2/2023
Date Commenced: 16/2/2023
Date Completed: 21/02/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


M Fennel
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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Whitworth Road, Rochdale

Contract No:

PSL23/0951

Client Ref:

GRO-22083

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



Whitworth Road, Rochdale

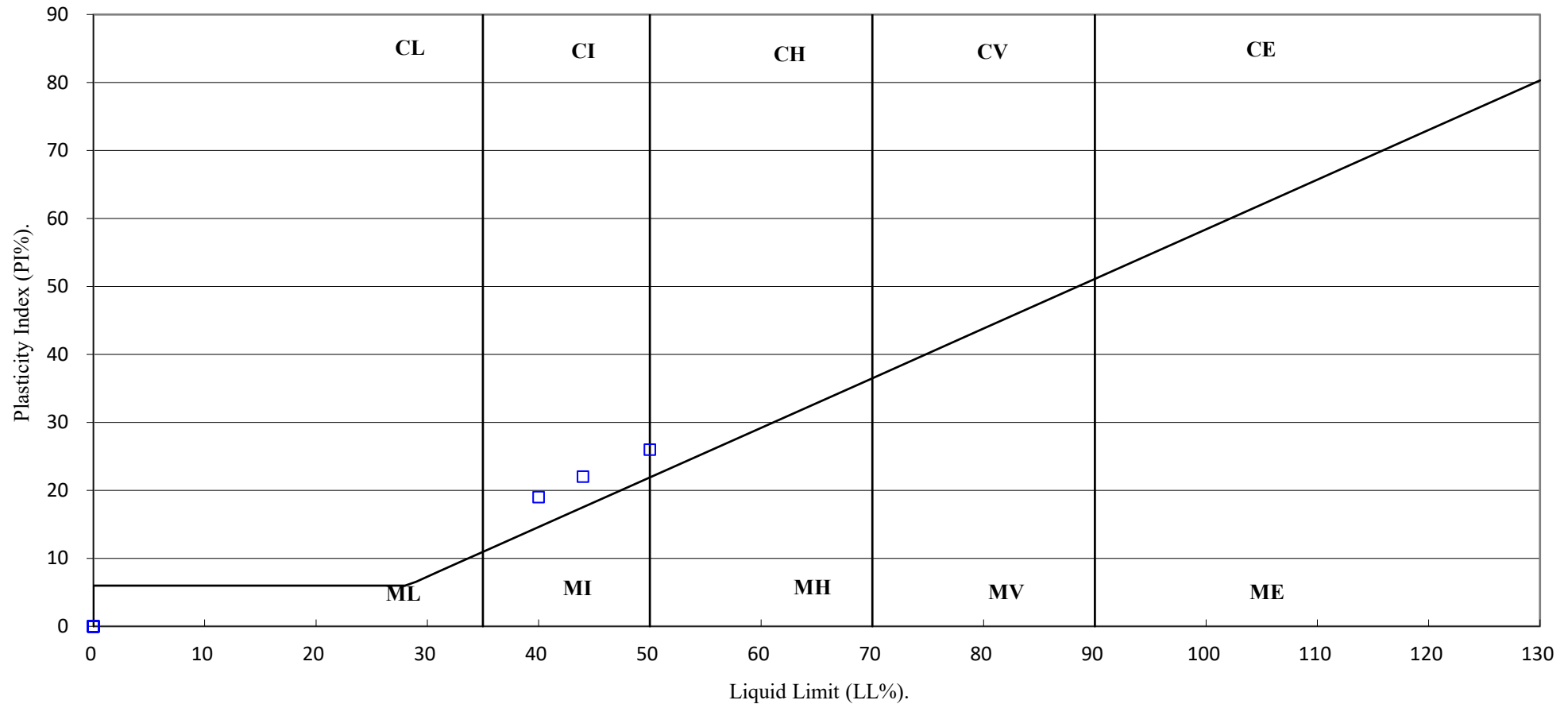
Contract No:

PSL23/0951

Client Ref:

GRO-22083

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Whitworth Road, Rochdale

Contract No:

PSL23/0951

Client Ref:

