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# LAND AT SHARSTON INDUSTRIAL ESTATE, MANCHESTER

## Site Investigation & Ground Assessment



Prepared for:

Report Ref: BEK-24035-2

May 2024

P. P. O'CONNOR
Committed To Excellence

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# Project Quality Assurance Information Sheet

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|---|---|
| Site | Land at Sharston Industrial Estate, Manchester |
| Report Title | Site Investigation & Ground Assessment |
| Report Status | Final |
| Report No | BEK-24035-2 |
| Date | May 2024 |
| Prepared For | **PP O'CONNOR**<br>The Exchange<br>5 Bank Street<br>Bury<br>BL9 0DN |
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## Site Investigation & Ground Assessment

**PROJECT NO:** 24035

**REPORT REF:** BEK-24035-2

**DATE:** May 2024

## REVISION STATUS / HISTORY

| Rev | Date | Issue / Comment | Prepared | Checked |
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## GENERAL REPORT LIMITATIONS

BEK Enviro Limited (BEK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and BEK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by BEK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of BEK and the party for whom it was prepared. 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.

Unless explicitly agreed otherwise, in writing, this report has been prepared under BEK's limited standard Terms and Conditions as included within our proposal to the Client.

The report needs to be considered in the light of the BEK proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

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# 1. INTRODUCTION

## 1.1 Appointment

1.1.1 BEK Enviro (BEK) has been commissioned by P.P. O'Connor Ltd to carry out a site investigation for a parcel of land located at land at Sharston Industrial Estate, Wythenshawe, Manchester (hereafter referred to as 'the site' to assess the potential risks associated with contamination and ground gas. The site investigation has also been designed to provide a geotechnical assessment to inform foundation design.

1.1.2 The site location and site layout are presented on BEK Drawing No 24035-1 and BEK Drawing No 24035-2, respectively. Copies of these drawings are presented in Appendix D.

## 1.2 Proposed Development

1.2.1 This report has been prepared to support a planning application for the improvements to the existing waste processing facility at the site. This will include construction of a new imported waste sorting building, erection of new perimeter fencing and car parking/access improvements.

1.2.2 The proposed development layout for the site is presented on the Oakbay Design 'Waste Processing Facility' Drawing (Ref: Z310.101, dated October 2023), a copy of which is presented in Appendix D.

## 1.3 Objective & Scope of Work

1.3.1 The site investigation was undertaken by BEK during April 2024 in accordance with the recommendations detailed in the BEK Preliminary Risk Assessment (PRA), Report Ref: BEK-24035-1, dated April 2024.

1.3.2 This report has been prepared to provide a summary of the site details and ground conditions encountered as well as a quantitative assessment of the potential pollutant linkages identified within the PRA. The site investigation data has also been used to provide recommendations for foundation design and drainage options.

1.3.3 The PRA should be read in conjunction with this report.

## 1.4 Limitations

1.4.1 The conclusions and recommendations presented in this report are the result of our professional interpretation of the information currently available. BEK reserve the right to amend the conclusions and recommendations if further information becomes available.

1.4.2 However, it should be noted that much of the information has been derived from reports written by others and BEK takes no responsibility for the accuracy of that information. Notwithstanding the above, the reports reviewed have all been written by professional environmental consultants with a duty of care to provide relevant and accurate information.

1.4.3 The comments given in this report and the opinions expressed are based on review of reports provided to BEK, ground conditions encountered during site works and the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigations and therefore could not be taken into account.

1.4.4 Issues associated with invasive plant species are outside the remit of this report.

# 2. BACKGROUND INFORMATION

2.0.1 This section provides an overview of the findings and recommendations presented in the PRA.

## 2.1 Site Location, Layout & History

2.1.1 The site is located to the east off Sharston Road (B5168). The National Grid Reference for the site is 383244, 389134. The site occupies an area approximately 6000 $m^2$.

2.1.2 The site is currently being utilized by PP O'Connor Ltd as a Waste Processing Facility. .The site is overlain by hardstanding concrete and is generally flat with a slight fall from west to east.

2.1.3 Briefly, the waste processing operations comprise the transport of unprocessed waste using grab wagons onto the site via the western site entrance boundary off Sharston Road (B5168). The unprocessed waste is placed on a stockpile in the centre of the site. Utilising JCB plant machinery and a picking belt complex the waste is segregated into both landfill and recyclable stockpiles. The processing automatically sorts the waste by size, type and weight. Weigh bridges are present at both entrance/exit of the site to support the operations.

2.1.4 A number of semi-permanent and permanent structures utilised to support the current waste processing operations are situated across the site. These include weigh bridges (in west and east), a picking belt complex (including a hopper, trammel, sorting belts, picking station and fans), a series of concrete segregated waste storage bays, shipping container, office structures and a series of shipping containers/skips. At the time of the site walkover, a number of JCB Wastemasters were present on site to supporting the processing operations. At this time, unprocessed waste was situated in the centre of the site and stockpiles of segregated waste destined for landfill (including fridge/ freezers) were located along the northern boundary to the east of the site.

2.1.5 A number of segregated waste stockpiles destined for recycling were located along the western section of the northern boundary which included: Hardcore materials i.e. 6F2, metal and wood.

2.1.6 A key features plan is presented on Figure 1.

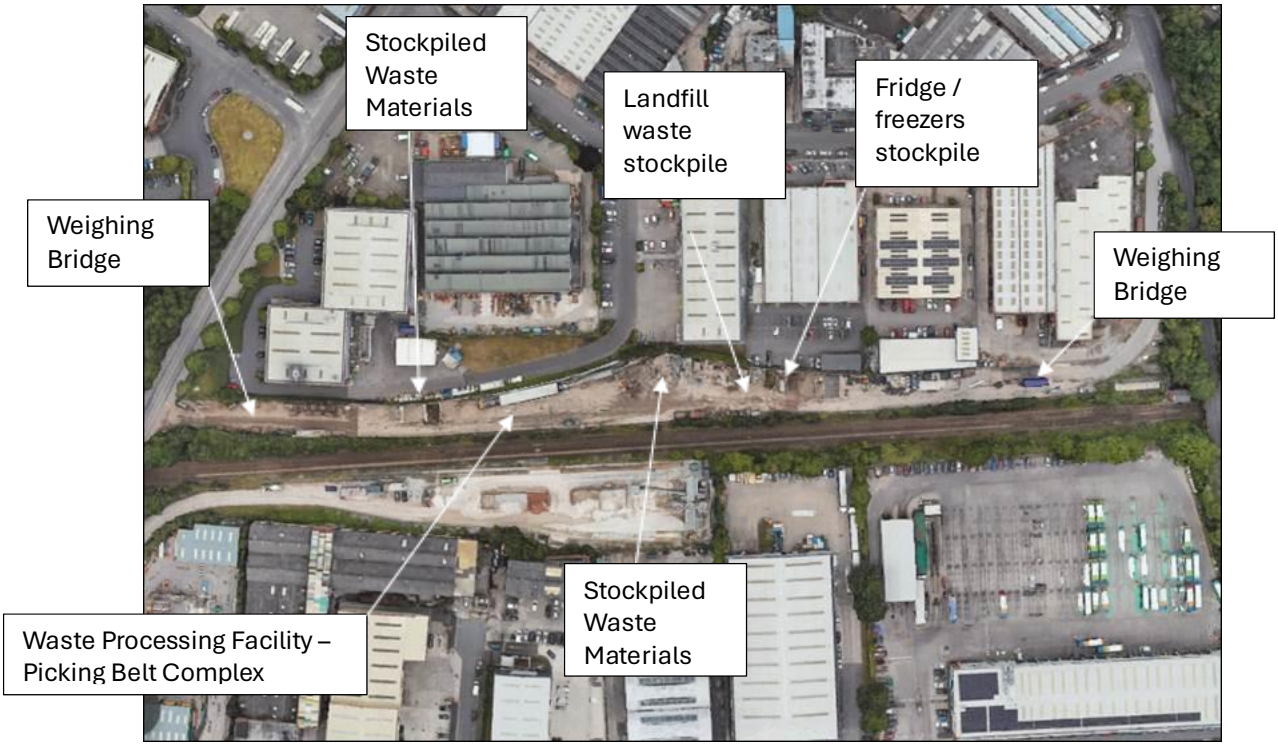



***Figure 1:*** *Key Features Plan*

2.1.7 The site boundaries consist of concrete fencing panels along the northern site boundary and metal fencing along the southern site boundary.

2.1.8 Based on the earliest available maps dating from 1872 the site was shown to form part of Northenden Train Station. A large building located south of the center of the site is marked as Northenden Station. Areas of worked ground are present along the northern and southern site boundaries. By 1910 there has been a small extension to the west of the Northenden Station building. Circa 1977 all building and structures on site have been cleared and are no longer present on the maps. The site remains in this configuration until circa 2022 where an aerial image of the site shows a structure located in the east and west of the site as well as numerous stockpiles of material located across the site.

## 2.2 Environmental Setting

Geology

2.2.1 There are 29 available BGS exploratory locations to view within 250 m of the site. The strata encountered within the closest three boreholes are summarised in Table 1 below:

| Distance/direction from site | Depth (m) | Strata |
|---|---|---|
| 30 m West | 0 – 0.79 | Topsoil |
| | 0.79 – 1.52 | Brown sandy silty CLAY |
| | 1.52 – 2.31 | Medium dense light brown fine to medium SAND with Gravel |
| | 2.31 – 4.14 | Medium dense to dense brown medium to coarse SAND and GRAVEL with occasional cobbles. |
| | 4.14 – 5.36 | Very dense brown fine to coarse SAND |
| | 5.36 – 6.88 | Hard red-brown silty CLAY with fragments of red and green mudstone |
| | 6.88 – 8.22 | Grey MUDSTONE with occasional bands of hard grey silty clay |
| | 8.22 – 9.23 | Grey SANDSTONE |
| 39 m North-west | 0 – 0.1 | Fill (topsoil and brick fragments) |
| | 0.1 – 1.21 | Brown sandy CLAY with mudstone fragments (possible fill) |
| | 1.21 – 1.52 | Brown sandy silty CLAY |
| | 1.52 – 3.96 | Medium dense to dense brown fine to coarse GRAVEL with some fine to coarse sand and cobbles |
| | 3.96 – 5.48 | Brown silty sandy CLAY with occasional fine gravel |
| | 5.48 – 8.1 | Medium dense brown fine to medium SAND with occasional traces of coal |
| | 8.1 – 8.71 | Firm to stiff laminated brown silty CLAY with occasional fine gravel |
| 74 m South-east | 0 – 0.91 | Soil |
| | 0.91 – 2.44 | Sandy clay & stone sump yellow sand |
| | 2.44 – 3.35 | Sand and gravel |
| | 3.35 – 3.51 | Clay |
| | 3.51 – 6.25 | Sandy clay & gravel |
| | 6.25 – 9.75 | Yellow sand |
| | 9.75 – 14.33 | Yellow sand & gravel |
| | 14.33 – 92.05 | Red sandstone |

*Table 1: Summary of Closest Three Boreholes Within 250 m Vicinity of the Site.*

2.2.2 There are no records of made ground deposits on site or within 250 m of the site. Given that areas of the site have been subject to historic and current development, BEK considers the presence of made ground to be highly likely.

2.2.3 The underlying superficial geology comprises 'Glaciofluvial Sheet Deposits'. This strata is dominated by sands and gravels. This strata has a high to very high permeability).

2.2.4 Within the off-site boreholes superficial 'sands and gravels' were encountered to depths varying from 3.91 m (Borehole 39 m north-west), 5.36 m (Borehole 30 m west) and to a maximum depth of 14.33 m (Borehole 74 m south-east).

2.2.5 The majority of the underlying solid geology comprises of the Tarporley Siltstone Formation, and is dominated by siltstone and sandstone. The remaining bedrock geology underlying the very eastern part of the site is Wilmslow Sandstone Formation which is dominated by sandstone. These strata's have a low to high permeability (see Figure 2).

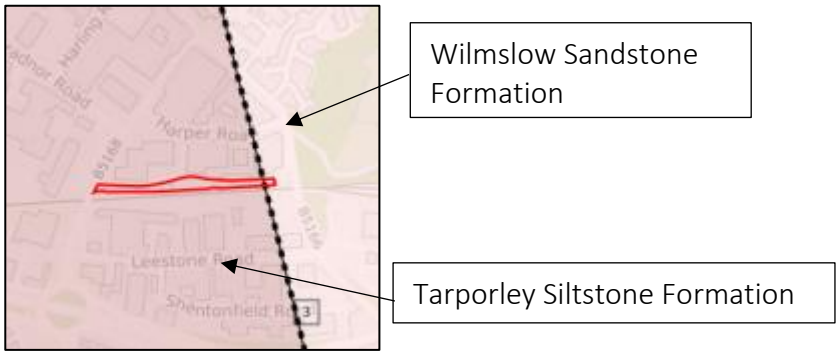



*Figure 2: Bedrock Geology Underlying the Site.*

2.2.6 Within the off-site borehole bedrock geology of 'grey and red sandstone' was encountered in Borehole 30 m west of the site at a depth of 8.22 m bgl. Sandstone was also encountered in the borehole located 74 m south-east of the site at a depth of 14.33 m bgl.

