

EEL.7473.R03.002.



**RELIANCE ST**

# **Phase II Geo-Environmental Investigation**

## **LAND ADJACENT TO UNITS OFF RELIANCE STREET, NEWTON HEATH, MANCHESTER, M40 3AG**

**January 2020**

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**Prepared for**  
**PMC Autos**  
**Unit 9**  
**Reliance St Industrial Estate**  
**Manchester**  
**M40 3AG**

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## **Document Review**

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## EXECUTIVE SUMMARY

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                               |
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| <b>Site Address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The area of investigation is on the site at the Land adjacent to Units off Reliance Street, Newton Heath, Manchester, M40 3AG |
| <b>National Grid Reference</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | E388134,N400783                                                                                                               |
| <b>Site Area</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.0537Ha                                                                                                                      |
| <b>Background</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                               |
| <p>Egniol Environmental Consultants Ltd. (EEL) has been commissioned by North West Extensions Ltd on behalf of PMC Autos to provide a Geo-Environmental Ground Investigation.</p> <p>The site has undergone a Phase I investigation which was carried out by EEL (Ref. EEL.7473.R03.001) Phase 1 Preliminary Risk Assessment, July 2019). The initial Phase I highlighted the requirement for a Phase II investigation to examine the potential pollutant linkages on site. EEL understands the proposed development is for the erection of a two-storey building to form 3 no. light industrial units (Class B1) on the western area of the Site and the erection of a two storey building to form car repair garage at ground floor with ancillary office to the first floor (Class B2) following the demolition of an existing building to the east of the site.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                               |
| <b>Contaminated Land Risk Assessment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                               |
| <p>On-site:</p> <p>The Tier II Risk Assessment identified all contaminants were found at levels below the GAC level for Commercial / Industrial Land Use.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                               |
| <b>Ground Conditions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                               |
| <p><b><u>Concrete</u></b></p> <p>All locations were covered by concrete which required coring prior to drilling, varying from 0.20m to 0.30m in thickness, though consistently 0.20m in the open compound.</p> <p><b><u>Made Ground</u></b></p> <p>Made Ground was encountered in all four locations during the investigation in window sample locations. Maximum depth of Made Ground was 1.80m bgl in WS102. The deepest single type of Made Ground in WS104 was described as <i>Black, very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ask, clinker, and mixed Made Ground lithologies</i> and was found in all four locations at varying depths.</p> <p><b><u>Topsoil</u></b></p> <p>Topsoil was not encountered in any location.</p> <p><b><u>Superficial CLAY</u></b></p> <p>Superficial CLAY was found in all four window sample locations recorded generally as Low to high strength firm to very stiff high strength greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone. (sand strata varied in depths and thickness in between clay strata). Clay on site has an unproven thickness.</p> <p><b><u>Superficial SAND</u></b></p> <p>Superficial Sand was found in WS102 from 2.50m to 2.85m bgl (observed to be wet) and in WS104 as a sand band circa 2.70m bgl recorded generally as fine to medium yellowish brown silty SAND.</p> <p><b><u>Bedrock</u></b></p> <p>Bedrock is recorded as Collyhurst Sandstone Formation which was not encountered during investigations.</p> <p><b><u>Groundwater</u></b></p> |                                                                                                                               |

Groundwater was not encountered in any exploratory hole. Perched water was identified in WS101 at 1.4m, WS102 at 1.5 and 2.5 (within sand layer) and WS103 at 1.5 over a clayey layer.

#### **Geotechnical Assessment**

|                             |                                                                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Foundation Options</b>   | It is considered that the shallow interbedded glacial deposits would be suitable for shallow foundation options.                     |
| <b>Sulphate Assessment</b>  | Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005). |
| <b>Waste Classification</b> | Waste Assessment Criteria (WAC) testing would be required should any waste be produced.                                              |

#### **Conclusions and Recommendations**

The Tier II Risk Assessment identified the screening values have not been exceeded for the Generic Acceptance Criteria for commercial / industrial land use. EEL considers no further Remediation is required based on the results to date.

Contingencies are advised should any significantly impacted material be encountered during the development.

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Appendix II- Proposed Site Plan

Appendix III Exploratory Hole Logs and In situ Testing

Appendix IV- Laboratory Testing

## **1.0 INTRODUCTION**

Egniol Environmental Consultants Ltd. (EEL) has been commissioned by North West Extensions Ltd on behalf of PMC Autos to provide a Geo-Environmental Ground Investigation, of the site known as Land adjacent to Units off Reliance Street, Newton Heath, Manchester, M40 3AG to inform as part of two approved planning applications reference: 119669/FO/2018 (condition 13a) for the erection of a two-storey building to form 3 no. light industrial units (Class B1) of the site and 124560/FO/2019 (condition 7a) Erection of two storey building to form car repair garage at ground floor with ancillary office to the first floor (Class B2) following demolition of existing building, known as The Shed, Reliance Street Industrial Estate.

The subject area currently comprises open concreted area which in some areas is in poor condition with sporadic areas of vegetation around the surrounding fencing. The Site is relatively level and is currently unused, though has being used as storage for apparel associated with the motor trade such as, a car shell, gas canisters, tires, and the adjacent shed to the east which is currently being used for automotive (repair garage) works. The oldest historical map of 1884 to 1880 identifies the site being open land until circa 1931 when it is part of a larger area identified as Timber Mill. Historic maps from 1952 suggest a building occupying the site which was no longer present by 1983. The site has remained open with a single shipping container to the east.

EEL has previously been provided with the proposed site plans (2542-04) for the Shed and (2312-04) the proposed units for the currently open compound. Proposed Site plans are presented as Appendix II.

Investigations were planned for obtaining positions for contamination testing on the site and limited geotechnical testing. Three groundwater and gas monitoring wells have also been installed for a period of ground gas monitoring.

A Site Location/Exploratory Hole Location Plan, are presented in Appendix I.

### **1.1 Report Objectives**

The purpose of the report is to provide comments on potential contamination aspects of the site and provide limited information for geotechnical purposes.

## **1.2 Scope of Works**

Locations for investigations were intended to provide an investigation of the site targeted around the proposed development and CSM from the initial Phase I PRA. The following was carried out:

A series of mini percussive boreholes were proposed to be excavated across the site to provide coverage in accessible areas. Samples were taken to assess levels of chemical contamination and in-situ tests.

Samples for contamination testing were obtained from the exploratory holes and taken to i2 Analytical Ltd. Selected soil samples will be submitted for a range of chemical analysis comprising metals, total and speciated poly-aromatic hydrocarbons (PAH's), asbestos, speciated and banded Total Petroleum Hydrocarbons (TPH's).

Samples for geotechnical testing were obtained from the exploratory locations and taken to Celtest Ltd. Selected samples will be submitted for a range of geotechnical data comprising, Atterberg Plasticity Index, pH value and sulphate content.

## **1.3 Confidentiality**

EEL has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from EEL; a charge may be levied against such approval.

## 2.0 SITE CHARACTERISTICS

### 2.1 Site Location and Description

|                                |                                                                                                                               |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Site Address</b>            | The area of investigation is on the site at the Land adjacent to Units off Reliance Street, Newton Heath, Manchester, M40 3AG |
| <b>National Grid Reference</b> | 388134,400783                                                                                                                 |
| <b>Site Area</b>               | 0.0537Ha                                                                                                                      |

The site is located within Newton Heath, north east of Manchester; within Reliance Trading Estate. The area of investigation comprises a roughly rectangular shaped parcel of land to the north of Oldham Road A62 and east of Reliance Street. The main Site is oriented south west to north east with the boundary being surrounded by fencing with two entry gates to the north east and north west boundary and includes a small garage unit to the east of the open compound.

The subject area currently comprises open concreted area which in some areas is in poor condition with sporadic areas of vegetation around the surrounding fencing. The Site is relatively level and is currently unused, though has being used as storage for apparel associated with the motor trade such as, a car shell, gas canisters, tires, and the adjacent shed to the east which is currently being used for automotive (repair garage) works.

The oldest historical map of 1884 to 1880 identifies the site being open land until circa 1931 when it is part of a larger area identified as Timber Mill. Historic maps from 1952 suggest a building occupying the site which was no longer present by 1983. The site has remained open with a single shipping container to the east.

### 2.2 Geology & Ground Conditions

Superficial deposits are recorded to be Devensian Till underlain by bedrock of the Collyhurst Sandstone Formation.

### 2.3 Hydrogeology and Hydrology

#### Groundwater

Solid Geology: Principle Aquifer within Bedrock - 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. Secondary (undifferentiated) with superficial deposits - Assigned where it is not possible to attribute either category A or B to a rock type.

#### Surface Waters

The closest surface water course within 250m of the site is a canal approximately 220m south. There is an inland river not influenced by normal tidal actions approximately 300m to the north.

### **3.0 SITE INVESTIGATION**

#### **3.1 General**

All exploratory hole work and associated sampling, and logging was carried out in accordance with techniques outlined in BS EN ISO 14688-1, Identification of soil, BS EN ISO 14688-2 classification of soil, BS EN ISO 22475, Sampling methods and groundwater measurements and BS EN ISO 22476 – Field Testing, as appropriate, at positions. .

A ground investigation has been designed based on the historic mapping in relation to the limited areas of external positions available for investigation with exploratory holes advanced to provide information on baseline conditions across the external areas of the site before demolition is carried out. The investigation has also been used to collect geo-environmental information to assist in establishing potential foundation options.

Exploratory fieldwork was completed on the 15<sup>th</sup> January 2020.

#### **3.2 Exploratory Holes**

The depths of all exploratory holes, descriptions of the materials encountered, samples taken together with any other relevant information can be found in the exploratory hole logs, Appendix III.

Four windowless sample boreholes were drilled on the 15<sup>th</sup> January 2020 to depths of up to 4.00mbgl. Dual purpose gas and water monitoring wells were installed in three of the four window sample locations.

