



# e3p

Validation Completion Report  
Extra Care Building  
Bowes Street, Manchester

Reference: 11-813-R6-1  
Date: March 2022



## VALIDATION COMPLETION REPORT

Extra Care Building  
Former Stagecoach Bus Depot  
Land off Bowes Street  
Manchester

Prepared for:  
**Rowlinson Construction**

The logo for Rowlinson, consisting of the word 'Rowlinson' in a bold, black, sans-serif font, enclosed within a thin black rectangular border.

**Report Ref: 11-813-R6-1**  
**Date Issued: March 2022**

## E3P

Taylor Road  
Trafford Park  
Urmston  
Manchester  
M41 7JQ

+ 44 (0) 161 707 9612  
<https://e3p.co.uk>

Registered in England  
CRN: 08725262

## QUALITY ASSURANCE

|                       |                       |  |  |
|-----------------------|-----------------------|--|--|
| <b>PROJECT NUMBER</b> | 11-813                |  |  |
| <b>VERSION</b>        | Version 1             |  |  |
| <b>REMARKS</b>        | Issue 1               |  |  |
| <b>DATE</b>           | March 2022            |  |  |
| <b>PREPARED BY</b>    | N Sellars             |  |  |
| <b>QUALIFICATIONS</b> | MSci (Hons), FGS      |  |  |
| <b>CHECKED BY</b>     | R Horseman            |  |  |
| <b>QUALIFICATIONS</b> | BSc (Hons), FGS, CEnv |  |  |
| <b>AUTHORISED BY</b>  | R Horseman            |  |  |
| <b>QUALIFICATIONS</b> | BSc (Hons), FGS, CEnv |  |  |

## Table of Contents

|                                                              |           |
|--------------------------------------------------------------|-----------|
| <b>1. INTRODUCTION .....</b>                                 | <b>3</b>  |
| 1.1. Background .....                                        | 3         |
| 1.2. Objectives .....                                        | 3         |
| 1.3. Limitations .....                                       | 3         |
| 1.4. Confidentiality .....                                   | 3         |
| <b>2. COVER SYSTEM VALIDATION .....</b>                      | <b>4</b>  |
| <b>3. CHEMICAL VALIDATION .....</b>                          | <b>5</b>  |
| 3.1. Topsol and Subsoil .....                                | 5         |
| 3.2. Chemical Validation .....                               | 5         |
| <b>4. GAS MEMBRANE VALIDATION .....</b>                      | <b>6</b>  |
| 4.1. Summary Of Ground Gas Risk Assessment .....             | 6         |
| 4.2. Gas Membrane Validation .....                           | 6         |
| <b>5. CONCLUSIONS .....</b>                                  | <b>7</b>  |
| <b>APPENDIX I LIMITATIONS .....</b>                          | <b>8</b>  |
| <b>APPENDIX II GLOSSARY .....</b>                            | <b>10</b> |
| <b>APPENDIX III DRAWINGS .....</b>                           | <b>13</b> |
| <b>APPENDIX IV CHEMICAL TESTING RESULTS .....</b>            | <b>14</b> |
| <b>APPENDIX V GAS MEMBRANE VALIDATION CERTIFICATE .....</b>  | <b>15</b> |
| <b>APPENDIX VI COVER SYSTEM VALIDATION CERTIFICATE .....</b> | <b>16</b> |



## **1. INTRODUCTION**

### **1.1. BACKGROUND**

E3P Ltd has been commissioned by Rowlinson Construction to produce a Completion Report in relation to the validation of the landscaping and gas membrane installation for the Extra Care Building at their newly constructed site at Bowes Street in Manchester.

Manchester City Council confirmed their general acceptance of the remediation works and subsequent validation works for the proposed residential development, pending the following information:

- Validation of the 300 mm cover system; and
- Validation of the ground gas protection measures.

Interim validation letters pertaining to the above have been produced previously, however all outstanding information is included within this report.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

### **1.2. OBJECTIVES**

E3P have been instructed to develop a detailed Validation Completion Report associated with the validation of the residential development that will incorporate the following:

- Overview of the validation works undertaken on the development site within the landscaped areas;
- Chemical laboratory analysis undertaken of the imported material; and
- Overview of the validation works undertaken on the development site pertaining to the installation of gas protection measures to Characteristic 2.

### **1.3. LIMITATIONS**

The limitations of this report are presented in Appendix I.

### **1.4. CONFIDENTIALITY**

E3P 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 E3P; a charge may be levied against such approval.



## 2. COVER SYSTEM VALIDATION

Independent validation of the Extra Care Building was undertaken on 15<sup>th</sup> July 2020 during which the depth of the cover system was measured to confirm the installation of 150 mm subsoil (imported) and 150 mm topsoil (imported) with photographs taken by way of validation.

All material used for the cover system was confirmed chemically suitable for use through chemical analysis, discussed further in Section 3.0. All validation works have been completed in strict accordance with the specification previously agreed with Manchester City Council.

Table 2.1 below shows the Cover System Validation reference and date of validation.

TABLE 2.1 SUMMARY OF GARDEN VALIDATIONS

| DATE                       | REPORT NUMBER | PLOT NUMBER         |
|----------------------------|---------------|---------------------|
| 23 <sup>rd</sup> July 2020 | V1            | Extra Care Building |

The cover system validation letter report is included in Appendix VI.



### **3. CHEMICAL VALIDATION**

#### **3.1. TOPSOL AND SUBSOIL**

All landscaped areas require a 300 mm chemically suitable cover system comprising at least 150 mm subsoil and 150 mm topsoil.

##### **Topsoil**

There was no suitable source of topsoil available on the site prior to remediation and enabling works. As such, topsoil was imported from Freeland Horticulture, Nook Lane, Astley and chemically validated by E3P to confirm suitability for use within the upper 150 mm cover system.

##### **Subsoil**

Subsoil was imported as a horticultural sand from Tarmac Crown Farm in Northwich and chemically validated by E3P to confirm suitability for use within the cover system.

#### **3.2. CHEMICAL VALIDATION**

Six topsoil samples were submitted for chemical analysis, the results confirmed that the material is suitable for use within the 300 mm cover system within the residential development.

Laboratory certificates 20-84975 and 20-19767 provide the results for the topsoil testing, providing a validated volume of 300 m<sup>3</sup> of topsoil.

Three samples of subsoil were analysed in accordance with the regulatory approved Remediation Strategy. Chemical analysis identified no contaminant exceedances; therefore, it has been determined that the subsoil would be suitable for utilisation within the proposed landscaping.

Laboratory certificate 19-55101 provides analysis of the imported subsoil, providing a validated volume of 750 m<sup>3</sup> of subsoil.

All samples were analysed in accordance with the regulatory approved Remediation Strategy

Furthermore, E3P inspected the materials intended for topsoil and subsoil. Chemical analysis identified no contaminant exceedances; therefore, it has been determined that the topsoil and subsoil is suitable for utilisation within the proposed landscaping.