2.2.7 There is one linear fault located on site (east) and is described as a normal fault inferred with crossmarks on the downthrow side.

Mining and Ground Stability

2.2.8 The site is located within an area which is unlikely to have been affected by Coal Mining.

2.2.9 There are six recorded of surface ground workings located on site and numerous locations off-site (see Figure 3).




*Figure 3: Surface Ground Workings on Site*

2.2.10 A summary of the features located on site is presented in Table 2 below.

| Location | Land Use | Year of Mapping | On-site Location |
|---|---|---|---|
| On-site | Cuttings | 1967 - 1975 – 1989 - 1995 | South-West |
| On-site | Unspecified Pit | 1938 | North-west |

*Table 2: Summary of Surface Ground Workings*

2.2.11 There are 31 surface ground workings located off-site and within 250 m of the site. The closest refers to an 'Unspecified Ground Workings' located some 13 m west of the site.

2.2.12 The Enviro+GeoInsight Report provides hazard ratings associated with ground subsidence at the site, as summarised below:

| | |
|---|---|
| Shrink-Swell Clay: | Negligible |
| Landslides: | Very Low |
| Dissolution of Soluble Rocks: | Negligible |
| Compressible Deposits: | Negligible |
| Collapsible Deposits: | Very Low |
| Running Sands: | Very Low |

2.2.13 It can be seen from the above that the site is unlikely to be affected by natural ground instability.

Hydrogeology

2.2.14 The superficial deposits beneath the site are classified by the EA as 'Secondary A Aquifers' which are described as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.'

2.2.15 The bedrock underlying the majority of the site is classified as 'Secondary B Aquifer' which is described as 'predominately lower permeability layers which may store/yield limited amounts of ground water due to localised features such as fissures, thin permeable horizons and weathering'. These are generally the water-bearing parts of the former non aquifer.

2.2.16 However, the Wilmslow Sandstone Formation bedrock underlying the very eastern section of the site is classified as a 'Principal Aquifer' which is described as 'geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale'.

2.2.17 The site is not located within a groundwater source protection zone.

2.2.18 There are no groundwater abstractions located within 250 m of the site.

2.2.19 There is a moderate risk from groundwater flooding at the site.

Hydrology

2.2.20 There are no surface water features located on site. The closest surface water feature is located some 125 m east and is described as an 'inland river' that contains water all year round.

2.2.21 There are no registered licensed discharge consents to controlled waters within 250 m of the site.

2.2.22 There are no surface water abstractions located within 250 m of the site.

Contaminated Land and Landfill Activities

2.2.23 There are no historic landfills located on site. However, there is one historic landfill located some 52 m east of the site that originates within EA/NRW records under the name 'Longley Lane, Northenden, Greater Manchester'. The licensed waste type of this landfill is not known. The landfill operational dates, licenses issue and surrender are not known (site reference of F053), see Figure 4 below.

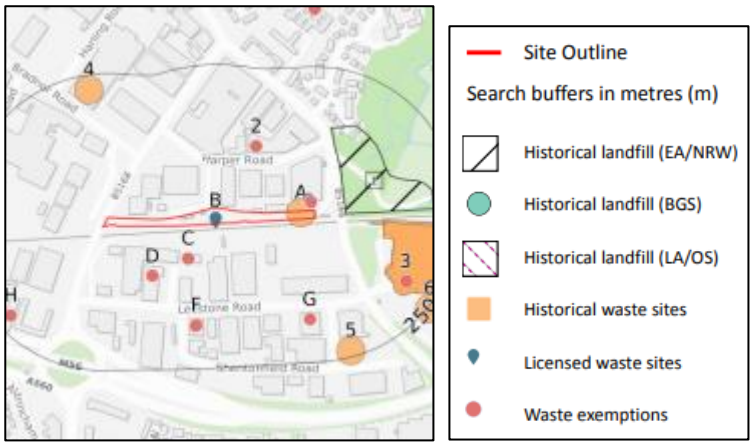



*Figure 4: Historic Landfill (EA/NRW) Located within 250 m of the Site.*

2.2.24 There is one recorded historic waste site located on site. The historic waste site originates under the name 'Waste Transfer Station, Off Longley Road, Worsley, Manchester, Greater Manchester' and the type of site is classified as 'Waste Transfer Station (Extension)'. The description of site operations state 'Scheme comprises part retrospective application for the creation of a new access point off Sharston Road to existing waste transfer station together with installation of waste processing equipment, site cabins, weigh bridges and storage bins'. The waste site was dated 23/10/2018 and is a historic planning application (site reference of 120297/FO/2018).

2.2.25 There are a further seven historical waste sites located within 250 m of the site. The closest refers to a 'Refuse Treatment Plant' with origins from historical mapping. No further details are provided.

2.2.26 There is three licensed waste sites located on site. All three originate under the name 'The Old Railway Station' with the same site address 'The Old Railway Station, Longley Lane, Sharston Ind Est, Manchester and the type of site is classified as 'Household, Commercial & Industrial Waste Transfer station'. Theses licensed waste sites were operational from 1998, and no surrender date is provide.

2.2.27 There are a further three licensed waste sites located off-site some 15 m east of the site. The details of these sites are summarised within Table 3 below.

| Location | Site Name & Address | Reference | Category/ Sub-Category/ Description |
|---|---|---|---|
| 15 m east | Davidsons Skip Hire Ltd - The Old Railway Station, Longley Lane, Sharston Industrial Area Manchester | --- | Household, Commercial & Industrial Waste Transfer Station |
| 15 m east | The Recycling Hutch - The Old Railway Station, Longley Lane, Sharston Industrial Area Manchester | GP3093SD/T001 | Household, Commercial & Industrial Waste Transfer Station. |
| 15 m east | - The Old Railweay Station, Longley Lane, Sharston Industrial Area Manchester | EA/EPR/UP3390VZ/T001 | Household, Commercial & Industrial Waste Transfer Station |

***Table 3:*** *List of the Licensed Waste Sites within 250 m of the Site*

2.2.28 There are 27 recorded waste exceptions located within 250 m of the site. The closest one to the site refers to both the storage and treating of waste exemptions not on a farm located some 15 m east of the site.

2.2.29 There has been one EA recorded pollution incident on site and a further three recorded within 250 m of the site, as summarised in Table 4 below.

| Location | Details/ Date/ Pollutant / Description | Water/ Land/ Air Impact Category |
|---|---|---|
| On site | 01/07/2010<br>Inert Materials and Wastes<br>Construction and Demolition Materials and Wastes | Water Impact: Category 4 (No Impact)<br>Land Impact: Category 2 (Significant Impact)<br>Air Impact: Category 3 (Minor Impact) |
| 158 m South | 26/101/2001<br>Inert Materials and Wastes<br>Construction and Demolition Materials and Wastes | Water Impact: Category 4 (No Impact)<br>Land Impact: Category 3 (Minor Impact)<br>Air Impact: Category 4 (No Impact) |
| 231 m East | 17/07/23<br>Specific Waste Materials<br>Inorganic Chemical Wastes | Water Impact: Category 4 (No Impact)<br>Land Impact: Category 4 (No Impact)<br>Air Impact: Category 4 (No Impact) |
| 233 m West | 22/05/2001<br>Other Pollutant<br>Other:Not Identified | Water Impact: Category 4 (No Impact)<br>Land Impact: Category 3 (Minor Impact)<br>Air Impact: Category 4 (No Impact) |
| 237 m South | 28/06/2001<br>Specific Waste Materials<br>Commercial Waste | Water Impact: Category 4 (No Impact)<br>Land Impact: Category 3 (Minor Impact)<br>Air Impact: Category 3 (Minor Impact) |

***Table 4:*** *EA recorded pollution incidents within 250 m of the Site.*

2.2.30 There are no NIHHS or COMAH sites, or IPPC Authorised Activities within 250 m of the site.

2.2.31 There is one registered Part A(1) processes situated within 250 m. This refers to a licensed industrial activities record under the name 'Ampil 2 Assest Limited – Ampil Electrium Sharston Road Biomass Boiler' and it was licensed to process MCP located some 173 m north of the site. The license issue date is not stated and last date noted as effective on 23/11/2023. The status of the license is effective with a permit number: WE6081AB.

2.2.32 There are seven registered Part B processes situated within 250 m of the site as summarised in Table 5 below.

| Location | Address | Process | Status | Enforcement Date |
|---|---|---|---|---|
| 19 m west | Blue Circle Industries, Shentonfield Rd, M22 4RT | Use of Bulk Cement | Historical Permit | No |
| 29 m South-east | Breedon Southern LTD, The Railway Sidings, off Leestone Road (Shentonfield Road), Sharston Industrial Estate, M22 4RT | Use of Bulk Cement | Current Permit | No |
| 82 m south | Lafarge Aggregates Limited, The Railway Sidings, Sharston Industrial Estate, M22 4RT | Use of Bulk Cement | Historical Permit | No |
| 120 m south-east | Bellcharm Motor Company Ltd, Accident Repair Centre, Leestone Road, M22 4RB | Respraying Road Vehicles | Historical Permit | No |
| 125 m north-west | Wylex Ltd, Sharston Road, Wythenshawe, M22 4RA | Combustion & Incineration | Historical Permit | No |
| 172 m North | Electrium Sales Ltd, Harper Road, Sharton, Wythenshawe, M22 4RA | Coating Processes | Current Permit | No |
| 184 m West | Aggregate Industries UK Limited, Paston Road, Wythenshawe, Manchester, M22 4TF | Use of Bulk Cement | Current Permit | No |

*Table 5: Licensed Pollutant Release Part B within 250 m of the site.*

2.2.33 There is 21 potentially contaminative historical industrial sites located on site and a further 113 located within 250 m of the site. BEK has chosen it prudent to review those on site and those closest, within 50 m of the site (See Table 6 below).

| Location | Company | Date |
|---|---|---|
| On Site | Railway Station | 1897 - 1905 – 1908 – 1911 - 1916 – 1923 - 1938 – 1954 – 1967 |
| On Site | Unspecified Factory | 1967 |
| On Site | Unspecified Pit | 1938 |
| On Site | Unspecified Works | 1967 |
| On Site | Cutting | 1967 – 1975 – 1985 - 1995 |
| On Site | Goods Yard | 1907 - 1938 |
| On Site | Unspecified Ground Workings | 1934 - 1938 |
| On Site | Railway Sidings | 1938 |
| 1 m West | Railway Sidings | 1905 – 1916 -1923 |
| 1 m West | Goods Yard | 1905 - 1923 |
| 6 m West | Unspecified Works | 1975 -1989 – 1995 |
| 6 m South-west | Railway Sidings | 1897 -1907 |
| 11 m South-west | Railway Sidings | 1954 – 1967 - 1975 – 1989 - 1995 |
| 12 m South-west | Railway Sidings | 1938 |
| 13 m West | Unspecified Ground Workings | 1954 - 1975 |
| 15 m South-west | Cattle Pen | 1907 |
| 15 m South-west | Goods Yard | 1907 |
| 15 m South | Railway Building | 1897 |
| 16 m East | Dairy | 1967 – 1975 |
| 17 m West | Railway Sidings | 1907 |
| 21 m South-west | Railway Sidings | 1967 |
| 26 m West | Cuttings | 1916 |
| 28 m West | Unspecified Commercial/Industrial | 1975 |
| 29 m West | Biscuit Factory | 1938 |
| 30 m West | Industrial Area | 1989 – 1995 |
| 31 m West | Unspecified Depot | 1967 |
| 47 m North | Unspecified Works | 1975 |
| 47 m North-east | Unspecified Works | 1975 |

***Table 6:*** *Potentially Recent Contaminative Industries on Site or Within 250 m.*

2.2.34 That there are 38 historical tanks within 250 m of the site. The closest refers to an 'Unspecified Tank' located some 60 m north-east of the site and is dated 1958.

2.2.35 There are five historical railway features located on site. These all refer to railways and railway sidings located in the south of the site, dating from 1898 to 1959.

2.2.36 There are 53 potentially contaminative industrial sites located within 250 m of the site, the closest of which is a vehicle repair and servicing, located some 14 m north-east of the site.

Sensitive Land Use

2.2.37 The site is not affected by any of the ecological systems identified as a statutory receptor in the DETR Circular 01/2006.