GRO-22083

APPENDIX 6 - Tier 1 Generic Screening Values

								GROUNDTECH CONSULTING
Generic Assessment Criteria (GAC)								
Proposed End Use	Unit	Residential with Plant Uptake			Residential without plant uptake			Source
SOM	%	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	32	32	32	40	40	40	SGVs
Beryllium	mg/kg	1.7	1.7	1.7	1.7	1.7	1.7	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	11000	11000	11000	LQM S4ULs
Cadmium	mg/kg	10	10	10	85	85	85	SGVs
Chromium (Total)	mg/kg	910	910	910	910	910	910	LQM S4ULs
Chromium (VI)	mg/kg	21	21	21	-	-	-	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	7100	7100	7100	LQM S4ULs
Lead	mg/kg	200	200	200	310	310	310	DEFRA C4SLs
Mercury	mg/kg	1.2	1.2	1.2	1.2	1.2	1.2	LQM S4ULs
Nickel	mg/kg	180	180	180	180	180	180	LQM S4ULs
Selenium	mg/kg	350	350	350	430	430	430	SGVs
Vanadium	mg/kg	410	410	410	1200	1200	1200	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	40000	40000	40000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	42	78	160	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	100	230	530	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	27	65	150	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) ^{vop}	330 (118) ^{vop}	760 (283) ^{vop}	130 (48) ^{vop}	330 (118) ^{vop}	770 (283) ^{vop}	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) ^{sol}	2400 (59) ^{sol}	4300 (142) ^{sol}	1100 (24) ^{sol}	2400 (59) ^{sol}	4400 (142) ^{sol}	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	65000 (8.48) ^{f, sol}	92000 (21) ^{f, sol}	110000 ^f	65000 (8.48) ^{f, sol}	92000 (21) ^{f, sol}	110000 ^f	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	65000 (8.48) ^{f, sol}	92000 (21) ^{f, sol}	110000 ^f	65000	92000 (21) ^{f, sol}	110000 ^f	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	370	690	1400	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	860	1800	3900	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	47	110	270	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	250	590	1200	LQM S4ULs
Aromatic EC 12 - 16	mg/kg	140	330	660	1800	2300	2500	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 ^f	540 ^f	930 ^f	1900	1900	1900	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 ^f	1500 ^f	1700 ^f	1900	1900	1900	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 ^f	1500 ^f	1700 ^f	1900	1900	1900	LQM S4ULs
Benzene	mg/kg	0.33	0.33	0.33	0.38	0.7	1.4	SGVs
Toluene	mg/kg	610	610	610	880	1900	3900	SGVs
Ethyl Benzene	mg/kg	350	350	350	83	190	440	SGVs
Xylene - o	mg/kg	250	250	250	88	210	480	SGVs
Xylene - m	mg/kg	240	240	240	82	190	450	SGVs
Xylene - p	mg/kg	230	230	230	79	180	430	SGVs
MTBE (methyl tert-butyl ether)	mg/kg	49	84	160	-	-	-	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	3000	4700	6000	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	2900	4600	6000	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	31000	35000	37000	LQM S4ULs
Benzo(a)anthracene	mg/kg	7.2	11	13	11	14	15	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	5*	3.2	3.2	3.2	DEFRA C4SL*/LQM S4ULs
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	3.9	4	4	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	360	360	360	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	110	110	110	LQM S4ULs
Chrysene	mg/kg	15	22	27	30	31	32	LQM S4ULs
Dibenzo(ah)anthracene	mg/kg	0.24	0.28	0.3	0.31	0.32	0.32	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	1500	1600	1600	LQM S4ULs
Fluorene	mg/kg	170	400	860	2800	3800	4500	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	45	46	46	LQM S4ULs
Naphthalene	mg/kg	2.3 ^f	5.6 ^f	13 ^f	2.3	5.6	13	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	1300	1500	1500	LQM S4ULs
Pyrene	ma/ka	620	1200	2000	3700	3800	3800	LQM S4ULs

GROUNDTECH
CONSULTING

APPENDIX 7 - JIWG Receptor Decision Tool



Joint Industry **Working Group**

Asbestos in Soil and Construction & Demolition Materials

Project Reference

GRO-22038

Site Name

WHITWORTH ROAD, ROCHDALE

Client

CORNERSTONE PLACE

Run by

CALLUM HOLDEN

Date

28-Apr-23

Scenario details

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

Score

Select ACM type (run model for each type to generate 'Worst Case' output)

Free dispersed fibres/fibre bundles

2

Extent of degradation of ACMs at outset of work

Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)

4

Friability and degree of bonding by matrix (ACM matrix, not ground materials)

Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)

4

Distribution of Visible Asbestos Across Affected Area

No visible ACMs/fibre bundles

0

Amount of asbestos fibre in selected ACM/fibre type as % of host material

Very Low quantities - <0.001 to 0.01 %wt/wt

1

Sub-total

11

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking

Medium

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.

It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2

Exposure Factors

Score

Anticipated airborne fibre concentration - Control Limit or SALI?

<0.001 fibres/ml

0

Anticipated duration of exposure to asbestos

> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)

4

Activity type and effect on deterioration of ACMs during work

Low intensity, no or minimal deterioration expected

0

Best description of primary host material matrix (soil/made ground)

Coarse to Fine Sand

2

Respirable fibre index for ACM - RIVM report 711701034 (2003)

Medium

3

Sub-total

9

Exposure ranking

Low

Combined hazard and exposure ranking

20

Low

Stage 3

Risk Assessment Outputs

Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.