#### **3.3 Samples**

Samples for Contamination testing were obtained from the exploratory holes and taken to i2 Analytical Ltd for selected testing as scheduled by EEL. Selected soil samples were submitted for a range of chemical analysis comprising, metals, total and speciated poly-aromatic hydrocarbons (PAHs), asbestos, speciated and banded total petroleum hydrocarbons (TPH) and. Results of the chemical laboratory testing are reproduced in Appendix IV.

### 3.4 Ground Conditions

#### 3.4.1 Summary of Ground Conditions

The ground investigation generally confirms the published geology and identifies the strata set out in Table 3.1 below. All drilling works were carried out on concrete surfacing and were relatively uniformed across the area of investigation.

Table 3.1 Summary of Strata within borehole locations

| Strata      | Typical Description                                                                                                                                                                                           | Min Depth to Top of Strata (m) | Max Depth to Top of Strata (m) | Max Thickness (m) |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|-------------------|
| Made Ground | Concrete                                                                                                                                                                                                      | 0.00                           | 0.00                           | 0.30              |
|             | Black, very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ask, clinker, and mixed Made Ground lithologies                                                                    | 0.20                           | 0.90                           | 1.2               |
|             | WS102 only – Fine to coarse purple silty gravelly sand. Gravel is fine to medium, angular to sub angular of ash                                                                                               | 0.45                           | 0.45                           | 0.45              |
|             | Very low strength soft orangish brown gravelly silty sandy silty clay. Gravel is fine to coarse, angular to sub rounded of sandstone and mudstone                                                             | 0.65                           | 0.65                           | 0.65              |
|             | Black slightly clayey sandy gravel. Gravel is fine to coarse, angular to sub rounded of sandstone, coal, wood, brick and mixed Made Ground lithologies. Black staining (perched water with hydrocarbon odour) | 0.90                           | 1.50                           | 0.90              |
| CLAY        | Low to high strength firm to very stiff high strength greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone.                                                | 1.70                           | 2.85                           | 1.50              |
| SAND        | Fine to medium yellowish-brown silty SAND                                                                                                                                                                     | 2.5                            | 2.5                            | 0.35              |

#### 3.4.2 Groundwater Conditions

Groundwater was not encountered in any exploratory hole. Perched water was identified in WS101 at 1.4m, WS1

02 at 1.5 and 2.5 (within sand layer) and WS103 at 1.5 over a clayey layer.

### 3.4.3 Ground Gas

Concentrations of methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), oxygen (O<sub>2</sub>), carbon monoxide (CO) and Hydrogen Sulphide (H<sub>2</sub>S), were measured using an infra-red gas analyser (GEO 5000+), calibrated to a reference standard (before and after each survey) and gas flow rates were measured using the internal flow pod. Gas measurements were recorded for a minimum of sixty seconds at each location, at which point the maximum concentration of CH<sub>4</sub> and CO<sub>2</sub> together with the lowest concentration of O<sub>2</sub> were recorded.

Organic soils or putrescible matter was encountered during the investigation. Low permeability clay would limit the possibility of gas migration onto site. Gas monitoring has not yet been completed following the initial phase II investigations, however an addendum will be issued upon completion. Readings to date are presented in Table 3.2 below.

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report C665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007).

One monitoring visit has been completed to date with atmospheric pressure varying between 1044mbar falling to 1036mbar. A maximum concentration of 2.2% v/v carbon dioxide was recorded in WS103. Methane levels were all 0.1% v/v. Borehole flow rates varied between -0.02 to -0.07l/hr.

In accordance with the methodology outlined with the CIRIA publication C665, EEL have utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). The maximum GSV calculated for methane was 0.0001l/hr and for carbon dioxide was 0.0022l/hr (WS103).

The GSV has been compared to the criteria outlined within CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

CIRIA C665 states that the maximum GSV for carbon dioxide and methane is <0.07 l/hr for Characteristic Situation 1/ Green NHBC Traffic Light Classification and therefore the site would fall into this bracket and no gas precautions need to be adopted for the site.

This is the final classification supplied on completion of the remaining monitoring visits.

**Table 3.2: Summary of ground gas and groundwater monitoring results**

| Well  | Date     | CH <sub>4</sub><br>Initial<br>%v/v | CH <sub>4</sub><br>Steady<br>%v/v | CH <sub>4</sub><br>GSV<br>l/hr | CO <sub>2</sub><br>Initial<br>%v/v | CO <sub>2</sub><br>Steady<br>%v/v | CO <sub>2</sub><br>GSV<br>l/hr | O <sub>2</sub><br>%v/v | H <sub>2</sub> S<br>%v/v | Atmos<br>(mb) | Atmos.<br>Dynamic | Flow<br>(l/hr) | Response<br>Zone<br>(mbgl) | Depth<br>to Base<br>(mbgl) | Depth to<br>Water<br>(mbgl) |
|-------|----------|------------------------------------|-----------------------------------|--------------------------------|------------------------------------|-----------------------------------|--------------------------------|------------------------|--------------------------|---------------|-------------------|----------------|----------------------------|----------------------------|-----------------------------|
| WS101 | 20.01.20 | 0.1                                | 0.1                               | 0.0001                         | 1.0                                | 1.0                               | 0.0001                         | 20.2                   | 0                        | 1044          | Falling           | -0.02          | 0.5-1.5                    | 1.52                       | 0.40                        |
|       | 03.02.20 | 0.1                                | 0.1                               | 0.0001                         | 0.3                                | 0.2                               | 0.0002                         | 20.8                   | 0                        | 1001          | Steady            | -0.0           |                            |                            | 0.44                        |
|       | 12.02.20 | 0.1                                | 0.1                               | 0.0001                         | 0.9                                | 0.7                               | 0.0007                         | 20.3                   | 0                        | 1000          | Falling           | -0.1           |                            |                            | 0.52                        |
| WS102 | 20.01.20 | 0.1                                | 0.1                               | 0.0001                         | 2.1                                | 2.1                               | 0.0021                         | 18.8                   | 0                        | 1036          | Falling           | -0.03          | 0.5-1.5                    | 1.57                       | 0.20                        |
|       | 03.02.20 | 0.1                                | 0.1                               | 0.0001                         | 2.3                                | 2.3                               | 0.0023                         | 18.6                   | 0                        | 1001          | Steady            | -0.0           |                            |                            | 0.32                        |
|       | 12.02.20 | 1.1                                | 1.1                               | 0.0011                         | 0.9                                | 0.7                               | 0.0007                         | 20.4                   | 0                        | 1000          | Falling           | -0.1           |                            |                            | 0.32                        |
| WS103 | 20.01.20 | 0.1                                | 0.1                               | 0.0001                         | 2.3                                | 2.2                               | 0.0022                         | 18.9                   | 0                        | 1036          | Rising            | -0.07          | 0.5-1.5                    | 1.83                       | 0.62                        |
|       | 03.02.20 | 0.1                                | 0.1                               | 0.0001                         | 2.4                                | 2.4                               | 0.0024                         | 18.7                   | 0                        | 1001          | Steady            | -0.0           |                            |                            | 0.63                        |
|       | 12.02.20 | 0.1                                | 0.1                               | 0.0001                         | 2.5                                | 2.5                               | 0.0025                         | 20.2                   | 0                        | 1000          | Falling           | -0.1           |                            |                            | 0.65                        |

## 4.0 CONTAMINATION RESULTS AND INTERPRETATION

### 4.1 Tier II Generic Quantitative Contaminated Land Risk Assessment

EEL has undertaken a Tier II qualitative risk assessment to determine if any potential contaminants within the underlying soils pose an unacceptable level of risk to the identified receptors.

At a Tier II stage, the long term (chronic) toxicity risk to human health is assessed by utilising appropriate and conservative generic assessment criteria (GAC) to determine whether there are actual or potential unacceptable risks at the site and if any viable pollutant linkages are present.

To undertake the Tier II assessment within the context of the development proposal, EEL has determined that the most appropriate GAC values available will be those based upon a commercial land use.

The following assessment, summarised below in Table 4.1, has primarily adopted the S4UL (Suitable for Use Levels reference values published by LQM/CIEH in 2015, the S4ULs). Currently, no published GAC value is available for cyanide and therefore EEL has utilised the Environment Agency Contaminated Land Exposure Assessment Tool (CLEAv1.06) to derive the relevant GAC for this proposed land use. Due to the absence of a published lead GAC for direct use within the planning regime, the 2014 Defra C4SL (Category 4 Screening Level) has been used as this value is considered to incorporate the latest toxicological, bioaccessibility and exposure modelling research to date.