Sufficient samples have been obtained and analysed to meet the agreed sample frequency of 1 sample per 50 m<sup>3</sup> topsoil and 1 sample per 250 m<sup>3</sup> subsoil. Laboratory certificates have been attached within the cover system validation letter and are also included within Appendix IV of this report.



## **4. GAS MEMBRANE VALIDATION**

### **4.1. SUMMARY OF GROUND GAS RISK ASSESSMENT**

The ground gas assessment, as detailed within the Capita Geo-Environmental Report, indicated that the site is Characteristic Situation 2 – Amber 1, thus requiring mitigation measures that conform to BS8485 (2015) (A1-2019) in the construction of new homes. Due to the presence of hydrocarbon vapours within the Made Ground, all plots all required the installation of a hydrocarbon resistant membrane to be constructed in accordance with BS8485 (2015).

### **4.2. GAS MEMBRANE VALIDATION**

The ground gas membrane was validated with the full details included within the Gas Membrane Validation Certificate included within Appendix V.

In brief, the works included the validation of the following for each plot:

- General condition of the membrane;
- Verification of the joints; and
- Verification of service entries and top hats.

Following the completion of the above, E3P can confirm that the Extra Care Building has been installed with gas protection measures in accordance with Characteristic 2 to an acceptable level of workmanship.



## **5. CONCLUSIONS**

On completion of the validation works undertaken in relation to the installation of a chemically suitable cover system and gas protection measures, E3P can confirm that all works were undertaken in strict accordance with the agreed Remediation Strategy and therefore would deem the site suitable for use as a residential development.

E3P do not consider that any further work is necessary.

**END OF REPORT**



# APPENDIX I

# LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
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 been 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. 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.
7. 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.
8. 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.
9. E3P cannot 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 E3P 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 E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



# **APPENDIX II**

## **GLOSSARY**

## TERMS

|              |                                                            |                |                                                      |
|--------------|------------------------------------------------------------|----------------|------------------------------------------------------|
| <b>ACM</b>   | Asbestos-containing material                               | <b>MMP</b>     | Materials management plan                            |
| <b>ADS</b>   | Acoustic design statement                                  | <b>ND</b>      | Not detected                                         |
| <b>AST</b>   | Above-ground storage tank                                  | <b>NDP</b>     | Nuclear density probe                                |
| <b>BGS</b>   | British Geological Survey                                  | <b>NMP</b>     | Noise management plan                                |
| <b>BSI</b>   | British Standards Institute                                | <b>NPSE</b>    | Noise policy statement for England                   |
| <b>BTEX</b>  | Benzene, toluene, ethylbenzene, xylenes                    | <b>NR</b>      | Not recorded                                         |
| <b>CA</b>    | Coal Authority                                             | <b>PAH</b>     | Polycyclic aromatic hydrocarbon                      |
| <b>CBR</b>   | California bearing ratio                                   | <b>PCB</b>     | Polychlorinated biphenyl                             |
| <b>CIEH</b>  | Chartered Institute of Environmental Health                | <b>PI</b>      | Plasticity index                                     |
| <b>CIRIA</b> | Construction Industry Research Association                 | <b>PID</b>     | Photo ionisation detector                            |
| <b>CLEA</b>  | Contaminated land exposure assessment                      | <b>POS</b>     | Public open space                                    |
| <b>CML</b>   | Council of Mortgage Lenders                                | <b>PPE</b>     | Personnel protective equipment                       |
| <b>CoC</b>   | Contaminants of concern                                    | <b>ProPG</b>   | Professional practice guidance                       |
| <b>CSM</b>   | Conceptual site model                                      | <b>QA</b>      | Quality assurance                                    |
| <b>DNAPL</b> | Dense non-aqueous phase liquid (chlorinated solvents, PCB) | <b>SGV</b>     | Soil guideline value                                 |
| <b>DWS</b>   | Drinking water standard                                    | <b>SPH</b>     | Separate-phase hydrocarbon                           |
| <b>EA</b>    | Environment Agency                                         | <b>SPT</b>     | Standard penetration test                            |
| <b>EQS</b>   | Environmental quality standard                             | <b>SVOC</b>    | Semi-volatile organic compound                       |
| <b>FFL</b>   | Finished floor level                                       | <b>TPH</b>     | Total and speciated petroleum hydrocarbon            |
| <b>GAC</b>   | General assessment criteria                                | <b>TPH CWG</b> | Total Petroleum Hydrocarbon (Criteria Working Group) |
| <b>GL</b>    | Ground level                                               | <b>UKWIR</b>   | United Kingdom Water Infrastructure Risk             |
| <b>GSV</b>   | Gas screening value                                        | <b>UST</b>     | Underground storage tank                             |
| <b>HCV</b>   | Health criteria value                                      | <b>VCC</b>     | Vibro-concrete column                                |
| <b>ICSM</b>  | Initial conceptual site model                              | <b>VOC</b>     | Volatile organic compound                            |
| <b>LEL</b>   | Lower explosive limit                                      | <b>VRSC</b>    | Vibro-replacement stone columns                      |
| <b>LMRL</b>  | Lower method reporting limit                               | <b>VSC</b>     | Vibro-stone columns                                  |
| <b>LNAPL</b> | Light non-aqueous phase liquid (petrol, diesel, kerosene)  | <b>WHO</b>     | World Health Organisation                            |
| <b>MCV</b>   | Moisture condition value                                   | <b>WRAP</b>    | Waste and Resources Action Programme                 |