**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)

***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

Decision Support Tool for Receptor Risk Ranking

Stage 1		Score
Hazard Identification		
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		10
Hazard ranking		Low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2		Score
Emission Factors		
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Trace quantities - <0.0001 to <0.001 %wt/wt	0
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Moderate disturbance, slight deterioration expected	3
Best description of primary host material matrix	Coarse to Fine Sand	2
Sub-total		8
Exposure ranking		Low

Stage 3		Score	
Pathway and Receptor Sensitivity			
Receptor category	Residential	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		7	High
Combined hazard, exposure and receptor ranking			Medium
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at depth, unlikely to be disturbed except for deeper construction related excavation	B	
Pathway ranking		4B	Very Low
Overall ranking			Very Low



Joint Industry Working Group
Asbestos in Soil and Construction & Demolition Materials

Project Reference	GRO-22083
Site Name	WHITWORTH ROAD, ROCHDALE
Client	CORNERSTONE PLACE
Run by	CALLUM HOLDEN
Date	28-Apr-23
Reviewed by	
Characterisation of scenario being evaluated	
Interpretation of scenario ranking by DST	

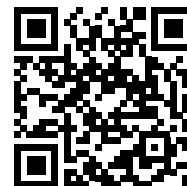


APPENDIX 8 - Waste Classification Report

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:

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



K1DI6-8UJ8T-1ICTC

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

Job name

EMT-23-2034-Batch-1-202302171626

Description/Comments

Supplementary investigation

Project

GRO-22083

Site

Whitworth Road, Rochdale

Classified by

Name: **Richard Wyatt**
Date: **21 Mar 2023 09:47 GMT**
Telephone: **07742660133**
Company: **Groundtech Consulting Limited**
First Floor, Lloyd House
Orford Court, Greenfold Way
Leigh
WN7 3XJ

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:

Course
Hazardous Waste Classification

Date
50% complete

Purpose of classification

2 - Material Characterisation

Address of the waste

Whitworth Road, Rochdale

Post Code **OL12 0RW**

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Redevelopment of land for new build apartments

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

Excavation

Description of the waste

Made Ground and natural strata

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP102-07/02/2023-0.80m		Non Hazardous		3
2	TP104-07/02/2023-0.50m		Non Hazardous		5
3	TP105-07/02/2023-1.00m		Non Hazardous		7
4	WS101-08/02/2023-1.50m		Non Hazardous		9
5	WS102-08/02/2023-0.50m		Non Hazardous		10
6	WS103-08/02/2023-0.30m		Non Hazardous		12
7	WS106-08/02/2023-0.30m		Non Hazardous		14
8	WS106-08/02/2023-0.80m		Non Hazardous		16
9	WS107-08/02/2023-0.30m		Non Hazardous		17

Related documents

#	Name	Description
1	EMT-23-2034-Batch-1-202302171626.HWOL	Element .hwol file used to populate the Job

Report

Created by: Richard Wyatt

Created date: 21 Mar 2023 09:47 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	19
Appendix B: Rationale for selection of metal species	20
Appendix C: Version	20

Classification of sample: TP102-07/02/2023-0.80m

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

Sample details

Sample name:	LoW Code:
TP102-07/02/2023-0.80m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
17.7%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 17.7% Dry Weight Moisture Correction applied (MC)

#	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								
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				10 mg/kg	1.895	16.096	mg/kg	0.00161 %	✓	
	033-005-00-1										
2	cadmium { cadmium sulfate }				<0.1 mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
	048-009-00-9	233-331-6	10124-36-4								
3	copper { copper sulphate pentahydrate }				33 mg/kg	3.929	110.16	mg/kg	0.011 %	✓	
	029-023-00-4	231-847-6	7758-99-8								
4	lead { lead chromate }			1	33 mg/kg	1.56	43.733	mg/kg	0.0028 %	✓	
	082-004-00-2	231-846-0	7758-97-6								
5	mercury { mercury difulminate }				0.3 mg/kg	1.419	0.362	mg/kg	0.0000362 %	✓	
	080-005-00-2	211-057-8	628-86-4								
6	nickel { nickel diiodide }				28.4 mg/kg	5.324	128.471	mg/kg	0.0128 %	✓	
	028-029-00-4	236-666-6	13462-90-3								
7	selenium { nickel selenate }				2 mg/kg	2.554	4.34	mg/kg	0.000434 %	✓	
	028-031-00-5	239-125-2	15060-62-5								
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				79 mg/kg	4.398	295.188	mg/kg	0.0295 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3 mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8										
10	naphthalene				<0.04 mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
11	acenaphthylene				<0.03 mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		205-917-1	208-96-8								
12	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								
13	fluorene				<0.04 mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7								
14	phenanthrene				0.06 mg/kg		0.051	mg/kg	0.0000051 %	✓	
		201-581-5	85-01-8								
15	anthracene				<0.04 mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		204-371-1	120-12-7								
16	fluoranthene				0.08 mg/kg		0.068	mg/kg	0.0000068 %	✓	
		205-912-4	206-44-0								