**Table 4.1 Summary of Generic Human Health Toxicity Assessment for an Industrial/Commercial end use**

| Determinand         | Units | GAC        | GAC Source | n   | [mc] | Location Strata | Primary Pathways | Assessment        |
|---------------------|-------|------------|------------|-----|------|-----------------|------------------|-------------------|
| Inorganics          |       |            |            |     |      |                 |                  |                   |
| Arsenic             | mg/kg | 640        | (i)        | 5   | 130  | N/A             | 1                | No Further Action |
| Cadmium             | mg/kg | 190        | (i)        |     | <0.2 |                 | 1, 2             |                   |
| Chromium III (VI)   | mg/kg | 8,600 (33) | (i)        |     | 140  |                 | 1, 2, 3          |                   |
| Lead                | mg/kg | 2330       | (iv)       |     | 390  |                 | 1, 2             |                   |
| Mercury [Inorganic] | mg/kg | 1100       | (i)        |     | 2.8  |                 | 1, 2             |                   |
| Nickel              | mg/kg | 980        | (i)        |     | 100  |                 | 1                |                   |
| Selenium            | mg/kg | 12000      | (i)        |     | 3.0  |                 | 1, 2             |                   |
| Copper              | mg/kg | 68000      | (i)        |     | 200  |                 | 1, 2             |                   |
| Zinc                | mg/kg | 780000     | (i)        |     | 210  |                 | 1, 2             |                   |
| TOC                 | %     | N/A        | (v)        |     | -    |                 | 1                |                   |
| Asbestos            | -     | D.         | -          | N.D | 3    |                 |                  |                   |
| Organics – PAHs     |       |            |            |     |      |                 |                  |                   |
| Naphthalene         | mg/kg | 76.4       | (ii)       | 5   | 0.76 | N/A             | 4                | No Further Action |
| Acenaphthylene      | mg/kg | 86.1       | (ii)       |     | 3.1  |                 | 2                |                   |
| Acenaphthene        | mg/kg | 520000     | (ii)       |     | 3.2  |                 | 2                |                   |
| Fluorene            | mg/kg | 30.9       | (ii)       |     | 2.1  |                 | 2                |                   |
| Phenanthrene        | mg/kg | 22000      | (ii)       |     | 22   |                 | 2                |                   |
| Anthracene          | mg/kg | 52,0000    | (ii)       |     | 5.3  |                 | 2                |                   |
| Fluoranthene        | mg/kg | 23000      | (ii)       |     | 29   |                 | 1, 2             |                   |
| Pyrene              | mg/kg | 54000      | (ii)       |     | 26   |                 | 1, 2             |                   |
| Benzo(a) Anthracene | mg/kg | 170        | (ii)       |     | 13   |                 | 1                |                   |

| Determinand                              | Units                                                                | GAC             | GAC Source | n | [mc]   | Location Strata | Primary Pathways | Assessment        |
|------------------------------------------|----------------------------------------------------------------------|-----------------|------------|---|--------|-----------------|------------------|-------------------|
| Chrysene                                 | mg/kg                                                                | 350             | (ii)       |   | 11     |                 | 1                |                   |
| Benzo(b) Fluoranthene                    | mg/kg                                                                | 44              | (ii)       |   | 9.9    |                 | 1                |                   |
| Benzo(k) Fluoranthene                    | mg/kg                                                                | 1200            | (ii)       |   | 6.7    |                 | 1                |                   |
| Benzo(a)Pyrene                           | mg/kg                                                                | 35              | (ii)       |   | 9.9    |                 | 1                |                   |
| Indeno (123-cd)Pyrene                    | mg/kg                                                                | 500             | (ii)       |   | 4.6    |                 | 1                |                   |
| Dibenzo(a,h) Anthracene                  | mg/kg                                                                | 3.5             | (ii)       |   | 1.5    |                 | 1                |                   |
| Benzo(ghi) Perylene                      | mg/kg                                                                | 3900            | (ii)       |   | 5.4    |                 | 1                |                   |
| Benzene                                  | mg/kg                                                                | 27              | (ii)       | 5 | <1.0   | N/A             | 4                | No Further Action |
| Toluene                                  | mg/kg                                                                | 869             | (ii)       |   | <1.0   |                 | 4                |                   |
| Ethyl Benzene                            | mg/kg                                                                | 518             | (ii)       |   | <1.0   |                 | 4                |                   |
| Xylene (o,m,p)                           | mg/kg                                                                | (478, 625, 576) | (ii)       |   | <1.0   |                 | 4                |                   |
| MTBE                                     | mg/kg                                                                | 76.4            | (ii)       |   | <1.0   |                 | 4                |                   |
| Organics – TPHs                          |                                                                      |                 |            |   |        |                 |                  |                   |
| TPH C <sub>5</sub> -C <sub>6</sub>       | mg/kg                                                                | 304             | (iii)      | 5 | <0.001 | N/A             | 4                | No Further Action |
| TPH C <sub>6</sub> -C <sub>8</sub>       | mg/kg                                                                | 144             | (iii)      |   | <0.001 |                 | 4                |                   |
| TPH C <sub>8</sub> -C <sub>10</sub>      | mg/kg                                                                | 78              | (iii)      |   | <0.001 |                 | 4                |                   |
| TPH C <sub>10</sub> -C <sub>12</sub>     | mg/kg                                                                | 48              | (iii)      |   | <1.0   |                 | 4                |                   |
| TPH C <sub>12</sub> -C <sub>16</sub>     | mg/kg                                                                | 24              | (iii)      |   | 77     |                 | 1, 4             |                   |
| TPH C <sub>16</sub> -C <sub>21</sub>     | mg/kg                                                                | 28,000          | (iii)      |   | 190    |                 | 1                |                   |
| TPH C <sub>21</sub> -C <sub>35</sub>     | mg/kg                                                                | 28,000          | (iii)      |   | 69     |                 | 1                |                   |
| Key                                      |                                                                      |                 |            |   |        |                 |                  |                   |
| [mc]                                     | Maximum Concentration Recorded                                       |                 |            |   |        |                 |                  |                   |
| D.                                       | Detected                                                             |                 |            |   |        |                 |                  |                   |
| N.D.                                     | None Detected (Limit of Detection = <0.0001%)                        |                 |            |   |        |                 |                  |                   |
| Primary Pathways                         |                                                                      |                 |            |   |        |                 |                  |                   |
| 1                                        | Ingestion of soil and indoor dust and / or oral background exposure; |                 |            |   |        |                 |                  |                   |
| 2                                        | Consumption of home-grown produce and attached soil;                 |                 |            |   |        |                 |                  |                   |
| 3                                        | Inhalation of dust (background and indoor);                          |                 |            |   |        |                 |                  |                   |
| 4                                        | Inhalation of vapour (background and indoor);                        |                 |            |   |        |                 |                  |                   |
| Generic Assessment Criteria (GAC) Source |                                                                      |                 |            |   |        |                 |                  |                   |
| (i)                                      | LQM/CIEH Suitable For Use Level (S4UL) (2015);                       |                 |            |   |        |                 |                  |                   |
| (ii)                                     | S4UL – Conservative Assessment Approach of 1% SOM;                   |                 |            |   |        |                 |                  |                   |
| (iii)                                    | S4UL –1% SOM and assumed worst case aliphatic / aromatic compound;   |                 |            |   |        |                 |                  |                   |
| (iv)                                     | Defra Category 4 Screening Level (2014);                             |                 |            |   |        |                 |                  |                   |
| (v)                                      | CIEA 1.06 Derived Value                                              |                 |            |   |        |                 |                  |                   |

Referring to Table 4.1, the results of this direct comparison indicates that the screening values have not been exceeded for the Generic Acceptance Criteria for industrial/commercial end use.

## **5.0 GEOTECHNICAL ASSESSMENT**

### **5.1 General requirements**

North West Extensions Ltd on behalf of PMC Autos plan to redevelop the site to 3 no. two-storey light industrial units (Class B1) and a two storey building to form car repair garage at ground floor with ancillary office to the first floor. EEL have been provided with proposed development plans.

EEL has provided the following factual information based on soil parameters encountered and has not fully assessed the foundation options for the proposed industrial unit. The following assessment is for preliminary purposes only.

Given the nature of the Made Ground and high strength superficial drift deposits overlying the site it is likely any development will be constructed within the shallow superficial deposits rather than the Made Ground, this will be determined by final design.

### **5.2 Engineering Profile of Strata**

The following section surmises the engineering descriptions of the strata encountered, during the site investigation.

#### **Concrete**

All locations were covered by concrete which required coring prior to drilling, varying from 0.20m to 0.30m in thickness, though consistently 0.20m in the open compound.

#### **Made Ground**

Made Ground was encountered in all four locations during the investigation in window sample locations. Maximum depth of Made Ground was 1.80m bgl in WS102. The deepest single type of Made Ground in WS104 was described as *Black, very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ash, clinker, and mixed Made Ground lithologies* and was found in all four locations at varying depths.

#### **Topsoil**

Topsoil was not encountered in any location.

#### **Superficial CLAY**

Superficial CLAY was found in all four window sample locations recorded generally as Low to high strength firm to very stiff high strength greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone. (sand strata varied in depths and thickness in between clay strata). Clay on site has an unproven thickness.

#### **Superficial SAND**

Superficial Sand was found in WS102 from 2.50m to 2.85m bgl (observed to be wet) and in WS104 as a sand band circa 2.70m bgl recorded generally as fine to medium yellowish brown silty SAND.

#### **Bedrock**

Bedrock is recorded as Collyhurst Sandstone Formation which was not encountered during investigations.

**Groundwater** was not encountered in any exploratory hole. Perched water was identified in WS101 at 1.4m, WS102 at 1.5 and 2.5 (within sand layer) and WS103 at 1.5 over a clayey layer.

Table 5.2.3 Standard Penetration Test Results

| Boreholes | Start Depth (m bgl) | Strata Type | Geological Unit / Description | CPT/SPT "N" Value | Corrected (N <sub>1</sub> ) <sub>60</sub> Value | Relative Density (Granular) | Eurocode Soil strength | Consistency (BS5930) | Approximate Undrained Shear Strength (kN/m <sup>2</sup> ) |
|-----------|---------------------|-------------|-------------------------------|-------------------|-------------------------------------------------|-----------------------------|------------------------|----------------------|-----------------------------------------------------------|
| ws101     | 1.00                | Cohesive    |                               | 2                 | 2                                               | -                           | Very low strength      | Soft                 | 10                                                        |
| ws101     | 2.00                | Cohesive    |                               | 22                | 20                                              | -                           | High strength          | Very Stiff           | 100                                                       |
| ws101     | 3.00                | Cohesive    |                               | 18                | 16                                              | -                           | High strength          | Very Stiff           | 78                                                        |
| ws102     | 1.00                | Cohesive    |                               | 4                 | 4                                               | -                           | Low strength           | Firm                 | 20                                                        |
| ws102     | 2.00                | Cohesive    |                               | 25                | 23                                              | -                           | High strength          | Very Stiff           | 114                                                       |
| ws102     | 3.00                | Cohesive    |                               | 19                | 17                                              | -                           | High strength          | Very Stiff           | 83                                                        |
| ws103     | 1.00                | Cohesive    |                               | 4                 | 4                                               | -                           | Low strength           | Firm                 | 20                                                        |
| ws103     | 2.00                | Cohesive    |                               | 19                | 17                                              | -                           | High strength          | Very Stiff           | 87                                                        |
| ws103     | 3.00                | Cohesive    |                               | 27                | 23                                              | -                           | High strength          | Very Stiff           | 117                                                       |

### 5.3 Engineering Properties of Soil Encountered

The following sections discuss the engineering properties of the strata encountered, based on results of in situ testing and laboratory testing obtained during the site investigation.