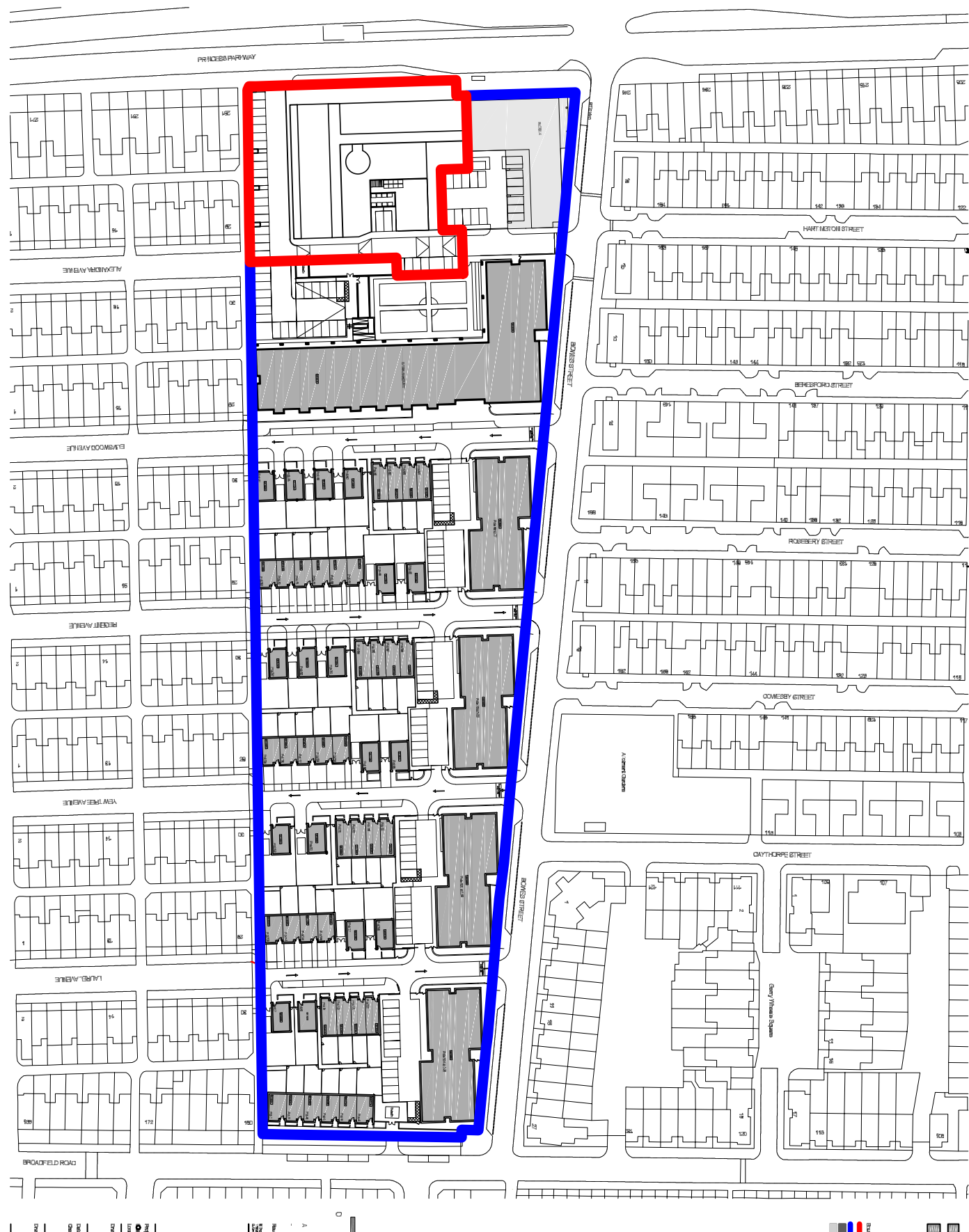


|                |                                                            |                         |                                         |
|----------------|------------------------------------------------------------|-------------------------|-----------------------------------------|
| <b>MIBK</b>    | Methyl isobutyl ketone                                     | <b>WTE</b>              | Water table elevation                   |
| <b>m</b>       | Metres                                                     | <b>ppm</b>              | Parts per million                       |
| <b>km</b>      | Kilometres                                                 | <b>mg/m<sup>3</sup></b> | Milligram per metre cubed               |
| <b>% v/v</b>   | Percent volume in air                                      | <b>m bgl</b>            | Metres below ground level               |
| <b>mb</b>      | Millibars (atmospheric pressure)                           | <b>m bcl</b>            | Metre below cover level                 |
| <b>l/hr</b>    | Litres per hour                                            | <b>mAOD</b>             | Metres above ordnance datum (sea level) |
| <b>µg/l</b>    | Micrograms per litre (parts per billion)                   | <b>kN/m<sup>2</sup></b> | Kilonewtons per metre squared           |
| <b>ppb</b>     | Parts per billion                                          | <b>µm</b>               | Micrometre                              |
| <b>mg/kg</b>   | Milligrams per kilogram (parts per million)                | <b>SSRT</b>             | Site Specific Remediation Target        |
| <b>PSD</b>     | Particle Size Distribution                                 | <b>DD</b>               | Dry Density                             |
| <b>CL:AIRE</b> | Contaminated Land: Applications in Real Environments       | <b>Mc</b>               | Moisture Content                        |
| <b>ρ</b>       | Bulk Density                                               | <b>GPR</b>              | Ground Penetrating Radar                |
| <b>NDP</b>     | Nuclear Density Probe                                      | <b>FFL</b>              | Finished Floor Level                    |
| <b>LEL</b>     | Lower Explosive Limit                                      | <b>UKWIR</b>            | UK Water Industry Research              |
| <b>CIRIA</b>   | Construction Industry Research and Information Association | <b>LOD</b>              | Limit of Detection                      |



# **APPENDIX III**

## **DRAWINGS**



|        |       |            |       |         |
|--------|-------|------------|-------|---------|
| Notes: |       |            |       |         |
| P1     | REVA  | 29.04.2021 | EB    | RH      |
| Phase  | Issue | Date       | Drawn | Checked |

|                                               |  |
|-----------------------------------------------|--|
| Client:<br><br>Rowlinson<br>Construction      |  |
| Job Title:<br><br>Bowes Street,<br>Manchester |  |

|                                                    |                         |
|----------------------------------------------------|-------------------------|
| Job No:<br><br>11-813                              | Date:<br><br>29.04.2021 |
| Drawing No:<br><br>002                             | Scale:<br><br>NTS@ A3   |
| Drawing Title:<br><br>Proposed<br>Development Plan |                         |



Environmental Engineering  
Partnership Ltd  
Taylor Road, Trafford Park  
Urmston, Manchester, M41 7JQ  
Tel: 0161 707 9612  
E-mail: [info@e3p.co.uk](mailto:info@e3p.co.uk)  
Website: [www.e3p.co.uk](http://www.e3p.co.uk)

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

# **APPENDIX IV CHEMICAL TESTING RESULTS**



**Rob Horseman**

e3p  
Office 4  
Heliport Business Park  
Eccles  
Liverpool Road  
Manchester  
M30 7RU

**t:** 0161 707 9612

**e:** Rhorseman@e3p.co.uk

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404

**f:** 01923 237404

**e:** reception@i2analytical.com

## **Analytical Report Number : 20-84975**

**Project / Site name:** Bow St

**Samples received on:** 04/02/2020

**Your job number:** 11813

**Samples instructed on:** 04/02/2020

**Your order number:**

**Analysis completed by:** 11/02/2020

**Report Issue Number:** 1

**Report issued on:** 11/02/2020

**Samples Analysed:** 3 soil samples

**Signed:** 

Karolina Marek  
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.