#	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							
17	pyrene	204-927-3	129-00-0		0.07 mg/kg		0.0595 mg/kg	0.00000595 %	✓	
18	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
19	chrysene	601-048-00-0	205-923-4	218-01-9	0.06 mg/kg		0.051 mg/kg	0.0000051 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	indeno[123-cd]pyrene		205-893-2	193-39-5	<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
23	benzo[ghi]perylene		205-883-8	191-24-2	<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.06 mg/kg		0.051 mg/kg	0.0000051 %	✓	
25	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.02 mg/kg		0.017 mg/kg	0.0000017 %	✓	
26	pH		PH		7.76 pH		7.76 pH	7.76 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9	63.7 mg/kg	1.462	79.1 mg/kg	0.00791 %	✓	
Total:								0.0663 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00003%)

Classification of sample: TP104-07/02/2023-0.50m

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

Sample details

Sample name:	LoW Code:
TP104-07/02/2023-0.50m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
26.8%	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
(dry weight correction)	Entry:

Hazard properties

None identified

Determinands

Moisture content: 26.8% Dry Weight Moisture Correction applied (MC)

#	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									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				17.6	mg/kg	1.895	26.296	mg/kg	0.00263 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				4.6	mg/kg	1.855	6.728	mg/kg	0.000673 %	✓	
	048-009-00-9	233-331-6	10124-36-4									
3	copper { copper sulphate pentahydrate }				154	mg/kg	3.929	477.188	mg/kg	0.0477 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
4	lead { lead chromate }			1	259	mg/kg	1.56	318.606	mg/kg	0.0204 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
5	mercury { mercury difulminate }				0.7	mg/kg	1.419	0.783	mg/kg	0.0000783 %	✓	
	080-005-00-2	211-057-8	628-86-4									
6	nickel { nickel diiodide }				63.1	mg/kg	5.324	264.955	mg/kg	0.0265 %	✓	
	028-029-00-4	236-666-6	13462-90-3									
7	selenium { nickel selenate }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5									
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				462	mg/kg	4.398	1602.399	mg/kg	0.16 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8											
10	naphthalene				0.09	mg/kg		0.071	mg/kg	0.0000071 %	✓	
	601-052-00-2	202-049-5	91-20-3									
11	acenaphthylene				0.06	mg/kg		0.0473	mg/kg	0.00000473 %	✓	
		205-917-1	208-96-8									
12	acenaphthene				0.1	mg/kg		0.0789	mg/kg	0.00000789 %	✓	
		201-469-6	83-32-9									
13	fluorene				0.08	mg/kg		0.0631	mg/kg	0.00000631 %	✓	
		201-695-5	86-73-7									
14	phenanthrene				1.01	mg/kg		0.797	mg/kg	0.0000797 %	✓	
		201-581-5	85-01-8									
15	anthracene				0.23	mg/kg		0.181	mg/kg	0.0000181 %	✓	
		204-371-1	120-12-7									
16	fluoranthene				1.74	mg/kg		1.372	mg/kg	0.000137 %	✓	
		205-912-4	206-44-0									

#	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							
17	pyrene	204-927-3	129-00-0		1.48 mg/kg		1.167 mg/kg	0.000117 %	✓	
18	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.82 mg/kg		0.647 mg/kg	0.0000647 %	✓	
19	chrysene	601-048-00-0	205-923-4	218-01-9	1.01 mg/kg		0.797 mg/kg	0.0000797 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.86 mg/kg		0.678 mg/kg	0.0000678 %	✓	
21	indeno[123-cd]pyrene		205-893-2	193-39-5	0.65 mg/kg		0.513 mg/kg	0.0000513 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.16 mg/kg		0.126 mg/kg	0.0000126 %	✓	
23	benzo[ghi]perylene		205-883-8	191-24-2	0.52 mg/kg		0.41 mg/kg	0.000041 %	✓	
24	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	1.15 mg/kg		0.907 mg/kg	0.0000907 %	✓	
25	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.45 mg/kg		0.355 mg/kg	0.0000355 %	✓	
26	pH		PH		7.22 pH		7.22 pH	7.22 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9	844.7 mg/kg	1.462	973.641 mg/kg	0.0974 %	✓	
Total:								0.357 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00007%)

Classification of sample: TP105-07/02/2023-1.00m

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

Sample details

Sample name:	LoW Code:
TP105-07/02/2023-1.00m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
14.8%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14.8% Dry Weight Moisture Correction applied (MC)