#### Atterberg Limit Tests

Atterberg Limit Tests were carried out on samples WS101 at 2.50-3.00m bgl within the Superficial Clay deposits. Results of the tests reported liquid limit value of 44%, and plastic limits values of 20%, resulting in values of plasticity of 24%. Results are shown below:

| Location            | Strata Description                       | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | %Materials Passing 425 $\mu$ m | Modified Plasticity Index I'p |
|---------------------|------------------------------------------|------------------|-------------------|----------------------|--------------------------------|-------------------------------|
| WS101 at 2.50-2.45m | Brown slightly gravelly sandy silty CLAY | 44               | 20                | 24                   | 89                             | 21.36                         |

For design purposes, a value of plasticity index = 24% is recommended, based on the average of the results.

In accordance with NHBC Chapter 4.2 Building Near Trees (2003) soils can be classified in terms of volume change potential, using the relationship:

$$I_p' = I_p \times \% \frac{\text{less than } 425\mu\text{m}}{100\%}$$

$I_p'$  = modified plasticity index,

$I_p$  = plasticity index.

Based on the laboratory test results, the above relationship and Table 1 of NHBC Chapter 4.2, the samples of clay are shown to have Low volume change potential.

### pH and Sulphate Testing

To determine the pH Value of Soils in accordance with BS 1377: Part 3:1990 - Clause 9, Electrometric Method and to determine the Sulphate Content of Soil in accordance with BS 1377: Part 3: 1990: Clause 5.5 (Gravimetric Method) the following testing was carried out.

| Sample id/Depth  | Soil Description                     | pH Value | Sulphate Content<br>(Water soluble sulphate as SO <sup>3</sup> ) |
|------------------|--------------------------------------|----------|------------------------------------------------------------------|
| WS101 @ 2.0-2.45 | Dark brown slightly sandy silty CLAY | 8.7      | <0.01%                                                           |
| WS103 @ 2.0-2.45 | Dark brown slightly sandy silty CLAY | 8.5      | <0.01%                                                           |

Sulphate assessment shows Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

The Tier II Risk Assessment identified the screening values have not been exceeded for the Generic Acceptance Criteria for commercial / industrial land use. EEL considers no further Remediation is required based on the results to date.

### **Ground Gas Assessment**

In accordance with the methodology outlined with both BS 8485 and the CIRIA publication C665, EEL have utilised the results of the three (3No.) ground gas monitoring rounds from the investigation to calculate a tentative Gas Screening Value (GSV). Due to low concentrations during initial monitoring a pragmatic methodology was determined no further monitoring was conducive to the outcome of this report.

The GSV has been compared to the criteria outlined within CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area. CIRIA C665 states that the maximum GSV for carbon dioxide and methane is <0.07l/hr for Characteristic Situation 1 / Green in line with the NHBC Traffic Light System and therefore the site would fall into this bracket and not require any gas protection measures.

It is recommended that Waste Acceptance Criteria Testing is carried out on any material identified as waste to be removed off site.

## **7.0 CONTINGENCY PLAN**

### **7.1 Previously Unidentified Contaminants**

Should any significantly impacted material be encountered during the development, then works should be stopped and a suitably qualified geo-environmental engineer should be contacted for further advice and assessment. In the event of asbestos, the material should not be disturbed until such a time where an appropriate management plan can be implemented.

Depending on the nature of any contamination encountered, it may be necessary to undertake validation testing of the excavation faces and base in order to demonstrate that no such materials are left in-situ.

## 8.0 GLOSSARY

### TERMS

|           |                                                      |
|-----------|------------------------------------------------------|
| MMP       | Material Management Plan                             |
| MM        | Material Movement                                    |
| FFL       | Finished Floor Level                                 |
| COP       | Code of Practice                                     |
| AST       | Above ground Storage Tank                            |
| UST       | Underground Storage Tank                             |
| EA        | Environment Agency                                   |
| CSM       | Conceptual Site Model                                |
| GL        | Ground Level                                         |
| D         | Not Detected                                         |
| NR        | Not Recorded                                         |
| BSI       | British Standards Institute                          |
| BGS       | British Geological Survey                            |
| CLEA      | Contaminated Land Exposure Assessment                |
| SGV       | Soil Guideline Value                                 |
| GAC       | General Assessment Criteria                          |
| CIEH      | Chartered Institute of Environmental Health          |
| PID       | Photo Ionisation Detector                            |
| CIRIA     | Construction Industry Research Association           |
| GSV       | Gas Screening Value                                  |
| EQS       | Environmental Quality Standard                       |
| DWS       | Drinking Water Standard                              |
| PAH       | Poly Aromatic Hydrocarbon                            |
| TPH (CWG) | Total Petroleum Hydrocarbon (Criteria Working Group) |
| VOC       | Volatile Organic Compound                            |
| SVOC      | Semi Volatile Organic Compound                       |
| SPT       | Standard Penetration Test                            |
| VCCs      | Vibro Concrete Columns                               |
| QA        | Quality Assurance                                    |

### UNITS

|                   |                                             |
|-------------------|---------------------------------------------|
| m                 | Metres                                      |
| km                | Kilometres                                  |
| %                 | Percent                                     |
| %v/v              | Percent volume in air                       |
| mb                | Milli Bars (atmospheric pressure)           |
| l/hr              | Litres per hour                             |
| µg/l              | Micrograms per Litre (parts per billion)    |
| ppb               | Parts Per Billion                           |
| mg/kg             | Milligrams per kilogram (parts per million) |
| ppm               | Parts Per Million                           |
| mg/m <sup>3</sup> | Milligram per metre cubed                   |
| m bgl             | Metres Below Ground Level                   |
| m bcl             | Metre Below Cover Level                     |
| mAOD              | Metres Above Ordnance Datum (sea level)     |
| kN/m <sup>2</sup> | Kilo Newtons per metre squared              |
| µm                | Micro meter                                 |

## 9.0 LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between EEL Ltd and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. In addition to the above EEL Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas.
7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
10. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.
11. EEL can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by EEL is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by EEL in this connection without their explicit written agreement there to by EEL.
12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geoenvironmental characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope

- of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

## **APPENDICES**

## **APPENDIX I- FIGURES**

**Figure 1 Exploratory Location Plan**



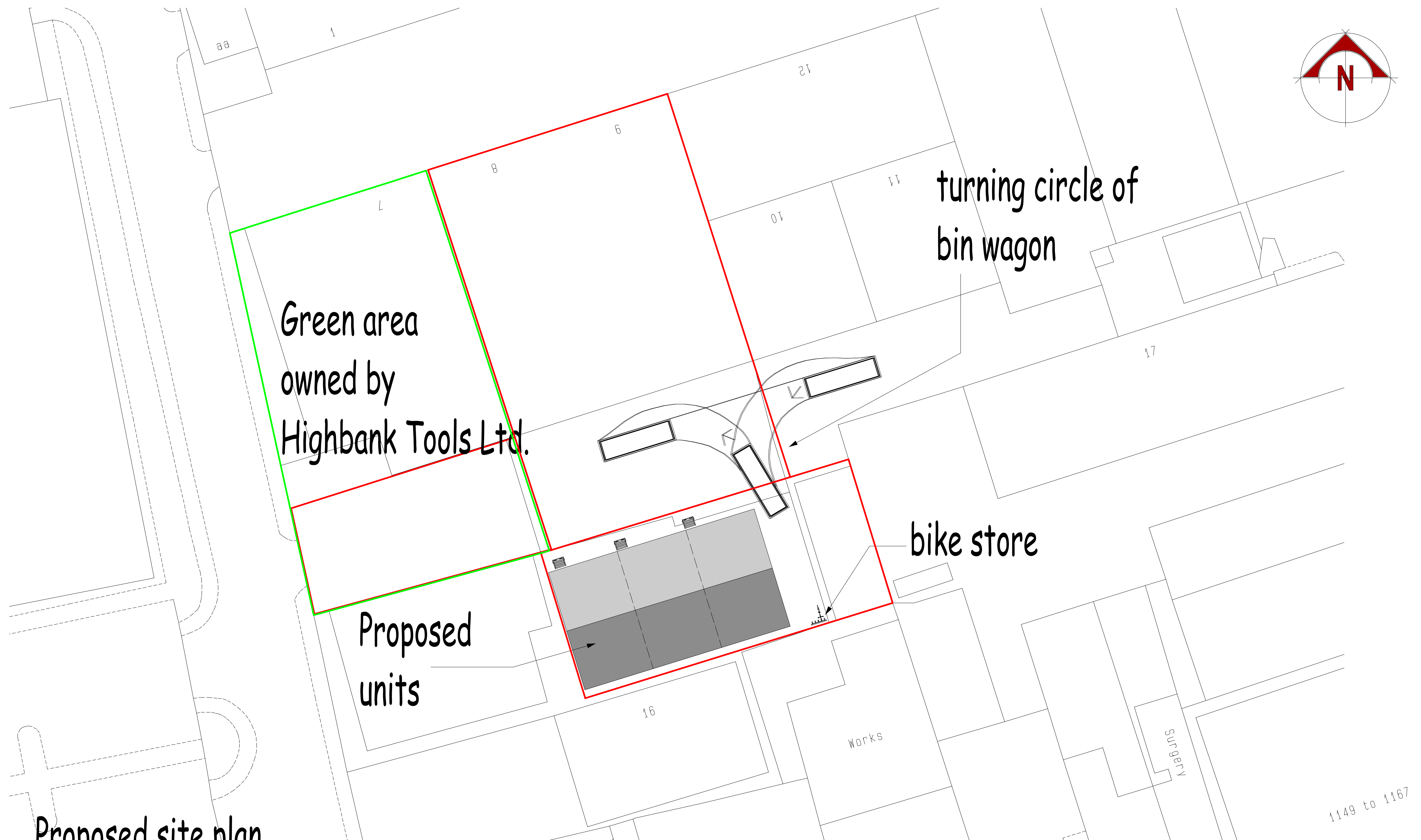
## **APPENDIX II- PROPOSED DEVELOPMENT PLANS**



Proposed site plan.