2.2.38 The site is not located within a designated nitrate vulnerable zone.

Radon

2.2.39 The Enviro+GeoInsight Report states that 'the property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level'. Therefore, 'no radon protective measures are necessary'

## 2.3 Preliminary Conceptual Model

2.3.1 This section identifies the potential contaminants of concern, sources, pathways and receptors that may be associated with the site based on its known history and the current condition and with respect to the redevelopment of the site for residential use.

2.3.2 The preliminary conceptual model is summarised in the following table:

| Link | Source | Hazard | Transport Mechanism | Pathway | Medium of Exposure | Receptor | Risk Summary* |
|---|---|---|---|---|---|---|---|
| 1 | Contaminated soils | Direct contact /ingestion of soil or dust | Direct contact with contaminated soil | Dermal contact/ingestion of soil at surface | Soil | Humans (on-site/off-site) | Low |
| 2 | Contaminated soils | Particulate inhalation | Wind blown particulates | Inhalation of particulates | Air | Humans (on-site/off-Site) | Low |
| 3 | Contaminated Soils | Inhalation of Ground Gas | Degradation of contaminants generating ground gas through unsaturated zone to soil leading to inhalation | Inhalation of Gases | Air | Humans (on-site/ off-site) | Medium |
| 4 | Contaminated Soils | Vapour Inhalation | Volatalisation of organic compounds through unsaturated zone of soil leading to inhalation | Inhalation of Gases | Air | Humans (on-site/ off-site) | Low |
| 5 | Contaminated Soils | Damage to structure/services | Direct contact of contaminants with building structures/services and flora | Direct contact | Soil/Water | Flora, services | Low |
| 6 | Contaminated Soils | Degradation of perched water quality | Dissolution or suspension of contaminants into perched waters | Dissolution or Suspension | Water | Perched Waters | Low - Medium |
| 7 | Contaminated Soils | Pollution of underlying groundwater | Dissolution or suspension of contaminants into Bedrock Aquifer | Dissolution or Suspension | Water | Groundwaters | Low - Medium |

*Table 7: Preliminary Conceptual Model*

***Relative Risk Screening and Prioritisation for further Investigation & or Assessment**

| | |
|---|---|
| High | Higher probability of occurrence and identification of primary sources of contamination with respect to most sensitive receptors. |
| Medium | Pollutant linkage generally dependent on the presence of other primary pollutant linkages and/or where pollutant linkage generally associated with less sensitive receptors. |
| Low | Lower probability of occurrence such as based on requirement for significant migration pathway or where pollutant linkage requires the presence of source contaminants at concentration likely to be much higher than other identified pollutant linkages. |

# 3. SITE INVESTIGATION

## 3.1 General

3.1.1 This section provides a summary of the site investigation works undertaken by BEK during April 2024.

3.1.2 The site investigation has been designed to provide indicative information for the ground conditions across the site and to provide a quantitative assessment of potential risks associated with contamination and to provide recommendations with respect to foundation design.

3.1.3 Six exploration locations were set out by the site engineer in order to establish representative conditions at the site. The exploratory locations are illustrated on BEK Drawing No 24035-3, presented in Appendix D.

## 3.2 Window Sample Boreholes

3.2.1 Six boreholes were drilled using a window sample borehole rig to a maximum depth of 3.45 m. In-situ testing (SPTs) were carried out in each of the boreholes.

3.2.2 Gas and groundwater monitoring wells were installed in three of the boreholes (Boreholes WS1, WS3 and WS6).

3.2.3 Representative samples were recovered for chemical testing in accordance with the potential contaminants of concern highlighted within the PRA to inform the contamination assessment. Samples were also recovered for geotechnical testing to inform recommendations for foundation design.

3.2.4 The ground conditions were recorded by an engineer from BEK and copies of the borehole records are presented in Appendix A.

## 3.3 Exploratory Locations Rationale

3.3.1 The site investigation was designed by BEK to confirm general ground conditions across the site and to help quantify the nature and extent of the made ground.

## 3.4 Laboratory Testing

Soil Chemical Testing

3.4.1 Chemical laboratory testing was undertaken by the UKAS accredited laboratory of Envirolab. All testing was undertaken to MCERTS standard (where available). The following samples were submitted for chemical analysis:

- Seven samples were tested for the standard BEK soil suite which includes: Arsenic (Total), Cadmium (Total), Copper (Total), Lead (Total), Nickel (Total), Zinc (Total), Chromium (Total), Selenium (Total), Mercury (Total), Boron (Soluble), Hexavalent Chromium, Cyanide (Total), pH, 16 EPA Poly-Aromatic Hydrocarbons (PAH), Total Phenols, Sulphate (acid soluble), Sulphate 2:1 extract and Soil Organic Matter

- Seven samples were tested for Speciated Total Petroleum Hydrocarbons (TPH-CWG)

- Three samples were subjected to SVOC & VOC

- Seven samples were subjected to Asbestos ID testing

3.4.2 Copies of the chemical test results are presented in Appendix B.

Geotechnical Testing

3.4.3 Following a review of ground conditions, two natural clay bulk samples were submitted to the UKAS accredited laboratory of Murray Rix and were tested for Plasticity Index and Moisture Content.

3.4.4 Copies of the geotechnical test results are presented in Appendix C.

## 3.5 Ground Conditions

*Made Ground*

3.5.1 Made ground was encountered at the surface of all exploratory locations to a maximum depth of 2 m. The made ground subtypes encountered are described below:

Concrete – hardstanding was identified at the surface of all exploratory locations at depth varying from 0.15 m in Borehole WS1, to 0.25 m in Borehole WS2, WS3, WS4 and WS6 respectively, and to a maximum depth of 0.35 in Borehole WS5.

'*Black ashy gravely SAND with frequent ash and clinker, rare broken bricks fragments, rare coal fragments*' - this strata was encountered beneath the concrete of Borehole WS1 to 0.5 m.

'*Golden brown/ black slightly gravely SAND with frequent ash and clinker, occasional broken brick fragments*' - this strata was encountered within Borehole WS1 at 0.5 m to a depth of 2 m.

'*Brown mottled orange and black slightly clayey gravely SAND with frequent ash and clinker, frequent broken brick fragments, occasional coal fragments, rare plastic'* – this strata was encountered beneath the concrete in Borehole WS2 to 1.2 m and in Borehole WS5 1 m.

*'Black/dark grey slightly clayey gravely SAND with frequent fine ash and clinker, frequent broken brick fragments, rare fibrous material* - This strata was encountered beneath the concrete in Borehole WS3 to 1.2 m and in Borehole WS4 0.8 m respectively.

*'Grey gravely SAND with rare broken brick fragments'* – This strata was encountered beneath the concrete in Borehole WS6 to 0.6 m.

*'Brown slightly sandy silty CLAY with occasional fine to coarse gravels, rare broken bricks fragments'* – This strata was encountered within Borehole WS6 at 0.6 m to 1.15 m.

*Superficial Strata*

3.5.2 Superficial strata was encountered in all exploratory locations and generally comprised the following:

*Brown gravely SAND* – This strata was encountered in all exploratory locations, in Borehole WS1 at 2 m to 2.4 m, in Borehole WS2 and WS3 at 1.2 to 1.8 m and 2.6 m respectively, in Borehole WS5 at 1 m to 2.4 m and in Borehole WS6 at 1.15 m to 1.5 m.

*Brown fine SAND* – This strata was encountered within Borehole WS2 at 2.5 m to 3.45 m, in Borehole WS5 at 2.4 m to 2.8 m, and in Borehole WS6 at 2.8 m to 3.45 m.

*Brown fine SAND with rare coal fragments* - This strata was encountered within Borehole WS1 at 2.4 m to 2.8 m and in Borehole WS6 at 2.2 m to 2.8 m.

*Brown SAND with rare medium gravels* – This strata was encountered within Borehole WS2 from 1.8 m to a depth of 3.5 m.

*Brown slightly sandy CLAY with rare fine to coarse gravel, rare sand lenses* – This strata was encountered in Borehole WS3 at 2.6 m to 3.45, in Borehole WS4 at 2.7 m to 3.45 m, in Borehole WS5 at 2.8 m to 3.45 and in Borehole WS6 1.5 m to 3.45 m.

*Brown slightly clayey gravely SAND* – This strata was encountered within Borehole WS4 at 0.8 m to a depth of 2.7 m.

*Bedrock*

3.5.3 Suspected bedrock was only encountered at one exploratory location and comprised of the following.

*Very Weathered SANDSTONE* – This strata was encountered within Borehole WS1 at 2.8 m.

*Groundwater*

3.5.4 Groundwater was only encountered in Borehole WS3 at 1.8 m and Borehole WS6 at 2.0 m during the site investigation.

*Visual/olfactory Evidence*

3.5.5 Ash and clinker is also noted to be present within the majority of the made ground subtypes.

## 3.6 Environmental Monitoring

3.6.1 Gas and groundwater monitoring is ongoing and the results will be assessed within an addendum report that will be completed when the gas monitoring programme has been completed.

Groundwater

3.6.2 Groundwater levels have been monitored in the boreholes on 1 occasion to date and the results summarised in Table 8 below.

| Location | Depth to Water (m) bgl | Depth to Base (m) bgl |
|---|---|---|
| WS1 | 2.29 | 2.3 |
| WS3 | Dry | 2.77 |
| WS6 | 1.99 | 2.27 |

***Table 8:*** *Summary of Groundwater Encountered During Groundwater Monitoring*

3.6.3 Note that seasonal variations in water levels cannot be accounted for over the short monitoring period.

Gas Monitoring

3.6.4 The boreholes have been monitored for ground gas on 1 occasion to date and a summary of the gas monitoring results are presented in Table 9 below:

| Location | Concentrations (% v/v) | | | Maximum Flow Rate (l/hr) |
|---|---|---|---|---|
| | Carbon Dioxide | Methane | Oxygen | |
| WS1 | 2.2 | 0 | 14.7 | 0 |
| WS3 | 1.8 | 0 | 16.2 | 0 |
| WS6 | 1.2 | 0 | 15.8 | 0 |

*Table 9: Summary of Gas Monitoring Data*

3.6.5 Based on the ground gas monitoring to date (1 monitoring visit), the risks from ground gas at the site are considered to be low.

3.6.6 The Gas Risk Assessment will be prepared as a separate report.

# 4. QUANTITATIVE RISK ASSESSMENT

## 4.1 Potentially Significant Pollutant Linkages

4.1.1 Potentially significant pollutant linkages identified within the preliminary conceptual model include:

(i) Human Health - risks associated with contamination in the made ground and/or natural strata: via direct contact, ingestion of contaminated soils or via inhalation (asbestos and/or vapours)

(ii) Human Health - risks associated with indoor inhalation of ground gas.

(iii) Controlled Waters - risks associated with contamination in the made ground and/or natural strata affecting the quality of perched water. Risks are associated with dissolution of contamination into perched water and vertical/lateral migration to water receptors.

(iv) Property (including services, flora and concrete) – risks associated contamination affecting concrete, flora and service pipes.

## 4.2 Risk Assessment: Human Health Risks from Exposure to Contaminated Soil

4.2.1 The risks to human health have been assessed by inspection of shallow soils for the presence of elevated contaminants based on the expected contaminant findings detailed in the conceptual model and completion of a quantitative risk assessment.

4.2.2 The soil contamination concentrations have initially been compared to a range of generic assessment criteria. These include the use of the Land Quality Management and Chartered Institute of Environmental Health assessment criteria (S4ULs), Category 4 Screening Levels (C4SLs) and the Contaminated Land: Applications in Real Environments assessment criteria (CL:AIRE).

4.2.3 These assessment criteria have been derived using the CLEA model and fully justified input parameters to be protective of risks to human health considering a commercial end use. The initial assessment assumes a soil organic matter (SOM) of 1 % as a conservative approach.