#	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									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				6.9	mg/kg	1.895	11.387	mg/kg	0.00114 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				<0.1	mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
	048-009-00-9	233-331-6	10124-36-4									
3	copper { copper sulphate pentahydrate }				131	mg/kg	3.929	448.35	mg/kg	0.0448 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
4	lead { lead chromate }			1	162	mg/kg	1.56	220.113	mg/kg	0.0141 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
5	mercury { mercury difulminate }				0.2	mg/kg	1.419	0.247	mg/kg	0.0000247 %	✓	
	080-005-00-2	211-057-8	628-86-4									
6	nickel { nickel diiodide }				24.7	mg/kg	5.324	114.556	mg/kg	0.0115 %	✓	
	028-029-00-4	236-666-6	13462-90-3									
7	selenium { nickel selenate }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5									
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				163	mg/kg	4.398	624.444	mg/kg	0.0624 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8											
10	naphthalene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
11	acenaphthylene				<0.15	mg/kg		<0.15	mg/kg	<0.000015 %		<LOD
		205-917-1	208-96-8									
12	acenaphthene				<0.25	mg/kg		<0.25	mg/kg	<0.000025 %		<LOD
		201-469-6	83-32-9									
13	fluorene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		201-695-5	86-73-7									
14	phenanthrene				0.7	mg/kg		0.61	mg/kg	0.000061 %	✓	
		201-581-5	85-01-8									
15	anthracene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		204-371-1	120-12-7									
16	fluoranthene				1	mg/kg		0.871	mg/kg	0.0000871 %	✓	
		205-912-4	206-44-0									

#	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							
17	pyrene	204-927-3	129-00-0		0.86 mg/kg		0.749 mg/kg	0.0000749 %	✓	
18	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.61 mg/kg		0.531 mg/kg	0.0000531 %	✓	
19	chrysene	601-048-00-0	205-923-4	218-01-9	0.63 mg/kg		0.549 mg/kg	0.0000549 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.53 mg/kg		0.462 mg/kg	0.0000462 %	✓	
21	indeno[123-cd]pyrene		205-893-2	193-39-5	0.39 mg/kg		0.34 mg/kg	0.000034 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
23	benzo[ghi]perylene		205-883-8	191-24-2	0.39 mg/kg		0.34 mg/kg	0.000034 %	✓	
24	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.71 mg/kg		0.618 mg/kg	0.0000618 %	✓	
25	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.27 mg/kg		0.235 mg/kg	0.0000235 %	✓	
26	pH		PH		8.59 pH		8.59 pH	8.59 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9	40.6 mg/kg	1.462	51.689 mg/kg	0.00517 %	✓	
Total:								0.14 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00002%)

Classification of sample: WS101-08/02/2023-1.50m

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

Sample details

Sample name:	LoW Code:
WS101-08/02/2023-1.50m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
27.6% (dry weight correction)	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 27.6% Dry Weight Moisture Correction applied (MC)

#	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							
1	pH				7.35 pH		7.35 pH	7.35 pH		
2	 magnesium { diphosphide }	magnesium phosphide; trimagnesium			0.0007 µg/l	1.85	1.01e-06 mg/kg	1.01e-10 %	✓	
	015-005-00-3	235-023-7	12057-74-8							
3	 sulfur { sulfur }				0.03 %		0.0235 %	0.0235 %	✓	
	016-094-00-1	231-722-6	7704-34-9							
Total:								0.0235 %		

Key

	User supplied data
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration

Classification of sample: WS102-08/02/2023-0.50m

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

Sample details

Sample name:	LoW Code:
WS102-08/02/2023-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
20% (dry weight correction)	

Hazard properties

None identified

Determinands

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

#	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									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				18.8	mg/kg	1.895	29.681	mg/kg	0.00297 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				<0.1	mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
	048-009-00-9	233-331-6	10124-36-4									
3	copper { copper sulphate pentahydrate }				303	mg/kg	3.929	992.086	mg/kg	0.0992 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
4	lead { lead chromate }			1	229	mg/kg	1.56	297.665	mg/kg	0.0191 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
5	mercury { mercury difulminate }				0.3	mg/kg	1.419	0.355	mg/kg	0.0000355 %	✓	
	080-005-00-2	211-057-8	628-86-4									
6	nickel { nickel diiodide }				38.9	mg/kg	5.324	172.596	mg/kg	0.0173 %	✓	
	028-029-00-4	236-666-6	13462-90-3									
7	selenium { nickel selenate }				1	mg/kg	2.554	2.128	mg/kg	0.000213 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				98	mg/kg	4.398	359.164	mg/kg	0.0359 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8											
10	naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
11	acenaphthylene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		205-917-1	208-96-8									
12	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
13	fluorene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7									
14	phenanthrene				0.32	mg/kg		0.267	mg/kg	0.0000267 %	✓	
		201-581-5	85-01-8									
15	anthracene				0.06	mg/kg		0.05	mg/kg	0.000005 %	✓	
		204-371-1	120-12-7									
16	fluoranthene				0.31	mg/kg		0.258	mg/kg	0.0000258 %	✓	
		205-912-4	206-44-0									