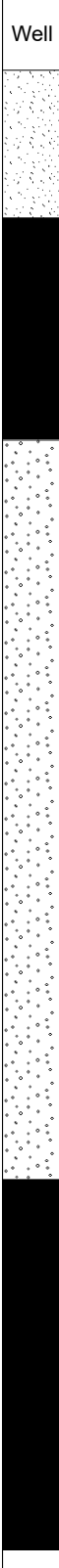
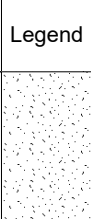
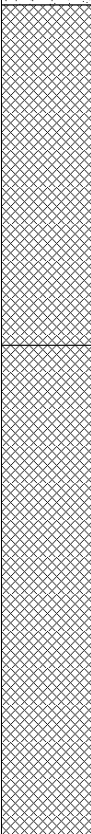
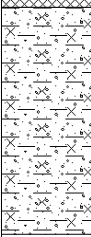
New Unit at Reliance St, Newton Heath. M40 3AG.

2542 - 04



### **APPENDIX III- EXPLORATORY HOLE LOGS**



| Well                                                                               | Water Strikes                                                                       | Sample and In Situ Testing                                                                                                                                                                                                  |       |                   | Depth (m)                                                                           | Level (m)                                                                                                                         | Legend                                                                             | Stratum Description                                                                                                                 |   |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                                    |                                                                                     | Depth (m)                                                                                                                                                                                                                   | Type  | Results           |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     |   |
|  |  | 0.40 - 0.50                                                                                                                                                                                                                 | ES    | N=3 (2,1/1,0,0,2) | 0.20                                                                                | -0.20                                                                                                                             |   | Concrete                                                                                                                            | 1 |
|                                                                                    |                                                                                     |                                                                                                                                                                                                                             |       |                   | 0.65                                                                                | -0.65                                                                                                                             |  | Black very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ash, clinker and made ground lithologies. |   |
|                                                                                    |                                                                                     | Very low strength soft orangeish brown gravelly silty sandy clay. Gravel is fine to coarse, angular to sub rounded of sandstone and mudstone                                                                                |       |                   |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     |   |
|                                                                                    |                                                                                     | <i>Reworked clay, becoming black (possible staining)</i>                                                                                                                                                                    |       |                   |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     |   |
|                                                                                    |                                                                                     | Black slightly clayey sandy gravel. Gravel is fine to coarse angular to sub rounded of sandstone, coal, wood, brick and other Made Ground mixed lithologies<br><i>Black staining (perched water with hydrocarbon odour)</i> |       |                   |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     |   |
|                                                                                    |                                                                                     | 1.30                                                                                                                                                                                                                        | -1.30 |                   |  | High strength very stiff greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone. |                                                                                    |                                                                                                                                     |   |
| 1.70                                                                               | -1.70                                                                               |                                                                                                                                                                                                                             |       |                   |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     |   |
|                                                                                    |                                                                                     | 2.00 - 2.45                                                                                                                                                                                                                 | B     |                   |                                                                                     |                                                                                                                                   |                                                                                    |                                                                                                                                     | 2 |

[illegible]

Complete at 3.2m bgl





Date: 15/01/2020

Contractor: Egniol Environmental Ltd

Drilling Equipment:

Page Number  
Sheet 2 of 2

| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

Complete at 3.2m bgl





# Window Sample Log

|                                                      |                  |                                      |           |                     |                             |
|------------------------------------------------------|------------------|--------------------------------------|-----------|---------------------|-----------------------------|
| Project Name: Land Adjacent to Units off Reliance St |                  | Client: PMC Autos                    |           | Date: 15/01/2020    |                             |
| Location: Newton Heath, Manchester                   |                  | Contractor: Egniol Environmental Ltd |           |                     |                             |
| Project No. : 7473                                   |                  | Crew Name:                           |           | Drilling Equipment: |                             |
| Borehole Number<br>WS102                             | Hole Type<br>WLS | Level                                | Logged By | Scale<br>1:10       | Page Number<br>Sheet 1 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |          |                   | Depth (m) | Level (m) | Legend | Stratum Description                                                                                                                                          |   |
|------|---------------|----------------------------|----------|-------------------|-----------|-----------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|      |               | Depth (m)                  | Type     | Results           |           |           |        |                                                                                                                                                              |   |
|      |               |                            |          |                   |           |           |        | Concrete                                                                                                                                                     |   |
|      |               |                            |          |                   | 0.20      | -0.20     |        | Black very gravelly sand. Gravel is fine to coarse, angular to sub angular of ash, clinker and mixed Made Ground lithologies                                 |   |
|      |               | 0.45 - 0.55                | ES       |                   | 0.45      | -0.45     |        | Fine to coarse purple silty gravelly sand. Gravel is fine to medium angular to sub angular of ash.                                                           |   |
|      |               | 1.00 - 1.45<br>1.00        | B<br>SPT | N=4 (1,1/1,1,1,1) | 0.90      | -0.90     |        | Black slightly clayey sandy gravel. Gravel is fine to coarse angular to sub rounded of sandstone, coal, wood, brick and other Made Ground mixed lithologies  | 1 |
|      |               | 1.60 - 1.75                | ES       |                   |           |           |        | <i>Black staining (perched water with hydrocarbon odour) - less than observed in WS101</i>                                                                   |   |
|      |               | 2.00 - 2.45                | B        |                   | 1.80      | -1.80     |        | Low strength firm becoming high strength very stiff greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone. | 2 |

| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

|                                 |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Remarks<br>Complete at 3.0m bgl |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|



Date: 15/01/2020

Contractor: Egniol Environmental Ltd

**Drilling Equipment:**

Page Number  
Sheet 2 of 2[illegible]

Complete at 3.0m bgl





# Window Sample Log

|                                                      |                  |                                      |           |                     |                             |
|------------------------------------------------------|------------------|--------------------------------------|-----------|---------------------|-----------------------------|
| Project Name: Land Adjacent to Units off Reliance St |                  | Client: PMC Autos                    |           | Date: 15/01/2020    |                             |
| Location: Newton Heath, Manchester                   |                  | Contractor: Egniol Environmental Ltd |           |                     |                             |
| Project No. : 7473                                   |                  | Crew Name:                           |           | Drilling Equipment: |                             |
| Borehole Number<br>WS103                             | Hole Type<br>WLS | Level                                | Logged By | Scale<br>1:10       | Page Number<br>Sheet 1 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |          |                   | Depth (m) | Level (m) | Legend | Stratum Description                                                                                                                                         |   |
|------|---------------|----------------------------|----------|-------------------|-----------|-----------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|      |               | Depth (m)                  | Type     | Results           |           |           |        |                                                                                                                                                             |   |
|      |               |                            |          |                   | 0.20      | -0.20     |        | Concrete                                                                                                                                                    |   |
|      |               |                            |          |                   |           |           |        | Black very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ash, clinker and made ground lithologies.                         |   |
|      |               | 0.70 - 0.80                | ES       |                   | 0.65      | -0.65     |        | Very low strength firm orangeish brown gravelly silty sandy clay. Gravel is fine to coarse, angular to sub rounded of sandstone and mudstone                | 1 |
|      |               | 1.00 - 1.45<br>1.00        | B<br>SPT | N=4 (1,1/1,1,1,1) |           |           |        |                                                                                                                                                             |   |
|      |               | 1.30 - 1.45                | ES       |                   | 1.30      | -1.30     |        | Black slightly clayey sandy gravel. Gravel is fine to coarse angular to sub rounded of sandstone, coal, wood, brick and other Made Ground mixed lithologies |   |
|      |               |                            |          |                   |           |           |        | <i>Black staining (perched water with hydrocarbon odour)- less than observed in WS101</i>                                                                   |   |
|      |               |                            |          |                   | 1.70      | -1.70     |        | High strength very stiff greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone.                           |   |
|      |               | 2.00 - 2.15                | ES       |                   |           |           |        |                                                                                                                                                             | 2 |

| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

|                                 |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Remarks<br>Complete at 3.0m bgl |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|



Date: 15/01/2020

Contractor: Egniol Environmental Ltd

Drilling Equipment:

Page Number  
Sheet 2 of 2

| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

Complete at 3.0m bgl





# Window Sample Log

|                                                      |                  |                                      |           |                     |                             |
|------------------------------------------------------|------------------|--------------------------------------|-----------|---------------------|-----------------------------|
| Project Name: Land Adjacent to Units off Reliance St |                  | Client: PMC Autos                    |           | Date: 15/01/2020    |                             |
| Location: Newton Heath, Manchester                   |                  | Contractor: Egniol Environmental Ltd |           |                     |                             |
| Project No. : 7473                                   |                  | Crew Name:                           |           | Drilling Equipment: |                             |
| Borehole Number<br>WS104                             | Hole Type<br>WLS | Level                                | Logged By | Scale<br>1:10       | Page Number<br>Sheet 1 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |      |         | Depth (m) | Level (m) | Legend | Stratum Description                                                                                                                                         |   |
|------|---------------|----------------------------|------|---------|-----------|-----------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|      |               | Depth (m)                  | Type | Results |           |           |        |                                                                                                                                                             |   |
|      |               |                            |      |         |           |           |        | Concrete                                                                                                                                                    |   |
|      |               | 0.40 - 0.45                | ES   |         | 0.30      | -0.30     |        | Black very gravelly sand. Gravel is fine to very coarse, angular to sub angular of brick, ash, clinker and made ground lithologies.                         |   |
|      |               |                            |      |         |           |           |        | <i>Becoming orangeish black with low content of angular to sub angular brick and sandstone cobbles within ash and clinker</i>                               |   |
|      |               |                            |      |         |           |           |        | <i>Moderate content of angular to sub angular of brick within fine brown sand</i>                                                                           | 1 |
|      |               |                            |      |         | 1.50      | -1.50     |        | Black slightly clayey sandy gravel. Gravel is fine to coarse angular to sub rounded of sandstone, coal, wood, brick and other Made Ground mixed lithologies |   |
|      |               | 1.70 - 1.75                | ES   |         | 1.70      | -1.70     |        | <i>Black staining (perched water with hydrocarbon odour)</i>                                                                                                |   |
|      |               |                            |      |         |           |           |        | High strength very stiff greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone.                           | 2 |