Analytical Report Number: 20-84975

Project / Site name: Bow St

|                                      |       |                    |                      |               |               |               |  |  |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|---------------|--|--|
| Lab Sample Number                    |       |                    |                      | 1432702       | 1432703       | 1432704       |  |  |
| Sample Reference                     |       |                    |                      | TS101         | TS102         | TS103         |  |  |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Depth (m)                            |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Date Sampled                         |       |                    |                      | 03/02/2020    | 03/02/2020    | 03/02/2020    |  |  |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Analytical Parameter (Soil Analysis) |       |                    |                      |               |               |               |  |  |
|                                      | Units | Limit of detection | Accreditation Status |               |               |               |  |  |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         | < 0.1         |  |  |
| Moisture Content                     | %     | N/A                | NONE                 | 10            | 11            | 14            |  |  |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.48          | 0.54          | 0.54          |  |  |

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

#### General Inorganics

|                                                                         |          |         |        |       |       |       |  |  |
|-------------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|--|--|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.7   | 7.8   | 7.9   |  |  |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   | < 1   | < 1   |  |  |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 400   | 490   | 540   |  |  |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 63    | 59    | 120   |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.032 | 0.029 | 0.061 |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 31.6  | 29.4  | 60.5  |  |  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 | 1.0   | < 1.0 |  |  |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 320   | 340   | 390   |  |  |

#### Total Phenols

|                            |       |   |        |       |       |       |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|

#### Speciated PAHs

|                        |       |      |        |        |        |        |  |  |
|------------------------|-------|------|--------|--------|--------|--------|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.1    |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.25   |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | < 0.05 | 0.31   | 0.97   |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | < 0.05 | 0.31   | 0.95   |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.65   |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.63   |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.66   |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.28   |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.58   |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.27   |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.35   |  |  |

#### Total PAH

|                             |       |     |        |        |        |      |  |  |
|-----------------------------|-------|-----|--------|--------|--------|------|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | < 0.80 | < 0.80 | 6.66 |  |  |
|-----------------------------|-------|-----|--------|--------|--------|------|--|--|

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |  |  |
|-----------------------------------|-------|-----|--------|-------|-------|-------|--|--|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 6.3   | 6.2   | 6.2   |  |  |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | < 0.2 |  |  |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 17    | 18    | 16    |  |  |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 16    | 16    | 17    |  |  |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 30    | 29    | 33    |  |  |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 |  |  |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 13    | 13    | 13    |  |  |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 57    | 55    | 72    |  |  |

Analytical Report Number: 20-84975

Project / Site name: Bow St

|                                         |               |                       |                         |  |  |
|-----------------------------------------|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                       | 1432702       | 1432703               | 1432704                 |  |  |
| Sample Reference                        | TS101         | TS102                 | TS103                   |  |  |
| Sample Number                           | None Supplied | None Supplied         | None Supplied           |  |  |
| Depth (m)                               | None Supplied | None Supplied         | None Supplied           |  |  |
| Date Sampled                            | 03/02/2020    | 03/02/2020            | 03/02/2020              |  |  |
| Time Taken                              | None Supplied | None Supplied         | None Supplied           |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

**Petroleum Hydrocarbons**

|                           |       |     |        |       |       |       |  |  |
|---------------------------|-------|-----|--------|-------|-------|-------|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | 9.3   |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 6.7   | < 1.0 | 18    |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 50    | < 1.0 | 21    |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | 24    | < 10  | < 10  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 83    | < 10  | 50    |  |  |



**Analytical Report Number : 20-84975**

**Project / Site name: Bow 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1432702           | TS101            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1432703           | TS102            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1432704           | TS103            | None Supplied | None Supplied | Brown clay and sand with gravel.                |

**Analytical Report Number : 20-84975**

**Project / Site name: Bow 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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                 | L080-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                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | MCERTS               |

**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.**

**Rob Horseman**  
e3p  
Taylor Road  
Urmston  
Manchester  
M41 7JQ

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

**e:** Rhorseman@e3p.co.uk

## **Analytical Report Number : 20-19767**

|                             |                |                                                    |            |
|-----------------------------|----------------|----------------------------------------------------|------------|
| <b>Project / Site name:</b> | Bowes St.      | <b>Samples received on:</b>                        | 16/07/2020 |
| <b>Your job number:</b>     |                | <b>Sample instructed/<br/>Analysis started on:</b> | 16/07/2020 |
| <b>Your order number:</b>   |                | <b>Analysis completed by:</b>                      | 22/07/2020 |
| <b>Report Issue Number:</b> | 1              | <b>Report issued on:</b>                           | 22/07/2020 |
| <b>Samples Analysed:</b>    | 3 soil samples |                                                    |            |

**Signed:** Karolina Marek

Karolina Marek  
PL Head of 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.



Analytical Report Number: 20-19767

Project / Site name: Bowes St.

|                                         |  |  |  |               |                       |                         |       |       |
|-----------------------------------------|--|--|--|---------------|-----------------------|-------------------------|-------|-------|
| Lab Sample Number                       |  |  |  | 1564595       | 1564596               | 1564597                 |       |       |
| Sample Reference                        |  |  |  | TS101         | TS102                 | TS103                   |       |       |
| Sample Number                           |  |  |  | None Supplied | None Supplied         | None Supplied           |       |       |
| Depth (m)                               |  |  |  | None Supplied | None Supplied         | None Supplied           |       |       |
| Date Sampled                            |  |  |  | 15/07/2020    | 15/07/2020            | 15/07/2020              |       |       |
| Time Taken                              |  |  |  | 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 |
| Moisture Content                        |  |  |  | %             | N/A                   | NONE                    | 10    | 13    |
| Total mass of sample received           |  |  |  | kg            | 0.001                 | NONE                    | 0.50  | 0.50  |

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

#### General Inorganics

|                                                                  |          |         |        |      |      |      |  |  |
|------------------------------------------------------------------|----------|---------|--------|------|------|------|--|--|
| pH - Automated                                                   | pH Units | N/A     | MCERTS | 8.0  | 6.7  | 7.1  |  |  |
| Total Cyanide                                                    | mg/kg    | 1       | MCERTS | 3    | 1    | 2    |  |  |
| Total Sulphate as SO <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 1900 | 1800 | 1900 |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.20 | 0.19 | 0.22 |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 410  | 380  | 440  |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/l     | 1.25    | MCERTS | 204  | 189  | 222  |  |  |
| Sulphide                                                         | mg/kg    | 1       | MCERTS | 1.1  | 7.3  | 2.9  |  |  |
| Total Sulphur                                                    | mg/kg    | 50      | MCERTS | 1100 | 1200 | 1200 |  |  |

#### Total Phenols

|                            |       |   |        |       |       |       |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|

#### Speciated PAHs

|                        |       |      |        |        |        |        |  |  |
|------------------------|-------|------|--------|--------|--------|--------|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | 0.29   | 0.23   | 0.95   |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.65   |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 2.3    | 1.8    | 5.2    |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.39   | 0.47   | 1.1    |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 3.3    | 4.1    | 7.0    |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 3.2    | 3.8    | 6.4    |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 2.0    | 2.4    | 4.8    |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | 1.4    | 2.0    | 2.8    |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 1.9    | 2.4    | 3.7    |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.94   | 0.95   | 1.5    |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 1.7    | 1.8    | 3.5    |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.71   | 0.85   | 1.4    |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.37   |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.83   | 0.94   | 1.5    |  |  |

#### Total PAH

|                             |       |     |        |      |      |      |  |  |
|-----------------------------|-------|-----|--------|------|------|------|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 19.0 | 21.7 | 40.9 |  |  |
|-----------------------------|-------|-----|--------|------|------|------|--|--|