#	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							
17	pyrene	204-927-3	129-00-0		0.31 mg/kg		0.258 mg/kg	0.0000258 %	✓	
18	benzo[a]anthracene	200-280-6	56-55-3		0.23 mg/kg		0.192 mg/kg	0.0000192 %	✓	
19	chrysene	205-923-4	218-01-9		0.23 mg/kg		0.192 mg/kg	0.0000192 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	200-028-5	50-32-8		0.16 mg/kg		0.133 mg/kg	0.0000133 %	✓	
21	indeno[123-cd]pyrene	205-893-2	193-39-5		0.1 mg/kg		0.0833 mg/kg	0.00000833 %	✓	
22	dibenz[a,h]anthracene	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
23	benzo[ghi]perylene	205-883-8	191-24-2		0.08 mg/kg		0.0667 mg/kg	0.00000667 %	✓	
24	benzo[b]fluoranthene	205-911-9	205-99-2		0.19 mg/kg		0.158 mg/kg	0.0000158 %	✓	
25	benzo[k]fluoranthene	205-916-6	207-08-9		0.07 mg/kg		0.0583 mg/kg	0.00000583 %	✓	
26	pH		PH		7.68 pH		7.68 pH	7.68 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		48.4 mg/kg	1.462	58.949 mg/kg	0.00589 %	✓	
Total:								0.181 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00003%)

Classification of sample: WS103-08/02/2023-0.30m

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

Sample details

Sample name:	LoW Code:
WS103-08/02/2023-0.30m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
15% (dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#	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									
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				25.6	mg/kg	1.895	42.174	mg/kg	0.00422 %	✓	
	033-005-00-1											
2	cadmium { cadmium sulfate }				<0.1	mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
	048-009-00-9	233-331-6	10124-36-4									
3	copper { copper sulphate pentahydrate }				188	mg/kg	3.929	642.315	mg/kg	0.0642 %	✓	
	029-023-00-4	231-847-6	7758-99-8									
4	lead { lead chromate }			1	71	mg/kg	1.56	96.302	mg/kg	0.00617 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
5	mercury { mercury difulminate }				0.3	mg/kg	1.419	0.37	mg/kg	0.000037 %	✓	
	080-005-00-2	211-057-8	628-86-4									
6	nickel { nickel diiodide }				49.5	mg/kg	5.324	229.176	mg/kg	0.0229 %	✓	
	028-029-00-4	236-666-6	13462-90-3									
7	selenium { nickel selenate }				1	mg/kg	2.554	2.221	mg/kg	0.000222 %	✓	
	028-031-00-5	239-125-2	15060-62-5									
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				108	mg/kg	4.398	413.023	mg/kg	0.0413 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8											
10	naphthalene				21.14	mg/kg		18.383	mg/kg	0.00184 %	✓	
	601-052-00-2	202-049-5	91-20-3									
11	acenaphthylene				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		205-917-1	208-96-8									
12	acenaphthene				20.09	mg/kg		17.47	mg/kg	0.00175 %	✓	
		201-469-6	83-32-9									
13	fluorene				13.14	mg/kg		11.426	mg/kg	0.00114 %	✓	
		201-695-5	86-73-7									
14	phenanthrene				107.61	mg/kg		93.574	mg/kg	0.00936 %	✓	
		201-581-5	85-01-8									
15	anthracene				20.86	mg/kg		18.139	mg/kg	0.00181 %	✓	
		204-371-1	120-12-7									
16	fluoranthene				122.2	mg/kg		106.261	mg/kg	0.0106 %	✓	
		205-912-4	206-44-0									

#	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							
17	pyrene	204-927-3	129-00-0		97.91 mg/kg		85.139 mg/kg	0.00851 %	✓	
18	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	42.44 mg/kg		36.904 mg/kg	0.00369 %	✓	
19	chrysene	601-048-00-0	205-923-4	218-01-9	52.16 mg/kg		45.357 mg/kg	0.00454 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	39.38 mg/kg		34.243 mg/kg	0.00342 %	✓	
21	indeno[123-cd]pyrene	205-893-2	193-39-5		26.75 mg/kg		23.261 mg/kg	0.00233 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	4.58 mg/kg		3.983 mg/kg	0.000398 %	✓	
23	benzo[ghi]perylene	205-883-8	191-24-2		22.36 mg/kg		19.443 mg/kg	0.00194 %	✓	
24	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	51.72 mg/kg		44.974 mg/kg	0.0045 %	✓	
25	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	20.11 mg/kg		17.487 mg/kg	0.00175 %	✓	
26	pH		PH		8.26 pH		8.26 pH	8.26 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		48.5 mg/kg	1.462	61.64 mg/kg	0.00616 %	✓	
Total:								0.203 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00003%)

Classification of sample: WS106-08/02/2023-0.30m

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

Sample details

Sample name:	LoW Code:
WS106-08/02/2023-0.30m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
16% (dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 16% Dry Weight Moisture Correction applied (MC)