4.2.4 The following table summarises the chemical test results for the samples tested and lists the relevant assessment criteria and the samples with a concentration in excess of the assessment criteria. Note that only determinands with a concentration above the laboratory limit of detection are presented in the table below:

| Determinand | Range of Concentrations (mg/kg) | Assessment Criteria (mg/kg) | Samples Fail |
|---|---|---|---|
| Arsenic | 3 - 11 | 640[1] | --- |
| Boron (water soluble) | <1 – 2.2 | 21000[1] | --- |
| Cadmium | <0.5 – 0.8 | 190[1] | --- |
| Copper | 22 - 134 | 68000[1] | --- |
| Chromium | 8 - 29 | 8600[1] | --- |
| Lead | 25 – 320 | 6000[2] | --- |
| Nickel | 9 - 20 | 980[1] | --- |
| Zinc | 44 - 213 | 730000[1] | --- |
| Acenaphthene | 0.04 – 11.2 | 84000[1] | --- |
| Acenaphthylene | <0.01 – 1.54 | 83000[1] | --- |
| Anthracene | 0.06 – 17.9 | 520000[1] | --- |
| Benzo(a)anthracene | 0.36 – 30.2 | 170[1] | --- |
| Benzo(a)pyrene | 0.04 – 19.5 | 35[1] | --- |
| Benzo(b)fluoranthene | 0.48 – 23.6 | 44[1] | --- |
| Benzo(ghi)perylene | 0.31 – 9.05 | 3900[1] | --- |
| Benzo(k)fluoranthene | 0.14 – 8.72 | 1200[1] | --- |
| Dibenzo(ah)anthracene | <0.04 – 2.68 | 3.5[1] | --- |
| Chrysene | 0.41 – 38.2 | 350[1] | --- |
| Fluoranthene | 0.56 – 67.7 | 23000[1] | --- |
| Fluorene | 0.03 – 7.87 | 63000[1] | --- |
| Indeno(123-cd)pyrene | 0.03 – 9.46 | 500[1] | --- |
| Naphthalene | <0.03 – 4.65 | 190[1] | --- |
| Phenanthrene | 0.26 – 89.7 | 22000[1] | --- |
| Pyrene | 0.56 – 70.5 | 54000[1] | --- |
| Aliphatic Hydrocarbons C10-C12 | <1 – 26 | 9700[1] | --- |
| Aliphatic Hydrocarbons C12-C16 | <1 – 100 | 59000[1] | --- |
| Aliphatic Hydrocarbons C16-C12 | <1 – 203 | 1600000[1] | --- |
| Aliphatic Hydrocarbons C21-C35 | 6 – 1270 | 1600000[1] | --- |
| Aromatic Hydrocarbons C8-C10 | <1 - 18 | 3500[1] | |
| Aromatic Hydrocarbons C10-C12 | <1 – 24 | 16000[1] | --- |
| Aromatic Hydrocarbons C12-C16 | <1 – 118 | 36000[1] | --- |
| Aromatic Hydrocarbons C16-C12 | <1- 331 | 28000[1] | --- |
| Aromatic Hydrocarbons C21-C35 | 1 - 1210 | 28000[1] | --- |
| Dibenzofuran | 0.527 – 0.745 | 2545[3] | --- |
| Carbazole | 0.514 – 1.21 | 491 | --- |
| Bis(2-ethylhexyl)phthalate | <0.5 – 0.626 | 90661[3] | --- |
| 2,4-Dinitrotoluene | <0.1 – 0.38 | 3726[3] | |
| 2-Methylphenol | 0.106 - 0.541 | 6818[2] | --- |
| 2-Methylnaphthalene | <0.1 – 2.03 | 5297[3] | --- |
| n-Dibutylphthalate | 0.148 – 1.390 | 18283[3] | --- |
| Perylene | 0.578 – 2.04 | 35* | --- |
| Carbon Disulphide | <0.001 – 0.003 | 21[3] | |
| 1,2,4-Trimethylbenzene | <0.001 - 0.001 | 296[3] | |
| Asbestos ID | 1 of 7 samples positive - WS1 (0.2 m) | | |

*Table 10: Summary of Contamination Assessment*

Notes from Table
1 CIEH/LQM Derived Assessment Criteria (S4ULs based on 1% SOM)
2 Category 4 Screening Levels (C4SL)
3 BEK Derived Assessment Criteria

*Given that WHO have assigned perylene as a class three carcinogen (not classifiable as to its carcinogenicity to humans due That further research being required) and in absence of any assessment criteria for perylene we have adopted the conservative assessment criteria for the structurally similar compound benzo(a)pyrene.

4.2.5 It can be seen from the above table that there are no elevated contaminants of concern above the commercial assessment criteria.

4.2.6 Notwithstanding, one out of the 7 samples tested proved positive for the presence of asbestos.

Further Assessment – Asbestos

4.2.7 One of the 7 samples tested (Borehole WS1 at 0.2 m) proved positive with respect to the presence of asbestos (Chrysotile – Loose Fibres).

4.2.8 To further assess potential risks associated with asbestos BEK instructed the laboratory to carry out the asbestos quantification testing.

4.2.9 The result for the quantification testing is presented in Table 11.

| Location, Depth & Strata | Asbestos Type/Matrix Description | Quantification Result (% w/w) |
|---|---|---|
| WS1 (0.2 m) | Chrysotile – Loose Fibres | <0.001 |

***Table 11:*** *Summary of Asbestos Quantification Testing in Positive Sample*

4.2.10 The additional testing confirmed that the asbestos concentrations within the sample recovered from Borehole WS1 (0.2 m) was identified at 'trace' concentrations (<0.001%).

4.2.11 In accordance with HSG248 if asbestos [fibres] are identified at the limit of detection this is taken to be the equivalent of 'trace' asbestos for bulk materials. In addition, work with soils containing asbestos concentrations of <0.001% are not considered to fall under CAR-SOIL given that the concentration of asbestos encountered are at trace.

4.2.12 However, specific mitigation measures may be required on site to mitigate the risks to end users and general public from asbestos.

## 4.3 Risk Assessment: Human Health Risks from Exposure to Hazardous Gases

4.3.1 Risks from ground gas have been identified in the PRA, due a historic landfill located some 52 m east of the site.

4.3.2 Based on the ground conditions encountered at the site and the gas monitoring data to date, the potential risks from ground gas are considered to be low.

4.3.3 A separate Ground Gas Risk Assessment will be prepared upon completion of the current gas monitoring programme.

## 4.4 Risk Assessment: Controlled Waters

4.4.1 Potential risks to the quality of groundwater have been identified in the ground conceptual model.

4.4.2 Risks associated with contamination in the made ground and/or natural strata affecting water quality in the superficial Secondary B Aquifer present within the Glaciofluvial Sheet Deposits and bedrock Principle A Aquifer (where Boulder Clay is absent).

4.4.3 It is noted that majority of borehole were dry during the exploratory drilling.

4.4.4 The soil contaminant levels within all of the made ground overlying the site were below commercial thresholds. Given that the proposals will effectively cap the site with buildings/hard standing, the risk of water infiltration will be minimal and risks to controlled waters are therefore considered to be very low.

## 4.5 Risk Assessment: Buildings

4.5.1 Risks to buildings include the assessment of the aggressive nature of the shallow ground with respect to concrete, the risks to the degradation of water pipes and flora due to contamination.

Risk to Concrete

4.5.2 To assess the potential risks to concrete, BEK has compared the previous site investigation data to assessment criteria presented in the BRE Special Digest 1: Concrete in Aggressive Ground.

4.5.3 With consideration to the range of pH values and sulphate concentrations, the concrete classification suitable for the site would be DS-2 AC-2.

Risks to Services

4.5.4 Potable water supply pipes can be at risk from degradation if the shallow ground consists of specific organic contamination.

4.5.5 Guidance published by UKWIR includes a methodology for the site investigation and risk assessment to determine pipe specification.

4.5.6 On the basis of the ground conditions encountered, risks to water supply pipelines are considered to be very low, however it is recommended that consultation is undertaken with the water service supplier to confirm this.

## 4.6 Risk Assessment: Conclusions

4.6.1 The site is overlain by laterally continuous heterogeneous made ground to depths varying from 0.8 m to 2 m. The made ground generally comprised an uppermost layer of concrete which was underlain by made ground generally comprising sands and gravels with fragments of brick and concrete. Also frequently found within the made ground were ash and clinker and rare plastics, fibrous material and coal.

4.6.2 There made ground is underlain directly by 'medium brown sand' in all locations except in Borehole WS4. The sands where generally underlain by clays. Very weathered sandstone was encountered in one exploratory location at a depth of 2.8 m.

4.6.3 Representative samples recovered from site investigation have been tested for a wide range of contaminants of concern in accordance with the recommendations outlined within the PRA and based on the observations made during the site investigation. Samples have also been recovered for geotechnical assessment to inform the foundation design.

4.6.4 The chemical test results have been compared to relevant generic assessment criteria to identify potential contaminants of concern.

4.6.5 Based on the contamination assessment herein and with respect to the redevelopment of the site for commercial use (with no landscaped areas), the only contaminant of concern identified at the site is considered to be low level asbestos concentrations were noted in one locations at the site.

4.6.6 The gas monitoring program is on-going and a gas risk assessment will be prepared as a separate report.

4.6.7 Risks to controlled water are considered to be negligible.

4.6.8 Risks to concrete are considered to be low and concrete classification of DS-2 AC-2 is likely to be suitable.

4.6.9 Potential risks to the service pipes are considered to be low, but advice should be sought from the water supply provider if new water pipes are to be installed.

# 5. GEOTECHNICAL ASSESSMENT

## 5.1 General

5.1.1 The proposed development consists of the construction of a heavy processing industrial unit adjacent to the railway at Sharston Industrial Estate, Manchester. It is presumed that the structure will comprise of a steel framed superstructure with lightweight cladding to the roof and walls, with some masonry elements to walls. It is also presumed that there will be a heavy concrete stab to sustain the loadings from the waste materials and to support internal masonry office structures. The guidance given herein will therefore need to be reviewed in terms of the actual building type to be adopted, by a suitably qualified and experienced engineer.

5.1.2 Site investigation has proven that the site is covered by made ground that varied in thickness from 0.8 m to 2.0 m. The made ground generally consists, of sands with ash, clinker, brick coal, and gravel inclusions. Underlying the made ground in the location of Borehole WS1 at 2 m is a band of gravely sand to 2.4 m over a fine sand before weathered mudstone is encountered at 2.8 m. Within Borehole WS2 there are gravely sands at 1.2 m before medium to dense sands are found. In Borehole WS3, gravely sands are encountered at 1.2 m before stiff sandy clays are encountered at 2.6 m. In Borehole WS4, clay, gravely sand is found at 0.8 m which overlies sandy clays that are encountered at a depth of 2.7 m. In Borehole WS5, gravely sands extend from 1 m depth to 2.4 m where they are medium dense sands, before stiff sandy clays are found at 2.8 m. At Borehole WS6 gravely sand is found at 1.1 m over a band of stiff clay between 1.5 m and 2.2 m before medium, then dense sands are found at depth.

5.1.3 Groundwater was encountered at depth of 1.8 m in Borehole WS3, within the gravely sands, and at 2 m in the clay layer within Borehole WS6. The remaining boreholes remained dry during the course of the investigation works. Bedrock was found in Borehole WS1 (as noted above) but at none of any of the other borehole locations.

5.1.4 Standard Penetration Tests (SPT) were conducted in the window sample boreholes, starting at a depth of 1 m and repeated at 1 m levels from 2 m onwards. The SPT results are summarised in Table 12 below.

| SPT Readings (N) | Depth of Test | | |
|---|---|---|---|
| | 1.0 – 1.45m | 2.0 – 2.45m | 3.0 – 3.45m |
| WS1 | 18* | 22 | >50 |
| WS2 | 14* | 24 | 42 |
| WS3 | 13* | 26 | 40 |
| WS4 | 17 | 25 | >50 |
| WS5 | 19 | 28 | 42 |
| WS6 | 18* | 23 | >50 |

*Table 12: Window Sample SPT Results (* - Results in fill materials)*

5.1.5 Clay samples were taken from Borehole WS5 and WS6. Atterberg tests were undertaken in the laboratory conditions to determine the plasticity index of the clay. The modified plasticity index for each sample was calculated in accordance with NHBC guidance and summarised in Table 13 below

| Plastic Limit Test Results | | | | | |
|---|---|---|---|---|---|
| Location | Depth (m) | Plasticity Index (P.I.) | Retained 425 Sieve | Passing 425 Sieve | Modified P.I. (%) |
| WS5 | 2.8-3.4m | 14 | 1% | 99% | 13.8 |
| WS6 | 1.5-2.0m | 16 | 0% | 100% | 16 |
| | Average | 15 | | Average: | 14.9 |

*Table 13: Plasticity Results*

5.1.6 The plasticity results vary across the site, however the building is to be located near the site of the results from Borehole WS4 where the clays can be categorised as low volume change potential. Foundation formation depths should therefore be taken based on low volume change potential, requiring a footing depth of 0.7 m below existing or proposed ground level, whichever is the lower, in areas where clay soils are present. Clay heave potential must be considered as part of the foundation design and must be appraised in accordance with NHBC Ch.4.2 requirements.

## 5.2 Assessment and Conclusions

5.2.1 The underlying soils to the site very considerably, with some areas predominantly clays (cohesive) and sands (non-cohesive) soils and some areas a mix depending on depth.

5.2.2 The general bearing capacities under the made ground materials based on the SPT values, however, indicates that good bearing capacities exist on the natural ground. These capacities are I excess of 200 kN/$m^2$ at a depth of 2 m below the surface.

5.2.3 The proposed development involves the construction of a waste processing factory. It is anticipated that a lightweight steel framed structure will be adopted to encapsulate the structure. Depending on spans and spacing's of the frames, this is likely to generate foundation base loads of 150 kN to 200 kN at the bases of posts. The floor slab is likely to be heavy duty, producing area loadings of between 40 kN/$m^2$ and 50 kN/$m^2$. Pad bases to the steel frame, formed on the natural soils beneath the fill would be acceptable for the frame.