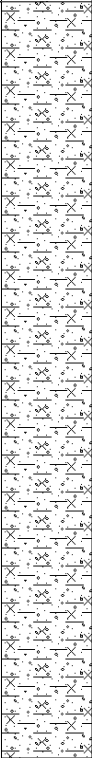
| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

|                                 |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Remarks<br>Complete at 3.0m bgl |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|



# Window Sample Log

|                                                      |                  |                                      |           |                     |                             |
|------------------------------------------------------|------------------|--------------------------------------|-----------|---------------------|-----------------------------|
| Project Name: Land Adjacent to Units off Reliance St |                  | Client: PMC Autos                    |           | Date: 15/01/2020    |                             |
| Location: Newton Heath, Manchester                   |                  | Contractor: Egniol Environmental Ltd |           |                     |                             |
| Project No. : 7473                                   |                  | Crew Name:                           |           | Drilling Equipment: |                             |
| Borehole Number<br>WS104                             | Hole Type<br>WLS | Level                                | Logged By | Scale<br>1:10       | Page Number<br>Sheet 2 of 2 |

| Well | Water Strikes | Sample and In Situ Testing |      |         | Depth (m) | Level (m) | Legend                                                                             | Stratum Description                                                                                                               |   |
|------|---------------|----------------------------|------|---------|-----------|-----------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---|
|      |               | Depth (m)                  | Type | Results |           |           |                                                                                    |                                                                                                                                   |   |
|      |               | 2.85 - 2.90                | ES   |         | 3.00      | -3.00     |  | High strength very stiff greyish brown gravelly silty sandy CLAY. Gravel is fine to medium sub angular of sandstone and mudstone. |   |
|      |               |                            |      |         |           |           |  | Fine to medium yellowish brown silty SAND band                                                                                    |   |
|      |               |                            |      |         |           |           |                                                                                    | End of Borehole at 3.000m                                                                                                         | 3 |
|      |               |                            |      |         |           |           |                                                                                    |                                                                                                                                   | 4 |

| Hole Diameter |          | Casing Diameter |          | Chiselling |            |          |      | Inclination and Orientation |            |             |             |
|---------------|----------|-----------------|----------|------------|------------|----------|------|-----------------------------|------------|-------------|-------------|
| Depth Base    | Diameter | Depth Base      | Diameter | Depth Top  | Depth Base | Duration | Tool | Depth Top                   | Depth Base | Inclination | Orientation |
|               |          |                 |          |            |            |          |      |                             |            |             |             |

|                                 |  |  |  |  |  |  |  |  |  |                                                                                       |
|---------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|
| Remarks<br>Complete at 3.0m bgl |  |  |  |  |  |  |  |  |  |  |
|---------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------|

## **APPENDIX IV- LABORATORY TESTING**



**Charlotte Radiven**  
Egniol Environmental Ltd  
Rouge Farm  
Bentley's Farm Lane  
Warrington  
WA4 4QW

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
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**t:** 01248355966

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## **Analytical Report Number : 20-81800**

**Project / Site name:** Reliance St

**Samples received on:**

**Your job number:** 7473

**Samples instructed on:** 17/01/2020

**Your order number:** POP000375

**Analysis completed by:** 24/01/2020

**Report Issue Number:** 1

**Report issued on:** 24/01/2020

**Samples Analysed:** 1 leachate sample - 5 soil samples

**Signed:** *A. Czerwińska*

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)  
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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

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

Iss No 20-81800-1 Reliance St 7473



Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

| Lab Sample Number                       |       |                       |                         | 1415678       | 1415679       | 1415680       | 1415681       | 1415682       |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                        |       |                       |                         | WS101         | WS101         | WS101         | WS102         | WS103         |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                       |                         | 0.40          | 1.60          | 3.00          | 0.50          | 0.70          |
| Date Sampled                            |       |                       |                         | 15/01/2020    | 15/01/2020    | 15/01/2020    | 15/01/2020    | 15/01/2020    |
| Time Taken                              |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |               |               |               |               |
| Stone Content                           | %     | 0.1                   | NONE                    | < 0.1         | < 0.1         | < 0.1         | < 0.1         | < 0.1         |
| Moisture Content                        | %     | N/A                   | NONE                    | 15            | 27            | 14            | 21            | 17            |
| Total mass of sample received           | kg    | 0.001                 | NONE                    | 0.98          | 1.2           | 1.2           | 1.2           | 2.0           |

|                  |      |     |           |              |              |              |              |              |
|------------------|------|-----|-----------|--------------|--------------|--------------|--------------|--------------|
| Asbestos in Soil | Type | N/A | ISO 17025 | Not-detected | Not-detected | Not-detected | Not-detected | Not-detected |
|------------------|------|-----|-----------|--------------|--------------|--------------|--------------|--------------|

#### Speciated PAHs

|                        |       |      |        |      |        |        |        |        |
|------------------------|-------|------|--------|------|--------|--------|--------|--------|
| Naphthalene            | mg/kg | 0.05 | MCERTS | 0.56 | 0.76   | < 0.05 | < 0.05 | 0.42   |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | 3.1  | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | 0.31 | 2.7    | < 0.05 | < 0.05 | 3.2    |
| Fluorene               | mg/kg | 0.05 | MCERTS | 0.65 | 2.0    | < 0.05 | < 0.05 | 2.1    |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 2.7  | 12     | 1.5    | 0.53   | 22     |
| Anthracene             | mg/kg | 0.05 | MCERTS | 1.8  | 2.4    | 0.31   | 0.13   | 5.3    |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 5.6  | 15     | 2.4    | 1.4    | 29     |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 7.4  | 16     | 2.2    | 1.4    | 26     |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 6.4  | 7.2    | 1.4    | 1.2    | 13     |
| Chrysene               | mg/kg | 0.05 | MCERTS | 5.5  | 7.7    | 0.96   | 0.92   | 11     |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 8.4  | 7.1    | 1.1    | 1.1    | 9.9    |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 2.5  | 2.8    | 0.38   | 0.76   | 6.7    |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 8.3  | 6.2    | 0.91   | 1.0    | 9.9    |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 4.6  | 2.4    | 0.34   | 0.46   | 4.5    |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | 1.5  | 0.75   | < 0.05 | < 0.05 | 1.2    |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 5.4  | 3.0    | 0.48   | 0.71   | 5.4    |

#### Total PAH

|                             |       |     |        |      |      |      |      |     |
|-----------------------------|-------|-----|--------|------|------|------|------|-----|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 64.7 | 88.1 | 11.9 | 9.57 | 150 |
|-----------------------------|-------|-----|--------|------|------|------|------|-----|

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |       |       |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 54    | 48    | 22    | 130   | 15    |
| Boron (water soluble)             | mg/kg | 0.2 | MCERTS | 0.9   | 2.9   | 0.6   | 0.7   | 1.3   |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 23    | 26    | 45    | 140   | 29    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 160   | 200   | 38    | 140   | 56    |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 210   | 390   | 55    | 290   | 57    |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 2.8   | 2.1   | < 0.3 | < 0.3 | < 0.3 |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 67    | 52    | 45    | 100   | 39    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | 3.0   | 2.3   | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 87    | 210   | 72    | 110   | 72    |

#### Monoaromatics & Oxygenates

|                                    |       |   |        |       |       |       |       |       |
|------------------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| Benzene                            | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Toluene                            | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Ethylbenzene                       | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| p & m-xylene                       | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| o-xylene                           | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |

Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

|                                         |               |                       |                         |               |               |
|-----------------------------------------|---------------|-----------------------|-------------------------|---------------|---------------|
| Lab Sample Number                       | 1415678       | 1415679               | 1415680                 | 1415681       | 1415682       |
| Sample Reference                        | WS101         | WS101                 | WS101                   | WS102         | WS103         |
| Sample Number                           | None Supplied | None Supplied         | None Supplied           | None Supplied | None Supplied |
| Depth (m)                               | 0.40          | 1.60                  | 3.00                    | 0.50          | 0.70          |
| Date Sampled                            | 15/01/2020    | 15/01/2020            | 15/01/2020              | 15/01/2020    | 15/01/2020    |
| Time Taken                              | None Supplied | None Supplied         | None Supplied           | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) | Units         | Limit of<br>detection | Accreditation<br>Status |               |               |