#		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									
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }			1	9.9	mg/kg	1.895	16.169	mg/kg	0.00162 %	✓	
		033-005-00-1											
2		cadmium { cadmium sulfate }			1	<0.1	mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
		048-009-00-9	233-331-6	10124-36-4									
3		copper { copper sulphate pentahydrate }			1	32	mg/kg	3.929	108.388	mg/kg	0.0108 %	✓	
		029-023-00-4	231-847-6	7758-99-8									
4		lead { lead chromate }			1	345	mg/kg	1.56	463.911	mg/kg	0.0297 %	✓	
		082-004-00-2	231-846-0	7758-97-6									
5		mercury { mercury difulminate }			1	0.3	mg/kg	1.419	0.367	mg/kg	0.0000367 %	✓	
		080-005-00-2	211-057-8	628-86-4									
6		nickel { nickel diiodide }			1	18.3	mg/kg	5.324	83.995	mg/kg	0.0084 %	✓	
		028-029-00-4	236-666-6	13462-90-3									
7		selenium { nickel selenate }			1	<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
		028-031-00-5	239-125-2	15060-62-5									
8		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }			1	65	mg/kg	4.398	246.436	mg/kg	0.0246 %	✓	
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
9		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }			1	<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
		024-017-00-8											
10		naphthalene			1	0.05	mg/kg		0.0431	mg/kg	0.00000431 %	✓	
		601-052-00-2	202-049-5	91-20-3									
11		acenaphthylene			1	<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-917-1	208-96-8									
12		acenaphthene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9									
13		fluorene			1	<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			201-695-5	86-73-7									
14		phenanthrene			1	0.24	mg/kg		0.207	mg/kg	0.0000207 %	✓	
			201-581-5	85-01-8									
15		anthracene			1	<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			204-371-1	120-12-7									
16		fluoranthene			1	0.31	mg/kg		0.267	mg/kg	0.0000267 %	✓	
			205-912-4	206-44-0									

#	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							
17	pyrene	204-927-3	129-00-0		0.26 mg/kg		0.224 mg/kg	0.0000224 %	✓	
18	benzo[a]anthracene	200-280-6	56-55-3		0.23 mg/kg		0.198 mg/kg	0.0000198 %	✓	
19	chrysene	205-923-4	218-01-9		0.19 mg/kg		0.164 mg/kg	0.0000164 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	200-028-5	50-32-8		0.13 mg/kg		0.112 mg/kg	0.0000112 %	✓	
21	indeno[123-cd]pyrene	205-893-2	193-39-5		0.09 mg/kg		0.0776 mg/kg	0.00000776 %	✓	
22	dibenz[a,h]anthracene	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
23	benzo[ghi]perylene	205-883-8	191-24-2		0.08 mg/kg		0.069 mg/kg	0.0000069 %	✓	
24	benzo[b]fluoranthene	205-911-9	205-99-2		0.17 mg/kg		0.147 mg/kg	0.0000147 %	✓	
25	benzo[k]fluoranthene	205-916-6	207-08-9		0.07 mg/kg		0.0603 mg/kg	0.00000603 %	✓	
26	pH		PH		7.46 pH		7.46 pH	7.46 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		53.7 mg/kg	1.462	67.66 mg/kg	0.00677 %	✓	
Total:								0.0826 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00003%)

Classification of sample: WS106-08/02/2023-0.80m



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

Sample details

Sample name:	LoW Code:
WS106-08/02/2023-0.80m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
17.4% (dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 17.4% Dry Weight Moisture Correction applied (MC)

#	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							
1	pH		PH		6.78 pH		6.78 pH	6.78 pH		
2	magnesium { diphosphide }	magnesium phosphide; trimagnesium			0.0008 µg/l	1.85	1.26e-06 mg/kg	1.26e-10 %	✓	
	015-005-00-3	235-023-7	12057-74-8							
3	sulfur { sulfur }				<0.01 %		<0.01 %	<0.01 %		<LOD
	016-094-00-1	231-722-6	7704-34-9							
Total:								0.01 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected

Classification of sample: WS107-08/02/2023-0.30m

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

Sample details

Sample name:	LoW Code:
WS107-08/02/2023-0.30m	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
18.3%	Entry:
(dry weight correction)	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 18.3% Dry Weight Moisture Correction applied (MC)

#	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								
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				10 mg/kg	1.895	16.015	mg/kg	0.0016 %	✓	
	033-005-00-1										
2	cadmium { cadmium sulfate }				<0.1 mg/kg	1.855	<0.185	mg/kg	<0.0000185 %		<LOD
	048-009-00-9	233-331-6	10124-36-4								
3	copper { copper sulphate pentahydrate }				38 mg/kg	3.929	126.208	mg/kg	0.0126 %	✓	
	029-023-00-4	231-847-6	7758-99-8								
4	lead { lead chromate }			1	95 mg/kg	1.56	125.26	mg/kg	0.00803 %	✓	
	082-004-00-2	231-846-0	7758-97-6								
5	mercury { mercury difulminate }				0.3 mg/kg	1.419	0.36	mg/kg	0.000036 %	✓	
	080-005-00-2	211-057-8	628-86-4								
6	nickel { nickel diiodide }				17 mg/kg	5.324	76.512	mg/kg	0.00765 %	✓	
	028-029-00-4	236-666-6	13462-90-3								
7	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5								
8	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				66 mg/kg	4.398	245.362	mg/kg	0.0245 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
9	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<0.3 mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
	024-017-00-8										
10	naphthalene				0.08 mg/kg		0.0676	mg/kg	0.00000676 %	✓	
	601-052-00-2	202-049-5	91-20-3								
11	acenaphthylene				0.09 mg/kg		0.0761	mg/kg	0.00000761 %	✓	
		205-917-1	208-96-8								
12	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								
13	fluorene				<0.04 mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		201-695-5	86-73-7								
14	phenanthrene				0.31 mg/kg		0.262	mg/kg	0.0000262 %	✓	
		201-581-5	85-01-8								
15	anthracene				0.17 mg/kg		0.144	mg/kg	0.0000144 %	✓	
		204-371-1	120-12-7								
16	fluoranthene				0.65 mg/kg		0.549	mg/kg	0.0000549 %	✓	
		205-912-4	206-44-0								