5.2.3 With the made ground materials of up to 2 m depth under the building, this would suggest that a ground bearing slab would not be suitable, however, removal of the made ground and bringing back to level with engineered made ground may be an option, but likely to be costly. The use of ground improvement techniques have been considered, however, the close proximity to the railway would suggest that this is not an option. The use of deep trench foundations to the competent ground at 2 m is therefore likely to be the most suitable option with a ground cast suspended heavy duty reinforced slab spanning between. The trench fill an also be used to sustain the base loads for the steel frame.

5.2.4 All formations must be checked on site to confirm that the design bearing capacity is extent before foundations are installed. Should areas of poor ground be encountered, the excavations may require extending until suitable strata is found, and the design engineer's instruction must be sought.

5.2.5 Local trees will have a bearing on the proposed building foundations, which will need to be appraised by the foundation designer. Formation levels must be designed to comply with LABC requirements and NHBC Ch.4.2 guidance.

5.2.6 All foundation designs must be reviewed and designed by a suitably qualified design engineer. The above advice is based upon the ground condition information obtained during the survey. The design engineer must satisfy themselves that the information meets with their design requirements.

# 6. RECOMMENDATIONS

6.1 This report provides an assessment of the ground conditions based on the assessment of available site investigation information by quantifies the potential risks associated with contamination with consideration to the proposed re-development of the site. The report also provides recommendations for foundation design considering the redevelopment proposals.

## Contamination Assessment

6.2 Based on the results of the contamination risk assessment undertaken at the land encompassing P.P. O'Connor Ltd land at Sharston Industrial Estate, Wythenshawe, Manchester and with consideration to the environmental setting and the proposed commercial use, the only potential risk identified is associated with asbestos (note that the gas risk assessment is yet to be completed).

6.3 Based on the available site investigation information and the contamination assessment herein, BEK recommends the following:

(i) An Asbestos Management Plan (AMP) should be prepared to manage and mitigate the potential risks from asbestos. The AMP should consider the findings of this report to implement safe working procedures and mitigate any potential risks to contractors on site or the general public adjacent to the site.

(ii) All groundworks should be carried out in accordance with the recommendations presented in the AMP. The groundworkers risk assessment and method statements should reflect the information presented herein and the AMP.

(iii) All ground workers adopt suitable PPE when working on the site and consider the requirements of site-specific risk assessments and working method statements.

(iv) Any material removed from the site should be disposed of in accordance with appropriate in accordance with appropriate legislation and regulations, including the Duty of Care Regulations.

(v) Consideration should be given to the requirements of the water supply provider. They are likely to require the UKWIR risk assessment to be completed to determine the specification for the water pipes. BEK recommends that the water supply provider is contacted, and enquiries made.

(vi) Consideration should be given to the requirements for use of concrete at the site. The concrete classification suitable for the site is DS-2 AC-2.

6.4 The ground conditions should be as anticipated during all excavations. Advice should be sought if ground conditions are significantly different or if visual/olfactory evidence of contamination is encountered.

6.5 A Ground Gas Risk Assessment will be prepared on completion of the gas monitoring programme. The recommendations of that report (if any) should be included within the Remediation Method Statement.

Geotechnical Assessment

6.6 The underlying soils to the site very considerably, with some areas predominantly clays (cohesive) and sands (non-cohesive) soils and some areas a mix depending on depth. The general bearing capacities under the made ground materials based on the SPT values, however, indicates that good bearing capacities exist on the natural ground. These capacities are I excess of 200 kN/$m^2$ at a depth of 2 m below the surface.

6.7 The proposed development involves the construction of a waste processing factory. It is anticipated that a lightweight steel framed structure will be adopted to encapsulate the structure. Depending on spans and spacing's of the frames, this is likely to generate foundation base loads of 150 kN to 200 kN at the bases of posts. The floor slab is likely to be heavy duty, producing area loadings of between 40 kN/$m^2$ and 50 kN/$m^2$. Pad bases to the steel frame, formed on the natural soils underlying the made ground would be acceptable for the frame.

6.8 With the made ground materials of up to 2 m depth under the building, this would suggest that a ground bearing slab would not be suitable, however, removal of the made ground and bringing back to level with engineered made ground may be an option, but likely to be costly. The use of ground improvement techniques have been considered, however, the close proximity to the railway would suggest that this is not an option. The use of deep trench foundations to the competent ground at 2 m is therefore likely to be the most suitable option with a ground cast suspended heavy duty reinforced slab spanning between. The trench fill an also be used to sustain the base loads for the steel frame.

6.9 All formations must be checked on site to confirm that the design bearing capacity is extent before foundations are installed. Should areas of poor ground be encountered, the excavations may require extending until suitable strata is found, and the design engineer's instruction must be sought.

6.10 Local trees will have a bearing on the proposed building foundations, which will need to be appraised by the foundation designer. Formation levels must be designed to comply with LABC requirements and NHBC Ch.4.2 guidance.

6.11 All foundation designs must be reviewed and designed by a suitably qualified design engineer. The above advice is based upon the ground condition information obtained during the survey. The design engineer must satisfy themselves that the information meets with their design requirements.

Waste Soil Management

6.12 Careful management of soils during the excavation works will ensure optimum utilisation of soil resources. Excavated soils which require off-site disposal are anticipated to be classified in accordance with the following document: Guidance on the Disposal of "Contaminated Soils" Version 3 (April 2001); produced by the Environment Agency.

6.13 In all cases where excess soils require off-site disposal, the materials needs to be managed under the appropriate legislation and consideration given to any remedial techniques that could be used to improve the soil.

6.14 If waste soils are to be re-used on site then a suitable permit exemption should be put in place (if appropriate) or a Material Management Plan (MMP) should be prepared as part of compliance with the CL:AIRE Definition of Waste:Code of Practice.

# APPENDIX A

Exploratory Logs

GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 5th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS1
**SHEET** 1/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Borehole Dry. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | CONCRETE | |
| | 0.2 | D=0.2 m | | | | | Black ashy gravely SAND with frequent ash and clinker, rare broken brick fragments, occasional coal fragments | |
| 0.2 | | | | | | | | 0.2 |
| 0.4 | | | | | | | | 0.4 |
| 0.6 | | | | | | | Medium golden brown/black slightly gravely SAND with frequent ash and clinker, occasional broken bricks | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 - 1.45 | SPT (C) N=18 | 5,6/6,4,4,4 | | | | | 1 |
| 1.2 | | | | | | | | 1.2 |
| 1.4 | | | | | | | | 1.4 |
| | 1.5 | D= 1.5 m | | | | | | |
| 1.6 | | | | | | | | 1.6 |
| 1.8 | | | | | | | | 1.8 |
| 2 | 2.0 - 2.45<br>2.2 | SPT (C) N=22<br>D= 2.2 m | 4,4/5,5,6,6 | | | | Medium brown gravely SAND | 2 |
| 2.2 | | | | | | | | 2.2 |
| 2.4 | | | | | | | Medium brown fine SAND with rare coal fragments | 2.4 |
| | 2.6 | D= 2.6 m | | | | | | |
| 2.6 | | | | | | | | 2.6 |
| 2.8 | | | | | | | Hard very weathered SANDSTONE | 2.8 |
| | 3.00 | D= 3.0 m | | | | | | |
| 3 | 3.0 - 3.45 | SPT (C) N=>50 | 6,11/14,21,50/60<br>Refusal | | | | | 3 |
| 3.2 | | | | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 6th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS2
**SHEET** 2/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Borehole Dry. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0.2 | | | | | | | CONCRETE | 0.2 |
| 0.4 | 0.4 | D=0.4 m | | | | | Medium brown mottled orange and black slightly clayey gravely SAND with frequent ash and clinker, frequent broken brick fragments, occasional coal fragment, rare plastic | 0.4 |
| 0.6 | | | | | | | | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 - 1.45 | SPT (C) N=14 | 3,3/3,3,4,4 | | | | | 1 |
| 1.2 | | | | | | | Medium brown gravely SAND | 1.2 |
| 1.4 | | | | | | | | 1.4 |
| 1.6 | 1.5 | D= 1.5 m | | | | | | 1.6 |
| 1.8 | | | | | | | Medium brown SAND rare medium gravel | 1.8 |
| 2 | 2.0 | D= 2.0 m | | | | | | 2 |
| 2.2 | 2.0 - 2.45<br>2.2 | SPT (C) N=24 | 4,4/5,5,6,8 | | | | | 2.2 |
| 2.4 | | | | | | | | 2.4 |
| 2.6 | | | | | | | Dense brown fine SAND | 2.6 |
| 2.8 | | | | | | | | 2.8 |
| 3 | 3.00 | D= 3.0 m | | | | | | 3 |
| 3.2 | 3.0 - 3.45 | SPT (C) N=42 | 4,6/8,8,12,14 | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 5th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS3
**SHEET** 3/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Water strike at 1.8 m. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0.2 | | | | | | | CONCRETE | 0.2 |
| 0.4 | 0.5 | D=0.5 m | | | | | Black/dark grey slightly clayey gravely SAND with frequent ash and clinker, frequent broken brick fragments, occasional coal fragments, rare fibrous material | 0.4 |
| 0.6 | | | | | | | | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 - 1.45 | SPT (C) N=13 | 2,2/3,3,3,4 | | | | | 1 |
| 1.2 | | | | | | | Medium brown gravely SAND | 1.2 |
| 1.4 | 1.5 | D= 1.5 m | | | | | | 1.4 |
| 1.6 | | | | | | | | 1.6 |
| 1.8 | | | | ▽ | | | | 1.8 |
| 2 | 2.0 - 2.45 | SPT (C) N=26 | 4,4/4,6,6,10 | | | | | 2 |
| 2.2 | | | | | | | | 2.2 |
| 2.4 | | | | | | | | 2.4 |
| 2.6 | | | | | | | Hard brown slightly sandy CLAY with rare fine to coarse gravels, rare sand lense | 2.6 |
| 2.8 | | | | | | | | 2.8 |
| 3 | 3.00 | D= 3.0 m | | | | | | 3 |
| 3.2 | 3.0 - 3.45 | SPT (C) N=40 | 6,6/6,8,12,14 | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 5th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS4
**SHEET** 4/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Borehole Dry. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0.2 | | | | | | | CONCRETE | 0.2 |
| 0.4 | 0.4 | D=0.4 m | | | | | Black/dark grey slightly clayey gravely SAND with frequent ash and clinker, frequent broken brick fragments, occasional coal fragments, rare plastic, rare fabric | 0.4 |
| 0.6 | | | | | | | | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 | D= 1.0 m | | | | | Medium brown slightly clayey gravely SAND | 1 |
| 1.2 | 1.0 - 1.45 | SPT (C) N=17 | 3,3/4,4,4,5 | | | | | 1.2 |
| 1.4 | | | | | | | | 1.4 |
| 1.6 | | | | | | | | 1.6 |
| 1.8 | | | | | | | | 1.8 |
| 2 | 2.0 - 2.45 | SPT (C) N=25 | 4,5/5,6,6,8 | | | | | 2 |
| 2.2 | 2.2 | | | | | | | 2.2 |
| 2.4 | | | | | | | | 2.4 |
| 2.6 | | | | | | | | 2.6 |
| 2.8 | | | | | | | Very dense brown slightly sandy CLAY with rare fine to coarse gravels, rare sand lense | 2.8 |
| 3 | 3.00 | D= 3.0 m | | | | | | 3 |
| 3.2 | 3.0 - 3.45 | SPT (C) N=>50 | 6,8,12,12,14,18 | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 5th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS5
**SHEET** 5/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Borehole Dry. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0.2 | | | | | | | CONCRETE | 0.2 |
| 0.4 | 0.5 | D=0.5 m | | | | | Brown mottled orange and black slightly clayey gravely SAND with frequent ash and clinker, frequent broken brick fragments, occasional coal fragment, rare plastic | 0.4 |
| 0.6 | | | | | | | | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 - 1.45 | SPT (C) N=19 | 4,4/4,5,5,5 | | | | Medium brown gravely SAND | 1 |
| 1.2 | | | | | | | | 1.2 |
| 1.4 | 1.5 | D= 1.5 m | | | | | | 1.4 |
| 1.6 | | | | | | | | 1.6 |
| 1.8 | | | | | | | | 1.8 |
| 2 | 2.0 - 2.45 | SPT (C) N=28 | 5,5/6,6,8,8 | | | | | 2 |
| 2.2 | | | | | | | | 2.2 |
| 2.4 | | | | | | | | 2.4 |
| 2.6 | 2.6 | D= 2.6 m | | | | | Medium brown fine SAND | 2.6 |
| 2.8 | 2.8 - 3.4 | B= 2.8 - 3.4 m | | | | | Hard brown slightly sandy CLAY with rare fine to coarse gravels, rare sand lense | 2.8 |
| 3 | 3.0 - 3.45 | SPT (C) N=42 | 4,5/8,8,12,14 | | | | | 3 |
| 3.2 | | | | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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GEO-ENVIROMENTAL CONSULTING ENGINEERS