**Petroleum Hydrocarbons**

|                                         |       |       |        |         |         |         |         |         |
|-----------------------------------------|-------|-------|--------|---------|---------|---------|---------|---------|
| TPH-CWG - Aliphatic >EC5 - EC6          | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC6 - EC8          | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aliphatic >EC10 - EC12        | mg/kg | 1     | MCERTS | < 1.0   | < 1.0   | < 1.0   | < 1.0   | < 1.0   |
| TPH-CWG - Aliphatic >EC12 - EC16        | mg/kg | 2     | MCERTS | 44      | 77      | < 2.0   | < 2.0   | < 2.0   |
| TPH-CWG - Aliphatic >EC16 - EC21        | mg/kg | 8     | MCERTS | 190     | 150     | < 8.0   | < 8.0   | < 8.0   |
| TPH-CWG - Aliphatic >EC21 - EC35        | mg/kg | 8     | MCERTS | 69      | 65      | < 8.0   | < 8.0   | < 8.0   |
| <b>TPH-CWG - Aliphatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | 310     | 290     | < 10    | < 10    | < 10    |

|                                        |       |       |        |         |         |         |         |         |
|----------------------------------------|-------|-------|--------|---------|---------|---------|---------|---------|
| TPH-CWG - Aromatic >EC5 - EC7          | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC7 - EC8          | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TPH-CWG - Aromatic >EC10 - EC12        | mg/kg | 1     | MCERTS | < 1.0   | 4.5     | < 1.0   | < 1.0   | < 1.0   |
| TPH-CWG - Aromatic >EC12 - EC16        | mg/kg | 2     | MCERTS | 12      | 94      | < 2.0   | < 2.0   | 15      |
| TPH-CWG - Aromatic >EC16 - EC21        | mg/kg | 10    | MCERTS | 100     | 330     | 20      | 18      | 86      |
| TPH-CWG - Aromatic >EC21 - EC35        | mg/kg | 10    | MCERTS | 210     | 300     | 25      | 50      | 98      |
| <b>TPH-CWG - Aromatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | 320     | 730     | 45      | 68      | 200     |



Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

|                                             |  |  |  |               |                       |                         |  |  |
|---------------------------------------------|--|--|--|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                           |  |  |  | 1415683       |                       |                         |  |  |
| Sample Reference                            |  |  |  | WS102         |                       |                         |  |  |
| Sample Number                               |  |  |  | None Supplied |                       |                         |  |  |
| Depth (m)                                   |  |  |  | 2.60          |                       |                         |  |  |
| Date Sampled                                |  |  |  | 15/01/2020    |                       |                         |  |  |
| Time Taken                                  |  |  |  | None Supplied |                       |                         |  |  |
| Analytical Parameter<br>(Leachate Analysis) |  |  |  | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |



Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

|                                             |  |  |  |               |                       |                         |  |  |
|---------------------------------------------|--|--|--|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                           |  |  |  | 1415683       |                       |                         |  |  |
| Sample Reference                            |  |  |  | WS102         |                       |                         |  |  |
| Sample Number                               |  |  |  | None Supplied |                       |                         |  |  |
| Depth (m)                                   |  |  |  | 2.60          |                       |                         |  |  |
| Date Sampled                                |  |  |  | 15/01/2020    |                       |                         |  |  |
| Time Taken                                  |  |  |  | None Supplied |                       |                         |  |  |
| Analytical Parameter<br>(Leachate Analysis) |  |  |  | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

**Speciated PAHs**

|                        |      |      |           |        |  |  |  |  |
|------------------------|------|------|-----------|--------|--|--|--|--|
| Naphthalene            | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Acenaphthylene         | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Acenaphthene           | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Fluorene               | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Phenanthrene           | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Anthracene             | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Fluoranthene           | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Pyrene                 | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Benzo(a)anthracene     | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Chrysene               | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Benzo(b)fluoranthene   | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Benzo(k)fluoranthene   | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Benzo(a)pyrene         | µg/l | 0.01 | ISO 17025 | < 0.01 |  |  |  |  |
| Indeno(1,2,3-cd)pyrene | µg/l | 0.01 | NONE      | < 0.01 |  |  |  |  |
| Dibenz(a,h)anthracene  | µg/l | 0.01 | NONE      | < 0.01 |  |  |  |  |
| Benzo(ghi)perylene     | µg/l | 0.01 | NONE      | < 0.01 |  |  |  |  |

**Total PAH**

|                   |      |     |      |       |  |  |  |  |
|-------------------|------|-----|------|-------|--|--|--|--|
| Total EPA-16 PAHs | µg/l | 0.2 | NONE | < 0.2 |  |  |  |  |
|-------------------|------|-----|------|-------|--|--|--|--|



Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

|                                             |  |  |  |               |                       |                         |  |  |
|---------------------------------------------|--|--|--|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                           |  |  |  | 1415683       |                       |                         |  |  |
| Sample Reference                            |  |  |  | WS102         |                       |                         |  |  |
| Sample Number                               |  |  |  | None Supplied |                       |                         |  |  |
| Depth (m)                                   |  |  |  | 2.60          |                       |                         |  |  |
| Date Sampled                                |  |  |  | 15/01/2020    |                       |                         |  |  |
| Time Taken                                  |  |  |  | None Supplied |                       |                         |  |  |
| Analytical Parameter<br>(Leachate Analysis) |  |  |  | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

#### Monoaromatics & Oxygenates

|                                    |      |    |           |       |  |  |  |  |
|------------------------------------|------|----|-----------|-------|--|--|--|--|
| Benzene                            | µg/l | 1  | ISO 17025 | < 1.0 |  |  |  |  |
| Toluene                            | µg/l | 1  | ISO 17025 | < 1.0 |  |  |  |  |
| Ethylbenzene                       | µg/l | 1  | ISO 17025 | < 1.0 |  |  |  |  |
| p & m-xylene                       | µg/l | 1  | ISO 17025 | < 1.0 |  |  |  |  |
| o-xylene                           | µg/l | 1  | ISO 17025 | < 1.0 |  |  |  |  |
| MTBE (Methyl Tertiary Butyl Ether) | µg/l | 10 | NONE      | < 10  |  |  |  |  |

#### Petroleum Hydrocarbons



Analytical Report Number: 20-81800

Project / Site name: Reliance St

Your Order No: POP000375

| Lab Sample Number                           |       |                       |                         | 1415683       |  |  |  |  |
|---------------------------------------------|-------|-----------------------|-------------------------|---------------|--|--|--|--|
| Sample Reference                            |       |                       |                         | WS102         |  |  |  |  |
| Sample Number                               |       |                       |                         | None Supplied |  |  |  |  |
| Depth (m)                                   |       |                       |                         | 2.60          |  |  |  |  |
| Date Sampled                                |       |                       |                         | 15/01/2020    |  |  |  |  |
| Time Taken                                  |       |                       |                         | None Supplied |  |  |  |  |
| Analytical Parameter<br>(Leachate Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |  |  |  |  |
| TPH-CWG - Aliphatic >C5 - C6                | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aliphatic >C6 - C8                | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aliphatic >C8 - C10               | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aliphatic >C10 - C12              | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aliphatic >C12 - C16              | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aliphatic >C16 - C21              | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aliphatic >C21 - C35              | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| <b>TPH-CWG - Aliphatic (C5 - C35)</b>       | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aromatic >C5 - C7                 | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aromatic >C7 - C8                 | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aromatic >C8 - C10                | µg/l  | 1                     | ISO 17025               | < 1.0         |  |  |  |  |
| TPH-CWG - Aromatic >C10 - C12               | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aromatic >C12 - C16               | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aromatic >C16 - C21               | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| TPH-CWG - Aromatic >C21 - C35               | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |
| <b>TPH-CWG - Aromatic (C5 - C35)</b>        | µg/l  | 10                    | NONE                    | < 10          |  |  |  |  |

**Analytical Report Number : 20-81800**

**Project / Site name: Reliance St**

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description *                           |
|-------------------|------------------|---------------|-----------|------------------------------------------------|
| 1415678           | WS101            | None Supplied | 0.40      | Brown clay and sand with gravel.               |
| 1415679           | WS101            | None Supplied | 1.60      | Grey clay and sand with gravel and vegetation. |
| 1415680           | WS101            | None Supplied | 3.00      | Brown clay with gravel.                        |
| 1415681           | WS102            | None Supplied | 0.50      | Brown sandy clay with gravel.                  |
| 1415682           | WS103            | None Supplied | 0.70      | Brown clay and sand with gravel.               |

**Analytical Report Number : 20-81800**

**Project / Site name: Reliance St**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

| Analytical Test Name                       | Analytical Method Description                                                                                                                          | Analytical Method Reference                                                          | Method number | Wet / Dry Analysis | Accreditation Status |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Asbestos identification in soil            | Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.                                  | In house method based on HSG 248                                                     | A001-PL       | D                  | ISO 17025            |
| Boron, water soluble, in soil              | Determination of water soluble boron in soil by hot water extract followed by ICP-OES.                                                                 | In-house method based on Second Site Properties version 3                            | L038-PL       | D                  | MCERTS               |
| BTEX and MTBE in leachates (Monoaromatics) | Determination of BTEX and MTBE in leachates by headspace GC-MS.                                                                                        | In-house method based on USEPA8260                                                   | L0738-PL      | W                  | ISO 17025            |
| BTEX and MTBE in soil (Monoaromatics)      | Determination of BTEX in soil by headspace GC-MS.                                                                                                      | In-house method based on USEPA8260                                                   | L0738-PL      | W                  | MCERTS               |
| Metals in soil by ICP-OES                  | Determination of metals in soil by aqua-regia digestion followed by ICP-OES.                                                                           | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil. | L038-PL       | D                  | MCERTS               |
| Moisture Content                           | Moisture content, determined gravimetrically. (30 oC)                                                                                                  | In house method.                                                                     | L019-UK/PL    | W                  | NONE                 |
| NRA Leachate Prep                          | 10:1 extract with de-ionised water shaken for 24 hours then filtered.                                                                                  | In-house method based on National Rivers Authority                                   | L020-PL       | W                  | NONE                 |
| Speciated EPA-16 PAHs in leachate          | Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.        | In-house method based on USEPA 8270                                                  | L1028-PL      | W                  | NONE                 |
| Speciated EPA-16 PAHs in soil              | Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. | In-house method based on USEPA 8270                                                  | L064-PL       | D                  | MCERTS               |
| Stones content of soil                     | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.                            | In-house method based on British Standard Methods and MCERTS requirements.           | L019-UK/PL    | D                  | NONE                 |
| TPHCWG (Leachates)                         | Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.                                                                        | In-house method                                                                      | L070-PL       | W                  | NONE                 |
| TPHCWG (Soil)                              | Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.                                                                              | In-house method with silica gel split/clean up.                                      | L088/76-PL    | W                  | MCERTS               |