#	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							
17	pyrene	204-927-3	129-00-0		0.59 mg/kg		0.499 mg/kg	0.0000499 %	✓	
18	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.45 mg/kg		0.38 mg/kg	0.000038 %	✓	
19	chrysene	601-048-00-0	205-923-4	218-01-9	0.38 mg/kg		0.321 mg/kg	0.0000321 %	✓	
20	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.33 mg/kg		0.279 mg/kg	0.0000279 %	✓	
21	indeno[123-cd]pyrene		205-893-2	193-39-5	0.26 mg/kg		0.22 mg/kg	0.000022 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.06 mg/kg		0.0507 mg/kg	0.00000507 %	✓	
23	benzo[ghi]perylene		205-883-8	191-24-2	0.22 mg/kg		0.186 mg/kg	0.0000186 %	✓	
24	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.43 mg/kg		0.363 mg/kg	0.0000363 %	✓	
25	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.17 mg/kg		0.144 mg/kg	0.0000144 %	✓	
26	pH		PH		8.4 pH		8.4 pH	8.4 pH		
27	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9	41.1 mg/kg	1.462	50.778 mg/kg	0.00508 %	✓	
Total:								0.0603 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 1: Explosive "waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included"

Force this Hazardous property to non hazardous because No free phase contamination encountered

Hazard Statements hit:

Unst. Expl.; H200 "Unstable explosives"

Because of determinand:

mercury difulminate: (compound conc.: 0.00003%)

Appendix A: Classifier defined and non GB MCL determinands

• **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

• **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

■ **magnesium phosphide; trimagnesium diphosphide** (EC Number: 235-023-7, CAS Number: 12057-74-8)

GB MCL index number: 015-005-00-3

Description/Comments:

Additional Hazard Statement(s): Water-react. 1; H260 >= 0.3 % , EUH032 >= 0.3 % , EUH029 >= 0.3 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - Water-react. 1; H260 >= 0.3 % hazard statement sourced from: WM3, Table C3.2

20 Nov 2021 - EUH032 >= 0.3 % hazard statement sourced from: WM3, Table C12.2

20 Nov 2021 - EUH029 >= 0.3 % hazard statement sourced from: WM3, Table C12.2

Appendix B: Rationale for selection of metal species

arsenic {arsenic acid and its salts with the exception of those specified elsewhere in this Annex}

Worst case scenario

cadmium {cadmium sulfate}

Worst case scenario

copper {copper sulphate pentahydrate}

Worst case scenario

lead {lead chromate}

Worst case scenario

mercury {mercury difulminate}

Worst case scenario

nickel {nickel diiodide}

Worst case scenario

selenium {nickel selenate}

Worst case scenario

zinc {zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2]}

Worst case scenario

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case scenario

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

Worst case scenario

magnesium {magnesium phosphide; trimagnesium diphosphide}

No free phase contamination detected

sulfur {sulfur}

No free phase contamination detected

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2023.73.5544.10256 (14 Mar 2023)

HazWasteOnline Database: 2023.73.5544.10256 (14 Mar 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

APPENDIX 9 - Groundtech Legislative Background

Legislative Background

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 (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

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;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

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 SPR 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:

- LCRM – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

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 Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- 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);
- Health and Safety at Work Act;

APPENDIX 10 - CIRIA Risk Assessment Methodology

Contaminated Land Risk Assessment

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.

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:

- **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;
- **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;
- **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;
- **Unlikely:** There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

The severity is also classified using a system based on CIRIA C552. 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

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.

APPENDIX 11 - Limitations

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

Since the Report was written, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change and should be investigated if there is any significant delay in acting on the findings of this report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions in this report should not be relied upon in the future without the written confirmation from Groundtech Consulting that it is safe to do so.

The observations and conclusions outlined in this report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting.

Groundtech Consulting are not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The services provided are based upon Groundtech Consulting observations of existing physical conditions at the site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and Groundtech Consulting assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable due to its heterogeneous



properties and as investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