# GEO-ENVIRONMENTAL CONSULTANTS

**PROJECT NUMBER** 24035
**PROJECT NAME** Sharston Industrial Estate
**CLIENT** PP O'Connor

**DATE** 5th April 2024
**DRILLING METHOD** Window Sample Borehole
**BOREHOLE NO** WS6
**SHEET** 6/6

**COMPLETION** | **CASING** uPVC | **SCREEN** uPVC Factory Slotted

**COMMENTS** Water strike at 2 m. Refusal on barrel at 3.45 m.

| Depth (m) | Depth (m) | Samples/ Test | Field Records | Water | Well Instal. | Graphic Log | Material Description | Elevation (m) |
|---|---|---|---|---|---|---|---|---|
| 0.2 | | | | | | | CONCRETE | 0.2 |
| 0.4 | 0.4 | D=0.4 m | | | | | Grey gravely SAND with rare broken brick fragments | 0.4 |
| 0.6 | | | | | | | Brown slightly sandy silty CLAY with occasional fine to coarse gravels, rare broken brick fragments. | 0.6 |
| 0.8 | | | | | | | | 0.8 |
| 1 | 1.0 | D= 1.0 m | | | | | | 1 |
| 1.2 | 1.0 - 1.45<br>1.2 | SPT (C) N=18 | 3,3/4,4,4,6 | | | | Medium brown gravely SAND | 1.2 |
| 1.4 | | | | | | | | 1.4 |
| 1.6 | 1.5<br>1.5 - 2.0 | D= 1.5 m<br>B= 1.5 - 2.0 m | | | | | Very stiff brown slightly sandy CLAY with rare fine to coarse gravels, rare sand lense | 1.6 |
| 1.8 | | | | | | | | 1.8 |
| 2 | 2.0 - 2.45 | SPT (C) N=23 | 4,5/5,6,6,6 | ▽ | | | | 2 |
| 2.2 | | | | | | | Medium brown fine SAND with rare coal fragments | 2.2 |
| 2.4 | | | | | | | | 2.4 |
| 2.6 | 2.5 | D= 2.5 m | | | | | | 2.6 |
| 2.8 | | | | | | | Very dense brown fine SAND | 2.8 |
| 3 | 3.00 | D= 3.0 m | | | | | | 3 |
| 3.2 | 3.0 - 3.45 | SPT (C) N=>50 | 6,8/12,18,19,20 | | | | | 3.2 |
| 3.4 | | | | | | | | 3.4 |
| 3.6 | | | | | | | Termination Depth at: 3.45 m | 3.6 |



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# APPENDIX B

Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/03532
**Issue Number:** 1 **Date:** 17 April, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Sharston Industrial Estate
**Project Ref:** Not specified
**Order No:** 8171-24035-MLM
**Date Samples Received:** 09/04/24
**Date Instructions Received:** 10/04/24
**Date Analysis Completed:** 17/04/24

**Approved by:**



Amy Riding
Administration Assistant

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| % Stones >10mm$_A$ | 9.0 | 25.5 | 16.5 | <0.1 | 13.1 | 11.0 | | % w/w | 0.1 | A-T-044 |
| Asbestos in soil$_D^{\#}$ | NAD | NAD | NAD | Chrysotile | NAD | NAD | | | | A-T-045 |
| Asbestos Matrix (visual)$_D$ | - | - | - | - | - | - | | | | A-T-045 |
| Asbestos Matrix (microscope)$_D$ | - | - | - | Loose Fibres | - | - | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_D$ | N/A | N/A | N/A | N/A | N/A | N/A | | | | A-T-045 |
| Asbestos in soil % composition (hand picking and weighing)$_D$ | - | - | - | <0.001 | - | - | | % w/w | 0.001 | A-T-054 |
| pH$_D^{M\#}$ | 8.18 | 8.78 | 11.09 | 9.54 | 8.08 | 8.35 | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 1.50 | 0.16 | 0.27 | 0.07 | 1.28 | 0.28 | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 7100 | 740 | 5800 | 1000 | 8300 | 1700 | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | <1 | <1 | <1 | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 3.7 | 1.9 | 1.9 | 7.7 | 2.1 | 7.4 | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 6 | 5 | 3 | 4 | 5 | 11 | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | 1.6 | <1.0 | 1.2 | <1.0 | 2.2 | 1.4 | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | 0.7 | <0.5 | 0.5 | 0.7 | <0.5 | 0.8 | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 134 | 22 | 86 | 84 | 30 | 81 | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 24 | 8 | 12 | 17 | 17 | 29 | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | <1 | <1 | <1 | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 320 | 47 | 25 | 123 | 92 | 190 | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 15 | 10 | 9 | 16 | 12 | 20 | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | <1 | <1 | <1 | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 213 | 44 | 58 | 185 | 109 | 199 | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | 0.04 | 11.2 | 0.24 | 1.78 | 1.58 | 4.83 | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | 0.04 | 1.54 | 0.03 | 0.35 | <0.10 | 0.47 | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | 0.06 | 17.9 | 0.32 | 3.81 | 2.28 | 14.3 | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | 0.36 | 30.2 | 0.70 | 8.98 | 4.02 | 21.8 | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.40 | 19.5 | 0.60 | 9.69 | 3.15 | 15.9 | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.48 | 23.6 | 0.70 | 11.3 | 3.30 | 19.1 | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | 0.32 | 9.05 | 0.31 | 6.09 | 1.48 | 8.04 | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | 0.14 | 8.72 | 0.45 | 3.87 | 1.30 | 7.14 | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | 0.41 | 38.2 | 0.79 | 9.25 | 4.93 | 22.1 | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A$ | 0.06 | 2.68 | 0.08 | 1.19 | <0.40 | 1.91 | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.56 | 67.7 | 1.61 | 21.4 | 9.43 | 59.6 | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | 0.03 | 7.87 | 0.16 | 1.90 | 1.24 | 5.92 | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.30 | 9.46 | 0.36 | 6.66 | 1.56 | 9.17 | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | 4.65 | 0.07 | 0.38 | <0.30 | <0.30 | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.26 | 89.7 | 1.37 | 12.1 | 9.65 | 59.1 | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.56 | 70.5 | 1.38 | 18.7 | 8.17 | 51.6 | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A$ | 4.02 | 412 | 9.17 | 117 | 52.1 | 301 | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| **SVOC excluding PAH-16** | | | | | | | | | | |
| 4-Bromophenyl phenyl ether$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Hexachlorobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Diethyl phthalate$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Dimethyl phthalate$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Dibenzofuran$_A$ | - | - | - | 745 | 527 | 707 | | µg/kg | 100 | A-T-052s |
| Carbazole$_A$ | - | - | - | 1010 | 514 | 1210 | | µg/kg | 100 | A-T-052s |
| Butylbenzyl phthalate$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Bis(2-ethylhexyl)phthalate$_A$ | - | - | - | 3200 | 588 | 2020 | | µg/kg | 500 | A-T-052s |
| Bis(2-chloroethoxy)methane$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Bis(2-chloroethyl)ether$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 4-Nitrophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 3+4-Methylphenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 4-Chloro-3-methylphenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2-Nitrophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2-Methylphenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 1,2,4-Trichlorobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2-Chlorophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,6-Dinitrotoluene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,4-Dinitrotoluene$_A$ | - | - | - | 380 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,4-Dimethylphenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,4-Dichlorophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,4,6-Trichlorophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2,4,5-Trichlorophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 1,4-Dichlorobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 1,3-Dichlorobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 1,2-Dichlorobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2-Chloronaphthalene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| 2-Methylnaphthalene$_A$ | - | - | - | 541 | 268 | 106 | | µg/kg | 100 | A-T-052s |
| Bis(2-chloroisopropyl)ether$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Phenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Pentachlorophenol$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| n-Nitroso-n-dipropylamine$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| n-Dioctylphthalate$_A$ | - | - | - | <500 | <500 | <500 | | µg/kg | 500 | A-T-052s |
| n-Dibutylphthalate$_A$ | - | - | - | 156 | 1390 | 148 | | µg/kg | 100 | A-T-052s |
| Nitrobenzene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Isophorone$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Hexachloroethane$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Hexachlorobutadiene$_A$ | - | - | - | <100 | <100 | <100 | | µg/kg | 100 | A-T-052s |
| Perylene$_A$ | - | - | - | 2040 | 578 | 1300 | | µg/kg | 100 | A-T-052s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| **VOC** | | | | | | | | | | |
| Dichlorodifluoromethane$_{A}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Chloromethane$_{A}$ | - | - | - | <10 | <10 | <250 | | µg/kg | 10 | A-T-006s |
| Vinyl Chloride (Chloroethene)$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Bromomethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Chloroethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Trichlorofluoromethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1-Dichloroethene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Carbon Disulphide$_{A}^{\#}$ | - | - | - | 3 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Dichloromethane$_{A}$ | - | - | - | <5 | <5 | <125 | | µg/kg | 5 | A-T-006s |
| trans 1,2-Dichloroethene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1-Dichloroethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| cis 1,2-Dichloroethene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 2,2-Dichloropropane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Bromochloromethane$_{A}^{\#}$ | - | - | - | <5 | <5 | <125 | | µg/kg | 5 | A-T-006s |
| Chloroform$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1,1-Trichloroethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1-Dichloropropene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Carbon Tetrachloride$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2-Dichloroethane$_{A}^{\#}$ | - | - | - | <2 | <2 | <50 | | µg/kg | 2 | A-T-006s |
| Benzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Trichloroethene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2-Dichloropropane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Dibromomethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Bromodichloromethane$_{A}^{\#}$ | - | - | - | <10 | <10 | <250 | | µg/kg | 10 | A-T-006s |
| cis 1,3-Dichloropropene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Toluene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| trans 1,3-Dichloropropene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1,2-Trichloroethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,3-Dichloropropane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Tetrachloroethene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Dibromochloromethane$_{A}^{\#}$ | - | - | - | <3 | <3 | <75 | | µg/kg | 3 | A-T-006s |
| 1,2-Dibromoethane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| Chlorobenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1,1,2-Tetrachloroethane$_{A}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Ethylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| m & p Xylene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| o-Xylene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Styrene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Bromoform$_{A}^{\#}$ | - | - | - | <3 | <3 | <75 | | µg/kg | 3 | A-T-006s |
| Isopropylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,1,2,2-Tetrachloroethane$_{A}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2,3-Trichloropropane$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| Bromobenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| n-Propylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 2-Chlorotoluene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,3,5-Trimethylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 4-Chlorotoluene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| tert-Butylbenzene$_{A}^{\#}$ | - | - | - | <2 | <2 | <50 | | µg/kg | 2 | A-T-006s |
| 1,2,4-Trimethylbenzene$_{A}^{\#}$ | - | - | - | 1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| sec-Butylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 4-Isopropyltoluene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,3-Dichlorobenzene$_{A}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,4-Dichlorobenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| n-Butylbenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2-Dichlorobenzene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2-Dibromo-3-chloropropane (DCBP)$_{A}$ | - | - | - | <2 | <2 | <50 | | µg/kg | 2 | A-T-006s |
| 1,2,4-Trichlorobenzene$_{A}$ | - | - | - | <3 | <3 | <75 | | µg/kg | 3 | A-T-006s |
| Hexachlorobutadiene$_{A}^{\#}$ | - | - | - | <1 | <1 | <25 | | µg/kg | 1 | A-T-006s |
| 1,2,3-Trichlorobenzene$_{A}$ | - | - | - | <3 | <3 | <75 | | µg/kg | 3 | A-T-006s |

**Envirolab Job Number: 24/03532**

**Client Project Name: Sharston Industrial Estate**

**Client Project Ref: Not specified**

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | WS2 | WS5 | WS6 | WS1 | WS3 | WS4 | | | | |
| Depth to Top | 0.40 | 0.50 | 0.40 | 0.20 | 0.50 | 0.40 | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | | | | |
| Sample Matrix Code | 4ABC | 4ABE | 4A | 4AE | 4AB | 4ABC | | | | |
| **TPH CWG with Clean Up** | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <10 | <10 | <10 | <1 | <10 | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <10 | <10 | 26 | <1 | <10 | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <10 | <10 | 100 | <1 | <10 | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <10 | <10 | 203 | <1 | 16 | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 68 | 38 | 1270 | 8 | 173 | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 6 | 68 | 38 | 1600 | 8 | 189 | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | 1 | 18 | 16 | 18 | <1 | 14 | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <10 | <10 | 24 | <1 | <10 | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | 50 | 11 | 118 | 2 | 38 | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | <1 | 331 | <10 | 293 | 2 | 325 | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 1 | 1210 | 22 | 795 | 6 | 906 | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 2 | 1610 | 49 | 1250 | 11 | 1280 | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 8 | 1670 | 87 | 2850 | 19 | 1470 | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and Interpretations expressed are outside our scope of accreditation.
The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| N/A | Not applicable |