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.**

**For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.**

**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**

| Sample ID | Other_ID | Sample Type | Job      | Sample Number | Sample Deviation Code | test_name                             | test_ref   | Test Deviation code |
|-----------|----------|-------------|----------|---------------|-----------------------|---------------------------------------|------------|---------------------|
| WS103     |          | S           | 20-81800 | 1415682       | b                     | BTEX and MTBE in soil (Monoaromatics) | L073B-PL   | b                   |
| WS103     |          | S           | 20-81800 | 1415682       | b                     | Speciated EPA-16 PAHs in soil         | L064-PL    | b                   |
| WS103     |          | S           | 20-81800 | 1415682       | b                     | TPHCWG (Soil)                         | L088/76-PL | b                   |

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Contract: Reliance Street

Date: 29 January 2020  
Test Report Ref: TR 717541

Order No: POP000376

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## LABORATORY TEST REPORT

### TEST REQUIREMENTS:

To determine the pH Value of Soils in accordance with  
**BS 1377:Part 3:2018 - Clause 12, Electrometric Method.**

### SAMPLE DETAILS:

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Certificate of sampling received: | No                                   |
| Laboratory Ref. No:               | S85639                               |
| Client Ref. No:                   | WS101 @ 2.0 - 2.45m                  |
| Date and Time of Sampling:        | 15/01/2020                           |
| Date of Receipt at Lab:           | 17/01/2020                           |
| Date of Start of Test:            | 24/01/2020                           |
| Sampling Location:                | WS101 @ 2.0 - 2.45m                  |
| Name of Source:                   | Site Won                             |
| Method of Sampling:               | Disturbed Tub Sample                 |
| Sampled By:                       | Egniol CQA Engineer                  |
| Tested By:                        | PJ                                   |
| Material Description:             | Dark brown slightly sandy silty CLAY |
| Target Specification:             | N/A                                  |

### RESULTS:

|                              |                        |
|------------------------------|------------------------|
| <b>pH Value =</b>            | <b>8.7</b>             |
| <b>95% Confidence limit*</b> | <b>= 8.47% - 8.93%</b> |

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These results relate only to the items tested.

| Comments                                                                                                                                                          | Report checked and approved by:                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 95% confidence limit calculation:- Test Result $\pm$ expanded uncertainty.<br><i>Expanded uncertainty = combined uncertainty multiplied by a factor (k) of 2.</i> | <br>Meical Owen<br>Soils Team Manager |

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Contract: Reliance Street

Date: 29 January 2020  
Test Report Ref: TR 717542

Order No: POP000376

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### LABORATORY TEST REPORT

#### TEST REQUIREMENTS:

To determine the Sulphate Content of Soil in accordance with  
**BS 1377: Part 3: 2018: Clause 7.6 (Gravimetric Method)**

#### SAMPLE DETAILS:

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Certificate of sampling received: | No                                   |
| Laboratory Ref. No:               | S85639                               |
| Client Ref. No:                   | WS101 @ 2.0 - 2.45m                  |
| Date and Time of Sampling:        | 15/01/2020                           |
| Date of Receipt at Lab:           | 17/01/2020                           |
| Date of Start of Test:            | 27/01/2020                           |
| Sampling Location:                | WS101 @ 2.0 - 2.45m                  |
| Name of Source:                   | Site Won                             |
| Method of Sampling:               | Disturbed Tub Sample                 |
| Sampled By:                       | Egniol CQA Engineer                  |
| Tested By:                        | GR                                   |
| Material Description:             | Dark brown slightly sandy silty CLAY |
| Target Specification              | N/A                                  |

#### RESULTS:

|                                           | Results  | 95% Confidence limit* |
|-------------------------------------------|----------|-----------------------|
| Mass of soil passing 2.0mm test sieve     | 81 %     |                       |
| Water Soluble Sulphate as SO <sub>3</sub> | <0.01 %  | 0.01% - 0.01%         |
| Water Soluble Sulphate as SO <sub>3</sub> | <0.1 g/L | 0.01% - 0.01%         |

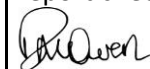
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#### Comments

95% confidence limit calculation:- Test Result  $\pm$  expanded uncertainty.  
*Expanded uncertainty = combined uncertainty multiplied by a factor (k) of 2.*

Report checked and approved by:



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Soils Team Manager

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Contract: Reliance Street

Date: 29 January 2020  
Test Report Ref: TR 717543

Order No: POP000376

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### LABORATORY TEST REPORT

#### TEST REQUIREMENTS:

To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with  
**BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

#### SAMPLE DETAILS:

|                                   |                                                      |
|-----------------------------------|------------------------------------------------------|
| Certificate of sampling received: | <b>No</b>                                            |
| Laboratory Ref. No:               | <b>S85639</b>                                        |
| Client Ref. :                     | <b>WS101 @ 2.5 - 3.0m</b>                            |
| Date and Time of Sampling:        | <b>15/01/2020</b>                                    |
| Date of Receipt at Lab:           | <b>17/01/2020</b>                                    |
| Date of Start of Test:            | <b>28/01/2020</b>                                    |
| Sampling Location:                | <b>WS101 @ 2.5 - 3.0m</b>                            |
| Name of Source:                   | <b>Site Won</b>                                      |
| Method of Sampling:               | <b>U100 Tube</b>                                     |
| Sampled By:                       | <b>Egniol CQA Engineer</b>                           |
| Tested By:                        | <b>DJ</b>                                            |
| Soil Description:                 | <b>Dark brown slightly gravelly sandy silty CLAY</b> |
| Target Specification:             | <b>N/A</b>                                           |

#### RESULTS:

|                                  |   |                          |
|----------------------------------|---|--------------------------|
| <b>History of sample:</b>        | : | <b>After wet sieving</b> |
| <b>% Materials passing 425µm</b> | = | <b>89</b>                |
| <b>Plastic Limit</b>             | = | <b>20</b>                |
| <b>Liquid Limit</b>              | = | <b>44</b>                |
| <b>Plasticity Index</b>          | = | <b>24</b>                |

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These results relate only to the items tested.

|                                     |                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Comments:</b></p> <p>None</p> | <p>Report checked and approved by:</p> <p></p> <p>Meical Owen<br/>Soils Team Manager</p> |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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Test Report Ref: TR 717544

Order No: POP000376

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## LABORATORY TEST REPORT

### TEST REQUIREMENTS:

To determine the pH Value of Soils in accordance with  
**BS 1377:Part 3:2018 - Clause 12, Electrometric Method.**

### SAMPLE DETAILS:

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Certificate of sampling received: | No                                   |
| Laboratory Ref. No:               | S85639                               |
| Client Ref. No:                   | WS103 @ 2.0 - 2.45m                  |
| Date and Time of Sampling:        | 15/01/2020                           |
| Date of Receipt at Lab:           | 17/01/2020                           |
| Date of Start of Test:            | 24/01/2020                           |
| Sampling Location:                | WS103 @ 2.0 - 2.45m                  |
| Name of Source:                   | Site Won                             |
| Method of Sampling:               | Disturbed Tub Sample                 |
| Sampled By:                       | Egniol CQA Engineer                  |
| Tested By:                        | PJ                                   |
| Material Description:             | Dark brown slightly sandy silty CLAY |
| Target Specification:             | N/A                                  |

### RESULTS:

|                              |                        |
|------------------------------|------------------------|
| <b>pH Value =</b>            | <b>8.5</b>             |
| <i>95% Confidence limit*</i> | <i>= 8.28% - 8.72%</i> |

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These results relate only to the items tested.

| Comments                                                                                                                                                          | Report checked and approved by:                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 95% confidence limit calculation:- Test Result $\pm$ expanded uncertainty.<br><i>Expanded uncertainty = combined uncertainty multiplied by a factor (k) of 2.</i> | <br>Meical Owen<br>Soils Team Manager |

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Date: 29 January 2020  
Test Report Ref: TR 717545

Order No: POP000376

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### LABORATORY TEST REPORT

#### TEST REQUIREMENTS:

To determine the Sulphate Content of Soil in accordance with  
**BS 1377: Part 3: 2018: Clause 7.6 (Gravimetric Method)**

#### SAMPLE DETAILS:

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Certificate of sampling received: | No                                   |
| Laboratory Ref. No:               | S85639                               |
| Client Ref. No:                   | WS103 @ 2.0 - 2.45m                  |
| Date and Time of Sampling:        | 15/01/2020                           |
| Date of Receipt at Lab:           | 17/01/2020                           |
| Date of Start of Test:            | 27/01/2020                           |
| Sampling Location:                | WS103 @ 2.0 - 2.45m                  |
| Name of Source:                   | Site Won                             |
| Method of Sampling:               | Disturbed Tub Sample                 |
| Sampled By:                       | Egniol CQA Engineer                  |
| Tested By:                        | GR                                   |
| Material Description:             | Dark brown slightly sandy silty CLAY |
| Target Specification              | N/A                                  |

#### RESULTS:

|                                           | Results  | 95% Confidence limit* |
|-------------------------------------------|----------|-----------------------|
| Mass of soil passing 2.0mm test sieve     | 83 %     |                       |
| Water Soluble Sulphate as SO <sub>3</sub> | <0.01 %  | 0.01% - 0.01%         |
| Water Soluble Sulphate as SO <sub>3</sub> | <0.1 g/L | 0.01% - 0.01%         |

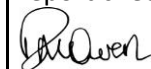
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#### Comments

95% confidence limit calculation:- Test Result  $\pm$  expanded uncertainty.  
*Expanded uncertainty = combined uncertainty multiplied by a factor (k) of 2.*

Report checked and approved by:



Meical Owen  
Soils Team Manager