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |  |  |
|-----------------------------------|-------|-----|--------|-------|-------|-------|--|--|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 28    | 29    | 39    |  |  |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | 0.6   | 0.6   | 0.7   |  |  |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 31    | 27    | 29    |  |  |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 66    | 68    | 75    |  |  |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 470   | 260   | 350   |  |  |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 0.7   | 0.7   | 0.8   |  |  |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 24    | 22    | 22    |  |  |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | 2.2   | 2.1   | 2.1   |  |  |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 150   | 150   | 170   |  |  |

Analytical Report Number: 20-19767

Project / Site name: Bowes St.

|                                         |  |  |  |               |                       |                         |  |  |
|-----------------------------------------|--|--|--|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                       |  |  |  | 1564595       | 1564596               | 1564597                 |  |  |
| Sample Reference                        |  |  |  | TS101         | TS102                 | TS103                   |  |  |
| Sample Number                           |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Depth (m)                               |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Date Sampled                            |  |  |  | 15/07/2020    | 15/07/2020            | 15/07/2020              |  |  |
| Time Taken                              |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Analytical Parameter<br>(Soil Analysis) |  |  |  | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

**Petroleum Hydrocarbons**

|                           |       |     |        |       |       |       |  |  |
|---------------------------|-------|-----|--------|-------|-------|-------|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 8.3   | 8.9   | 24    |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 25    | 42    | 74    |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | < 10  | < 10  | < 10  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 36    | 53    | 99    |  |  |



**Analytical Report Number : 20-19767**

**Project / Site name: Bowes 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1564595           | TS101            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |
| 1564596           | TS102            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |
| 1564597           | TS103            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |

**Analytical Report Number : 20-19767**

**Project / Site name: Bowes 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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                 | L080-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                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Sulphate, water soluble, in soil (1hr extraction)  | Sulphate, water soluble, in soil (1hr extraction)                                                                                                                      | In-house method                                                                                                 | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | MCERTS               |

**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.**



**Rob Horseman**

e3p  
Office 4  
Heliport Business Park  
Eccles  
Liverpool Road  
Manchester  
M30 7RU

**t:** 0161 707 9612

**e:** Rhorseman@e3p.co.uk

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404

**f:** 01923 237404

**e:** reception@i2analytical.com

## **Analytical Report Number : 19-55101**

**Project / Site name:** Bowes Street

**Samples received on:** 16/08/2019

**Your job number:**

**Samples instructed on:** 16/08/2019

**Your order number:**

**Analysis completed by:** 23/08/2019

**Report Issue Number:** 1

**Report issued on:** 23/08/2019

**Samples Analysed:** 6 soil samples

**Signed:**

Karolina Marek  
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.



Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                    |       |                    |                      | 1293738       | 1293739       | 1293740       | 1293741       | 1293742       |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                     |       |                    |                      | TS101         | TS102         | TS103         | SS101         | SS102         |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                            |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Date Sampled                         |       |                    |                      | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Limit of detection | Accreditation Status |               |               |               |               |               |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         | < 0.1         | < 0.1         | < 0.1         |
| Moisture Content                     | %     | N/A                | NONE                 | 17            | 18            | 18            | 19            | 17            |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.48          | 0.49          | 0.50          | 0.40          | 0.52          |

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

#### General Inorganics

|                                                                         |          |         |        |       |       |       |       |       |
|-------------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|-------|-------|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.7   | 7.7   | 7.7   | 7.8   | 7.7   |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   | < 1   | < 1   | < 1   | < 1   |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 530   | 460   | 620   | 510   | 500   |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 100   | 120   | 99    | 120   | 110   |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.051 | 0.061 | 0.050 | 0.059 | 0.053 |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 50.9  | 60.9  | 49.7  | 58.5  | 53.2  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 350   | 360   | 380   | 360   | 380   |

#### Total Phenols

|                            |       |   |        |       |       |       |       |       |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|

#### Speciated PAHs

|                        |       |      |        |        |        |        |        |        |
|------------------------|-------|------|--------|--------|--------|--------|--------|--------|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.63   | < 0.05 |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.34   | < 0.05 |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 1.3    | 1.0    | 0.75   | 2.5    | 0.83   |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.28   | 0.17   | 0.17   | 0.43   | 0.18   |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 2.2    | 2.0    | 1.4    | 2.6    | 1.6    |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 2.0    | 1.9    | 1.4    | 2.3    | 1.4    |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 1.0    | 1.1    | 0.73   | 1.2    | 0.81   |
| Chrysene               | mg/kg | 0.05 | MCERTS | 0.98   | 0.84   | 0.73   | 1.2    | 0.73   |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 1.3    | 1.1    | 0.89   | 1.3    | 0.99   |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.40   | 0.44   | 0.25   | 0.51   | 0.22   |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 0.98   | 0.84   | 0.68   | 1.0    | 0.70   |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.44   | 0.43   | 0.34   | 0.48   | 0.34   |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.59   | 0.52   | 0.40   | 0.70   | 0.44   |

#### Total PAH

|                             |       |     |        |      |      |      |      |      |
|-----------------------------|-------|-----|--------|------|------|------|------|------|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 11.4 | 10.4 | 7.75 | 15.2 | 8.24 |
|-----------------------------|-------|-----|--------|------|------|------|------|------|

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                       |       |                       |                         | 1293738       | 1293739       | 1293740       | 1293741       | 1293742       |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                        |       |                       |                         | TS101         | TS102         | TS103         | SS101         | SS102         |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Date Sampled                            |       |                       |                         | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    |
| 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 |               |               |               |               |               |

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |       |       |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 16    | 16    | 16    | 14    | 17    |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | 0.5   | 0.5   | 0.6   | 0.4   | 0.6   |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 | < 4.0 | < 4.0 |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 22    | 17    | 16    | 17    | 17    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 61    | 54    | 62    | 58    | 63    |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 85    | 76    | 85    | 73    | 80    |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 0.3   | 0.6   | < 0.3 | 0.7   | < 0.3 |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 17    | 17    | 18    | 15    | 18    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | 1.8   | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 88    | 73    | 100   | 86    | 85    |

#### Petroleum Hydrocarbons

|                           |       |     |        |       |       |       |       |       |
|---------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 | 5.7   | < 4.0 |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 12    | 16    | 11    | 19    | 6.8   |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 49    | 29    | 36    | 43    | 10    |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | < 10  | < 10  | < 10  | < 10  | < 10  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 63    | 47    | 49    | 70    | 19    |

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                       |       |                       |                         | 1293743       |  |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|--|--|--|--|
| Sample Reference                        |       |                       |                         | SS103         |  |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied |  |  |  |  |
| Depth (m)                               |       |                       |                         | None Supplied |  |  |  |  |
| Date Sampled                            |       |                       |                         | 15/08/2019    |  |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied |  |  |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |  |  |  |  |
| Stone Content                           | %     | 0.1                   | NONE                    | < 0.1         |  |  |  |  |
| Moisture Content                        | %     | N/A                   | NONE                    | 18            |  |  |  |  |
| Total mass of sample received           | kg    | 0.001                 | NONE                    | 0.52          |  |  |  |  |