**Asbestos**
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ 25$^{o}$C / 11550µS/cm @ 20$^{o}$C fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Sharston Industrial Estate

**Clients Project No:**

**Project No:** 24/03532

**Date Received:** 10/04/2024 (am)

**Cool Box Temperatures (°C):** 9.5

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 |
|---|---|---|---|---|---|---|
| Client Sample No | | | | | | |
| Client Sample ID/Depth | WS2 0.40m | WS5 0.50m | WS6 0.40m | WS1 0.20m | WS3 0.50m | WS4 0.40m |
| Date Sampled | | | | | | |
| Deviation Code | | | | | | |
| E (no date) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Key*
*E (no date)* *No sampling date provided (all results affected if not provided)*

*If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.*

# Envirolab Analysis Dates

| Lab Sample ID | 24/03532/1 | 24/03532/2 | 24/03532/3 | 24/03532/4 | 24/03532/5 | 24/03532/6 |
|---|---|---|---|---|---|---|
| Client Sample No | | | | | | |
| Client Sample ID/Depth | WS2 0.40m | WS5 0.50m | WS6 0.40m | WS1 0.20m | WS3 0.50m | WS4 0.40m |
| Date Sampled | | | | | | |
| A-T-006s | | | | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-019s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 16/04/2024 | 15/04/2024 |
| A-T-022s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-024s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-026s | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |
| A-T-027s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-028s | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |
| A-T-031s | 13/04/2024 | 13/04/2024 | 13/04/2024 | 15/04/2024 | 13/04/2024 | 13/04/2024 |
| A-T-032s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-040s | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-042sTCN | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 | 15/04/2024 |
| A-T-044 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |
| A-T-045 | 11/04/2024 | 11/04/2024 | 11/04/2024 | 11/04/2024 | 11/04/2024 | 11/04/2024 |
| A-T-050s | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |
| A-T-052s | | | | 17/04/2024 | 17/04/2024 | 17/04/2024 |
| A-T-054 | | | | 12/04/2024 | | |
| A-T-055s | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |
| Calc-As Recd | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 | 16/04/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

# APPENDIX C

Geotechnical Test Results

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

# TEST REPORT

**Client** BEK Enviro Ltd

**Address** Suite One
No. 3 Mitton Road Business Park
Mitton Road
Whalley
Lancashire
BB7 9YE

**Contract** Sharston Industrial Estate

**Job Number** MRN 24115/14
**Date of Issue** 22 April 2024


Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

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

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

UKAS TESTING 1580

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

# MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

**TEST CERTIFICATE**

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

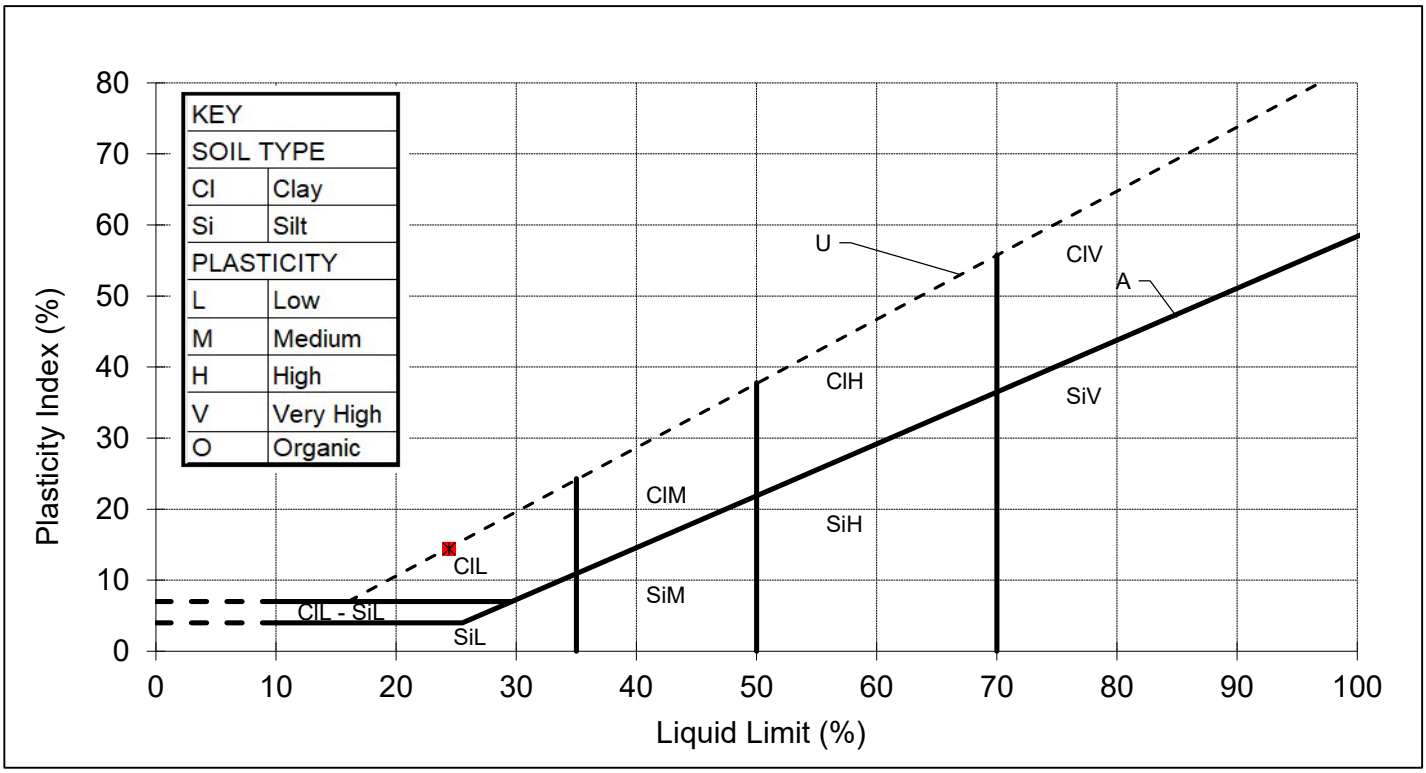
| | |
|---|---|
| CLIENT | BEK Enviro Ltd |
| SITE | Sharston Industrial Estate |
| JOB NUMBER | MRN 24115/14 |

| | | | |
|---|---|---|---|
| SAMPLE LABEL | WS5 (2.8-3.4m) | DATE SAMPLED | 5/6-Apr-24 |
| SAMPLE No. | 451001 | DATE RECEIVED | 08-Apr-24 |
| DATE TESTED | 12-Apr-24 | SAMPLED BY | Client |

| | | | |
|---|---|---|---|
| MATERIAL | Brown silty slightly sandy CLAY | | |
| ADVISED SOURCE | Site Investigation Sample | WATER CONTENT | Increasing |
| SAMPLE HISTORY | Natural State | % RET. 425um BY | Wet Sieved |

| Test Readings mm (average) | | Moisture Content % | Correction Factor | Correction factor from Clayton and Jukes 1978 |
|---|---|---|---|---|
| Determination 1 (avg) | 15.9 | 23.0 | 1.052 | |
| Determination 2 (avg) | 16.1 | 23.4 | | |

| Natural Moisture Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Passing 425 micron (%) |
|---|---|---|---|---|
| 10.3 | 24 | 10 | 14 | 99 |




REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Apr-24

# MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

**TEST CERTIFICATE**

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

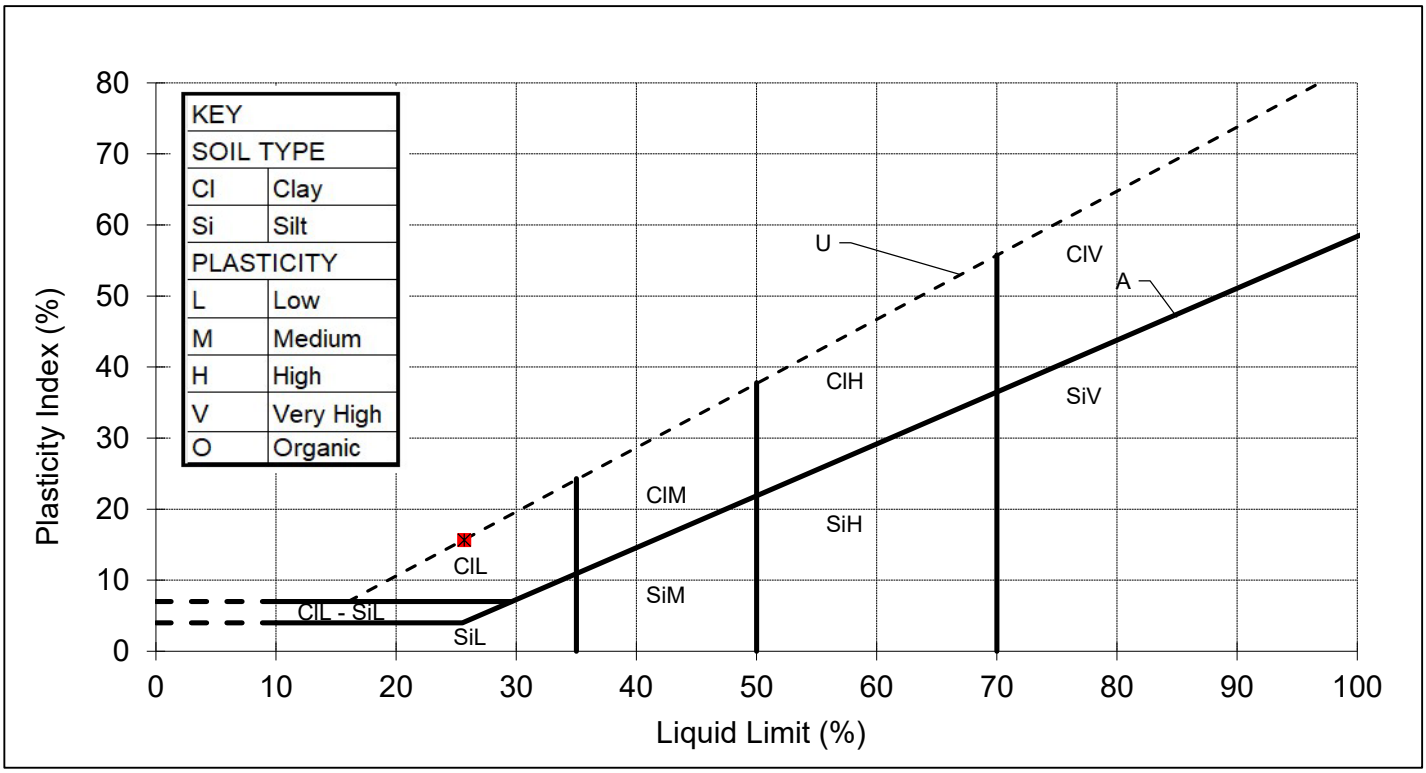
| | |
|---|---|
| CLIENT | BEK Enviro Ltd |
| SITE | Sharston Industrial Estate |
| JOB NUMBER | MRN 24115/14 |

| | | | |
|---|---|---|---|
| SAMPLE LABEL | WS6 (1.5-2m) | DATE SAMPLED | 5/6-Apr-24 |
| SAMPLE No. | 451002 | DATE RECEIVED | 08-Apr-24 |
| DATE TESTED | 12-Apr-24 | SAMPLED BY | Client |

| | | | |
|---|---|---|---|
| MATERIAL | Brown silty slightly sandy CLAY | | |
| ADVISED SOURCE | Site Investigation Sample | WATER CONTENT | Increasing |
| SAMPLE HISTORY | Natural State | % RET. 425um BY | Wet Sieved |

| Test Readings mm (average) | | Moisture Content % | Correction Factor | Correction factor from Clayton and Jukes 1978 |
|---|---|---|---|---|
| Determination 1 (avg) | 18.4 | 25.9 | 1.026 | |
| Determination 2 (avg) | 18.1 | 24.1 | | |

| Natural Moisture Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Passing 425 micron (%) |
|---|---|---|---|---|
| 11.0 | 26 | 10 | 16 | 100 |



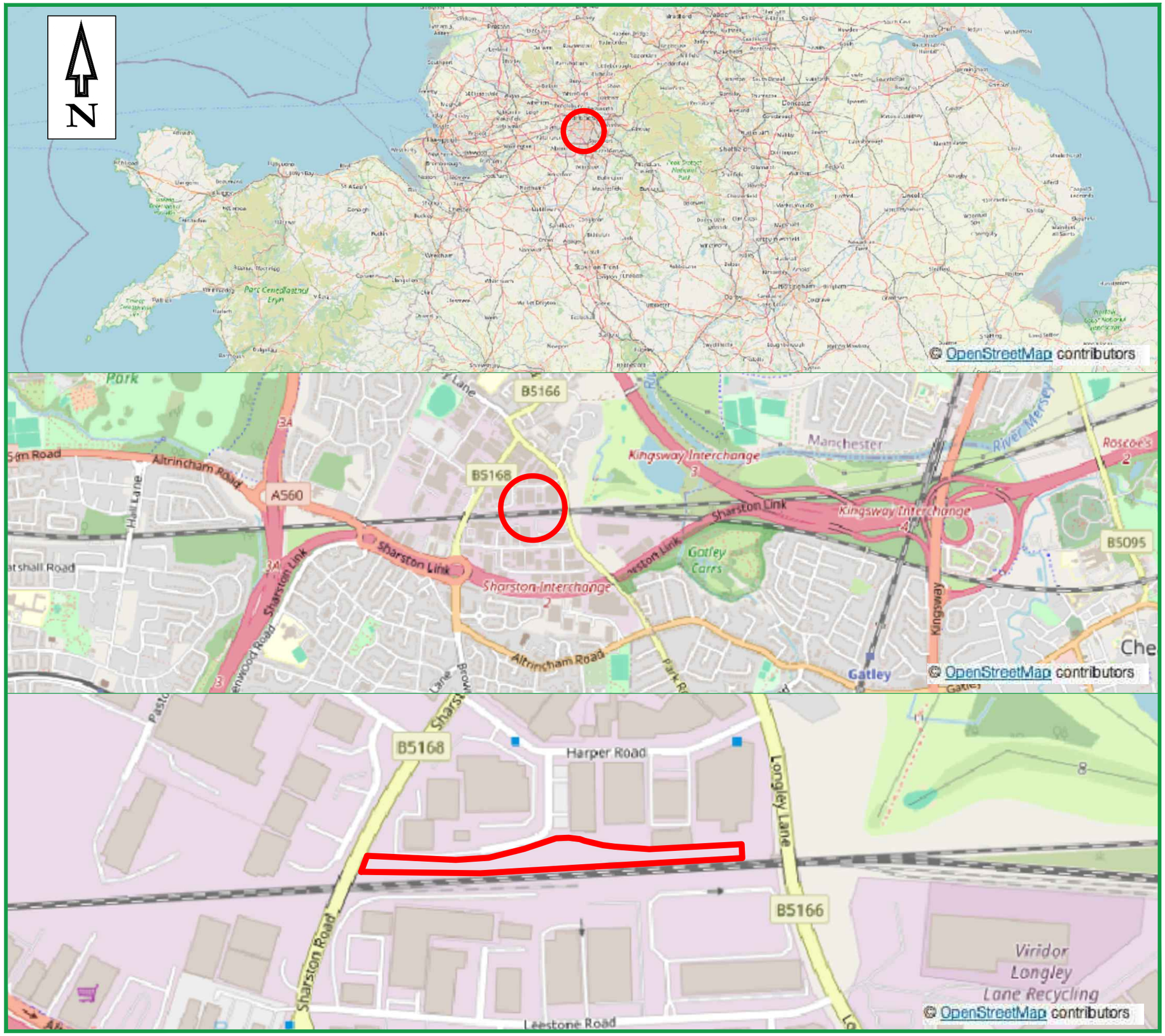

REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Apr-24

# APPENDIX D

Drawings




## LEGEND

SITE LOCATION

| REV | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |
| | | | |

GEO-ENVIRONMENTAL CONSULTING
No 2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

CLIENT.
P.P. O'CONNOR

JOB TITLE.
SHARSTON INDUSTRIAL ESTATE, MANCHESTER

DRAWING TITLE.
SITE LOCATION PLAN

| SCALE @ A3. | DRAWN BY. | APPROVED BY. | DATE. |
|---|---|---|---|
| NTS | D.E. | M.B. | 15/03/24 |

DRAWING No. 24035-1

REV. -




## LEGEND

SITE FOOTPRINT

| REV | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |
| | | | |

GEO-ENVIRONMENTAL CONSULTING
No 2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire, BB5 5GY
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

CLIENT.

P.P. O'CONNOR

JOB TITLE.

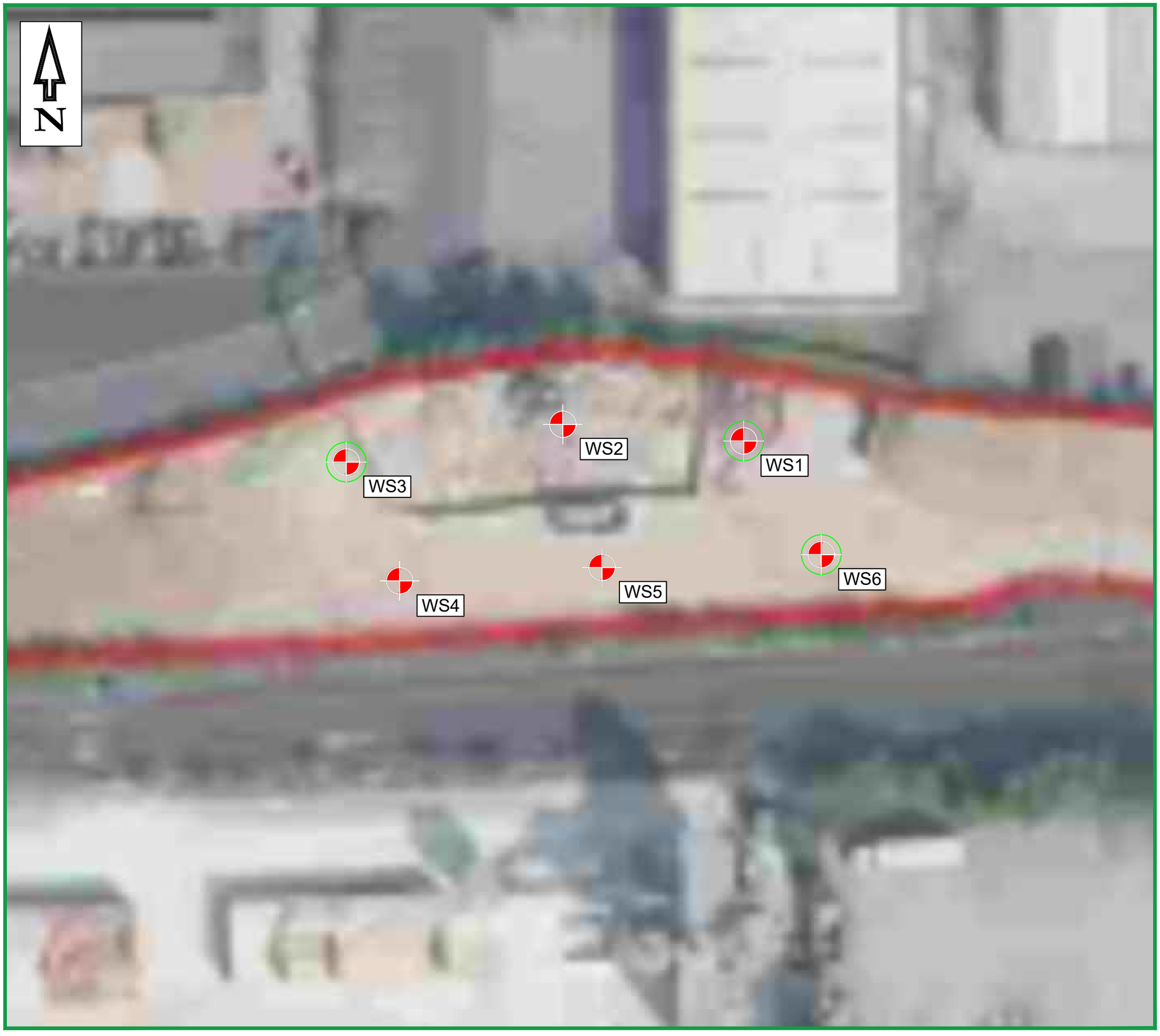
SHARSTON INDUSTRIAL ESTATE, MANCHESTER

DRAWING TITLE.

SITE LAYOUT PLAN

| SCALE @ A3. | DRAWN BY. | APPROVED BY. | DATE. |
|---|---|---|---|
| NTS | D.E. | M.B. | 15/03/24 |

| DRAWING No. | REV. |
|---|---|
| 24035-2 | - |




# LEGEND

WINDOW SAMPLE BOREHOLE

WINDOW SAMPLE BOREHOLE (GAS/GROUNDWATER WELLS)

| REV | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |
| | | | |

GEO-ENVIRONMENTAL CONSULTING
No 2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire, BB5 5GY
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

CLIENT.

P.P. O'CONNOR

JOB TITLE.

SHARSTON INDUSTRIAL ESTATE, MANCHESTER

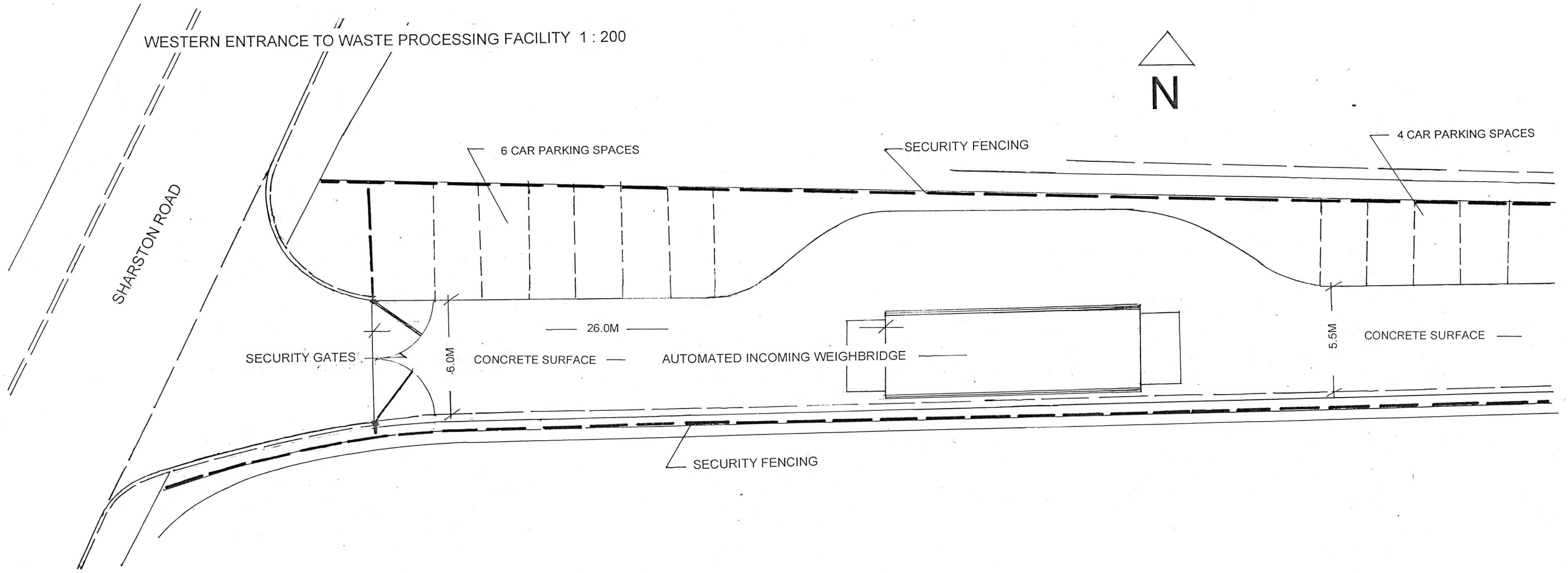
DRAWING TITLE.

SITE INVESTIGATION PLAN

| SCALE @ A3. | DRAWN BY. | APPROVED BY. | DATE. |
|---|---|---|---|
| NTS | D.E. | M.B. | 23/04/24 |

| DRAWING No. | REV. |
|---|---|
| 24035-3 | - |

WESTERN ENTRANCE TO WASTE PROCESSING FACILITY 1 : 200




SCALE BAR 1 : 200

0 2 5 10 20

Job Title
SHARSTON INDUSTRIAL ESTATE

All dimensions must be checked on site and not scaled from this drawing

Drawing Title
WASTE PROCESSING FACILITY
WESTERN ENTRANCE WEIGHBRIDGE AND PARKING

OakbayDesign
29 Bradford Road Eccles Manchester M30 9FF
Tel: +44 (0)7966 470358 info@oakbaydesign.com

| Scale | Date |
|---|---|
| 1 : 200 @ A3 | FEBRUARY 2024 |

| Drawing No. | Rev. |
|---|---|
| Z310.103 | |