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

#### General Inorganics

|                                                                         |          |         |        |       |  |  |  |  |
|-------------------------------------------------------------------------|----------|---------|--------|-------|--|--|--|--|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.8   |  |  |  |  |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   |  |  |  |  |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 510   |  |  |  |  |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 120   |  |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.060 |  |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 59.8  |  |  |  |  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 |  |  |  |  |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 410   |  |  |  |  |

#### Total Phenols

|                            |       |   |        |       |  |  |  |  |
|----------------------------|-------|---|--------|-------|--|--|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |  |  |  |  |
|----------------------------|-------|---|--------|-------|--|--|--|--|

#### Speciated PAHs

|                        |       |      |        |        |  |  |  |  |
|------------------------|-------|------|--------|--------|--|--|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 0.89   |  |  |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.22   |  |  |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 1.7    |  |  |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 1.6    |  |  |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 0.79   |  |  |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | 0.77   |  |  |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.87   |  |  |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.41   |  |  |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 0.72   |  |  |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.35   |  |  |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.48   |  |  |  |  |

#### Total PAH

|                             |       |     |        |      |  |  |  |  |
|-----------------------------|-------|-----|--------|------|--|--|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 8.76 |  |  |  |  |
|-----------------------------|-------|-----|--------|------|--|--|--|--|

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                       |       |                       |                         | 1293743       |  |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|--|--|--|--|
| Sample Reference                        |       |                       |                         | SS103         |  |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied |  |  |  |  |
| Depth (m)                               |       |                       |                         | None Supplied |  |  |  |  |
| Date Sampled                            |       |                       |                         | 15/08/2019    |  |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied |  |  |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |  |  |  |  |
| <b>Heavy Metals / Metalloids</b>        |       |                       |                         |               |  |  |  |  |
| Arsenic (aqua regia extractable)        | mg/kg | 1                     | MCERTS                  | 16            |  |  |  |  |
| Cadmium (aqua regia extractable)        | mg/kg | 0.2                   | MCERTS                  | 0.6           |  |  |  |  |
| Chromium (hexavalent)                   | mg/kg | 4                     | MCERTS                  | < 4.0         |  |  |  |  |
| Chromium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | 20            |  |  |  |  |
| Copper (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 70            |  |  |  |  |
| Lead (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 90            |  |  |  |  |
| Mercury (aqua regia extractable)        | mg/kg | 0.3                   | MCERTS                  | < 0.3         |  |  |  |  |
| Nickel (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 20            |  |  |  |  |
| Selenium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | < 1.0         |  |  |  |  |
| Zinc (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 93            |  |  |  |  |

#### Petroleum Hydrocarbons

|                           |       |     |        |       |  |  |  |  |
|---------------------------|-------|-----|--------|-------|--|--|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 |  |  |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 |  |  |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 |  |  |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 |  |  |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 |  |  |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 5.8   |  |  |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 25    |  |  |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | < 10  |  |  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 33    |  |  |  |  |

**Analytical Report Number : 19-55101**

**Project / Site name: Bowes Street**

\* 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1293738           | TS101            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1293739           | TS102            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1293740           | TS103            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293741           | SS101            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293742           | SS102            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293743           | SS103            | None Supplied | None Supplied | Brown loam and clay with vegetation and gravel  |

**Analytical Report Number : 19-55101**

**Project / Site name: Bowes Street**

**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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                                   | L080-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.                                                                                                                          | In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests                                                  | L019-UK/PL    | W                  | NONE                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)                   | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES. | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                                   | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)                   | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil                      | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                                            | L076-PL       | D                  | MCERTS               |

**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 300C.**

# **APPENDIX V GAS MEMBRANE VALIDATION CERTIFICATE**

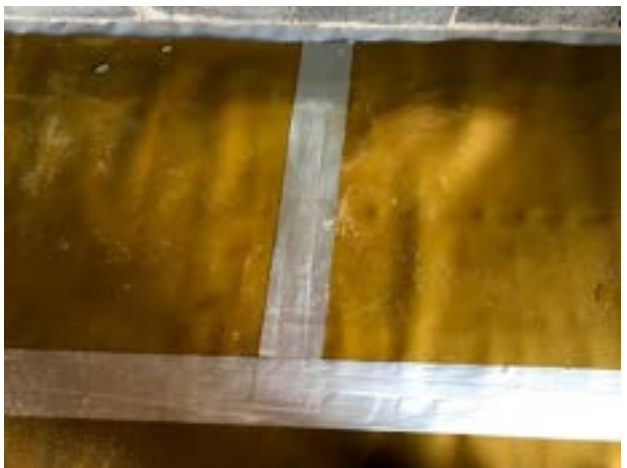
## GAS MEMBRANE VALIDATION

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Site: Bowes Street</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        |
| Date: 03-05-2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Project Number: 11-813 |
| Project Manager: R. Horseman                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | E3P Engineer: J. James |
| <b>Ground Gas Risk Assessment: Hydrocarbon Resistant Membrane (VOC Blok and Visqueen GX) – Characteristic Situation 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        |
| <p><b>Overview:</b></p> <p>The membrane comprised of Visqueen Ultimate VOC Blok, this was laid below the slab with welded joints, laid over Visqueen Vent Membrane &amp; vented to external air at 3.0m centres DPC Visqueen GX with taped joints.</p> <p>Visqueen Ultimate VOC Blok and Visqueen GX is resistant to Hydrocarbons, Methane, VOCs and BTEX and carbon dioxide. E3P can confirm there were no holes or rips at the time of inspection. Upon being laid the membrane is to be covered with a Celotex (closed Cell) floor insulation material which is considered to provide a high degree of protection.</p> <p>All external joints were inspected and E3P can confirm that the membrane was overlapped and double taped to external and internal gas resistant DPM. The membrane was taped to the gas resistant DPM using a double-sided jointing tape. All the overlaps were then additionally taped using foil backed girth tape.</p> <p>Each unit has a service duct located to the front and outer edge of the property. E3P inspected each one and can confirm that the top hats have been adequately sealed against the membrane.</p> <p>Based on the information provided within this report, the site inspections and validation checklists, E3P can confirm that the <b>Extra Care Building</b> has been installed with gas protection measures in accordance with Characteristic Situation 2 to an acceptable level of workmanship.</p> |                        |
| <b>Membrane Specification: Hydrocarbon Resistant Membrane (VOC Blok and Visqueen GX)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |

**Extra Care Building**  
**General Condition of Membrane-Good Condition**

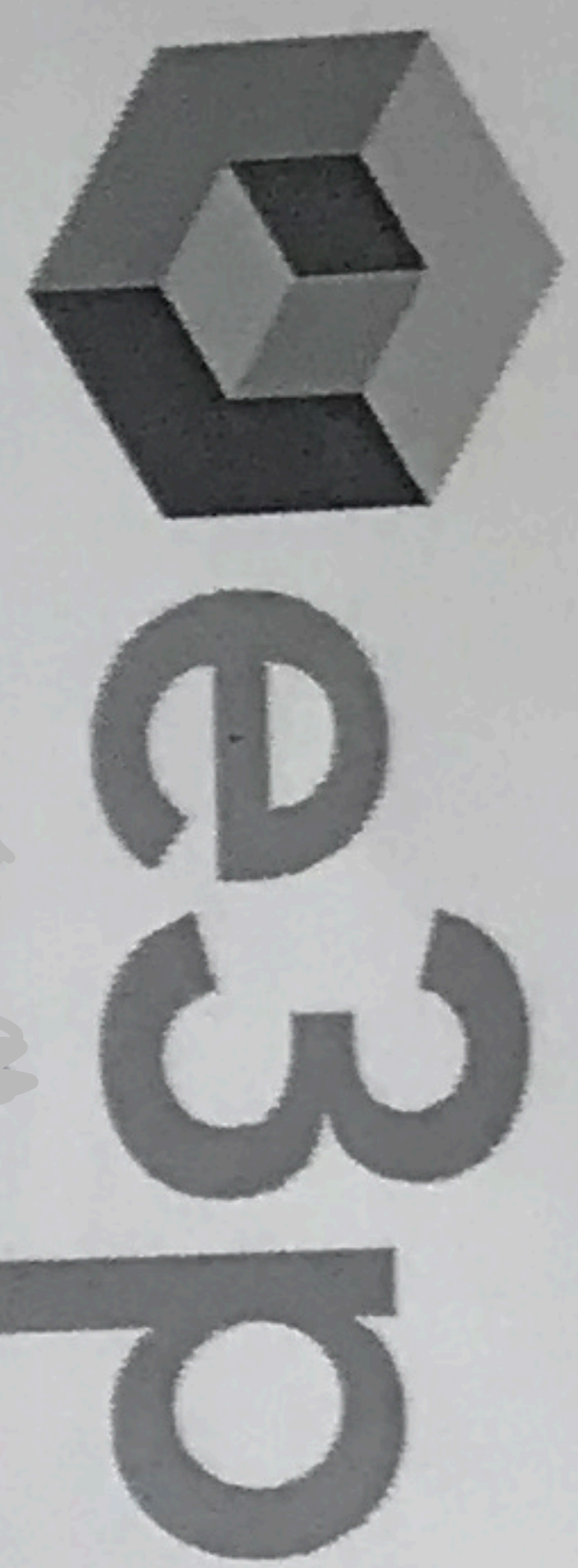


### Verification of Joints and Seals



### Verification of Service Penetrations





# Gas Protection Validation Site Record

Plot No:..... *Extra Lane* .....

|                       |               |               |                |               |     |
|-----------------------|---------------|---------------|----------------|---------------|-----|
| Inspection date/time: | <i>3/5/19</i> | Inspected by: | <i>S JAMES</i> | Photographed: | ✓/x |
|                       |               |               |                |               |     |

✓/x      Notes/recommendations

|                                         |   |  |
|-----------------------------------------|---|--|
| Membrane Type Correct                   | ✓ |  |
| Extent of Coverage Correct              | ✓ |  |
| Underside of Membrane                   | ✓ |  |
| Slab / membrane condition               | ✓ |  |
| Laps and joints                         | ✓ |  |
| Damp-proof course                       | ✓ |  |
| Service entries                         | ✓ |  |
| Folded Membrane Joint Taped & inspected | ✓ |  |

This Plot has PASSED/FAILED\* inspection. (Any proposed remedial works will be noted in the "Remarks" column on this form).  
An additional inspection visit IS/IS NOT\* required for this Plot.

Inspection by:..... *Jordan James* ..... Signed:..... *JJM* .....

One record sheet to be completed for each plot – To be completed by E3P Professional Inspecting.

**APPENDIX VI  
COVER SYSTEM  
VALIDATION CERTIFICATE**



**E3P**  
Taylor Road  
Trafford Park  
Urmston  
Manchester  
M41 7JQ

Manchester | London | Edinburgh

info@E3P.co.uk  
[www.E3P.co.uk](http://www.E3P.co.uk)

Ref: 11-813-Rev 1  
Date: 10<sup>th</sup> March 2022

**Steve Weir**  
**Rowlinson Construction**  
London House  
London Road South  
Poynton  
Stockport  
SK12 1YP

BY Email

**Dear Steve,**

## **COVER SYSTEM VALIDATION – EXTRA CARE BUILDING**

An E3P engineer attended the above site to validate the thickness of the cover system that had been placed within the rear public open space areas of the Extra Care Building at Bowes Street, Manchester.

In total 3 No. hand excavated trial pits were advanced with the resulting strata detailed to the rear of this letter.

All trial pits were completed to highlight the required cover system of 300 mm (150 mm topsoil and at least 150 mm subsoil).

E3P can confirm that our independent validation demonstrates that the landscaped areas have been installed with at least 300 mm of certified topsoil and subsoil in accordance with the NHBC requirements for a site of this nature.

### **TOPSOIL**

E3P attended site on 4<sup>th</sup> February 2020 to obtain three samples of the stockpiled topsoil deposits and again on the 15<sup>th</sup> July 2020 which were analysed in accordance with the E3P Remediation Strategy. Chemical analysis confirmed that these topsoil deposits were chemically suitable for use within the proposed soft landscaping areas.

Chemical analysis results are included within lab reports 20-84975 – 20-19767 (attached to this letter).



## **SUBSOIL**

Subsoil was imported as a horticultural sand from Tarmac Crown Farm in Northwich.

Three samples of subsoil were analysed in accordance with the regulatory approved Remediation Strategy. Chemical analysis identified no contaminant exceedances; therefore, it has been determined that the subsoil would be suitable for utilisation within the proposed landscaped areas.

Laboratory certificate 19-55101 provides analysis of the imported subsoil.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

**For and on behalf of E3P Ltd**



**Rob Horseman**  
**Associate Director**



## Site: Bowes Street

|                                             |                          |
|---------------------------------------------|--------------------------|
| Date: 15-07-2020                            | Project Number: 11-813   |
| Project Manager: R. Horseman                | E3P Engineer: T. Preston |
| Plot Numbers Validated: Extra Care Building |                          |

### Chemical Laboratory Analysis

Analysis for topsoil and subsoil undertaken by I2 Analytical Laboratory using UKAS accredited methods where applicable.

Chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos.

Sampling frequency in accordance with the agreed Remediation Strategy. Laboratory analysis certificates attached to this validation certificate.

|                                                        | Topsoil | Subsoil |
|--------------------------------------------------------|---------|---------|
| <i>Chemical analysis confirmed materials suitable?</i> | Pass    | Pass    |
| <i>Further Comments</i>                                | N/A     | N/A     |



**Plot No: Extra Care Building**

|                                |           |                   |
|--------------------------------|-----------|-------------------|
| <b>Depth of Strata (m bgl)</b> | 0.00-0.15 | Validated TOPSOIL |
|                                | 0.15-0.60 | Validated SUBSOIL |

**Depth of Cover System Materials**



**Depth of Cover System Materials**



**Depth of Cover System at Ground Level**



**Depth of Cover System in Relation to Plot**



**Plot No: Extra Care Building**

|                                |           |                   |
|--------------------------------|-----------|-------------------|
| <b>Depth of Strata (m bgl)</b> | 0.00-0.15 | Validated TOPSOIL |
|                                | 0.15-0.60 | Validated SUBSOIL |

**Depth of Cover System Materials**



**Depth of Cover System Materials**



**Depth of Cover System at Ground Level**



**Depth of Cover System in Relation to Plot**



**Plot No: Extra Care Building**

|                                |           |                   |
|--------------------------------|-----------|-------------------|
| <b>Depth of Strata (m bgl)</b> | 0.00-0.15 | Validated TOPSOIL |
|                                | 0.15-0.60 | Validated SUBSOIL |

**Depth of Cover System Materials**



**Depth of Cover System Materials**



**Depth of Cover System at Ground Level**



**Depth of Cover System in Relation to Plot**



**Rob Horseman**  
e3p  
Taylor Road  
Urmston  
Manchester  
M41 7JQ

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

**e:** Rhorseman@e3p.co.uk

## **Analytical Report Number : 20-19767**

|                             |                |                                                    |            |
|-----------------------------|----------------|----------------------------------------------------|------------|
| <b>Project / Site name:</b> | Bowes St.      | <b>Samples received on:</b>                        | 16/07/2020 |
| <b>Your job number:</b>     |                | <b>Sample instructed/<br/>Analysis started on:</b> | 16/07/2020 |
| <b>Your order number:</b>   |                | <b>Analysis completed by:</b>                      | 22/07/2020 |
| <b>Report Issue Number:</b> | 1              | <b>Report issued on:</b>                           | 22/07/2020 |
| <b>Samples Analysed:</b>    | 3 soil samples |                                                    |            |

**Signed:** Karolina Marek

Karolina Marek  
PL Head of 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.



Analytical Report Number: 20-19767

Project / Site name: Bowes St.

|                                      |       |                    |                      |               |               |               |  |  |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|---------------|--|--|
| Lab Sample Number                    |       |                    |                      | 1564595       | 1564596       | 1564597       |  |  |
| Sample Reference                     |       |                    |                      | TS101         | TS102         | TS103         |  |  |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Depth (m)                            |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Date Sampled                         |       |                    |                      | 15/07/2020    | 15/07/2020    | 15/07/2020    |  |  |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Analytical Parameter (Soil Analysis) |       |                    |                      |               |               |               |  |  |
|                                      | Units | Limit of detection | Accreditation Status |               |               |               |  |  |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         | < 0.1         |  |  |
| Moisture Content                     | %     | N/A                | NONE                 | 10            | 13            | 14            |  |  |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.50          | 0.50          | 0.50          |  |  |

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

#### General Inorganics

|                                                                  |          |         |        |      |      |      |  |  |
|------------------------------------------------------------------|----------|---------|--------|------|------|------|--|--|
| pH - Automated                                                   | pH Units | N/A     | MCERTS | 8.0  | 6.7  | 7.1  |  |  |
| Total Cyanide                                                    | mg/kg    | 1       | MCERTS | 3    | 1    | 2    |  |  |
| Total Sulphate as SO <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 1900 | 1800 | 1900 |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.20 | 0.19 | 0.22 |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 410  | 380  | 440  |  |  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/l     | 1.25    | MCERTS | 204  | 189  | 222  |  |  |
| Sulphide                                                         | mg/kg    | 1       | MCERTS | 1.1  | 7.3  | 2.9  |  |  |
| Total Sulphur                                                    | mg/kg    | 50      | MCERTS | 1100 | 1200 | 1200 |  |  |

#### Total Phenols

|                            |       |   |        |       |       |       |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|

#### Speciated PAHs

|                        |       |      |        |        |        |        |  |  |
|------------------------|-------|------|--------|--------|--------|--------|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | 0.29   | 0.23   | 0.95   |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.65   |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 2.3    | 1.8    | 5.2    |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.39   | 0.47   | 1.1    |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 3.3    | 4.1    | 7.0    |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 3.2    | 3.8    | 6.4    |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 2.0    | 2.4    | 4.8    |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | 1.4    | 2.0    | 2.8    |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 1.9    | 2.4    | 3.7    |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.94   | 0.95   | 1.5    |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 1.7    | 1.8    | 3.5    |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.71   | 0.85   | 1.4    |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.37   |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.83   | 0.94   | 1.5    |  |  |

#### Total PAH

|                             |       |     |        |      |      |      |  |  |
|-----------------------------|-------|-----|--------|------|------|------|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 19.0 | 21.7 | 40.9 |  |  |
|-----------------------------|-------|-----|--------|------|------|------|--|--|

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |  |  |
|-----------------------------------|-------|-----|--------|-------|-------|-------|--|--|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 28    | 29    | 39    |  |  |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | 0.6   | 0.6   | 0.7   |  |  |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 31    | 27    | 29    |  |  |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 66    | 68    | 75    |  |  |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 470   | 260   | 350   |  |  |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 0.7   | 0.7   | 0.8   |  |  |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 24    | 22    | 22    |  |  |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | 2.2   | 2.1   | 2.1   |  |  |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 150   | 150   | 170   |  |  |

Analytical Report Number: 20-19767

Project / Site name: Bowes St.

|                                         |  |  |  |               |                       |                         |  |  |
|-----------------------------------------|--|--|--|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                       |  |  |  | 1564595       | 1564596               | 1564597                 |  |  |
| Sample Reference                        |  |  |  | TS101         | TS102                 | TS103                   |  |  |
| Sample Number                           |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Depth (m)                               |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Date Sampled                            |  |  |  | 15/07/2020    | 15/07/2020            | 15/07/2020              |  |  |
| Time Taken                              |  |  |  | None Supplied | None Supplied         | None Supplied           |  |  |
| Analytical Parameter<br>(Soil Analysis) |  |  |  | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

**Petroleum Hydrocarbons**

|                           |       |     |        |       |       |       |  |  |
|---------------------------|-------|-----|--------|-------|-------|-------|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 8.3   | 8.9   | 24    |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 25    | 42    | 74    |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | < 10  | < 10  | < 10  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 36    | 53    | 99    |  |  |



**Analytical Report Number : 20-19767**

**Project / Site name: Bowes 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1564595           | TS101            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |
| 1564596           | TS102            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |
| 1564597           | TS103            | None Supplied | None Supplied | Brown loam and sand with gravel and vegetation. |

**Analytical Report Number : 20-19767**

**Project / Site name: Bowes 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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                 | L080-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                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Sulphate, water soluble, in soil (1hr extraction)  | Sulphate, water soluble, in soil (1hr extraction)                                                                                                                      | In-house method                                                                                                 | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | MCERTS               |

**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.**



**Rob Horseman**

e3p  
Office 4  
Heliport Business Park  
Eccles  
Liverpool Road  
Manchester  
M30 7RU

**t:** 0161 707 9612

**e:** Rhorseman@e3p.co.uk

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404

**f:** 01923 237404

**e:** reception@i2analytical.com

## **Analytical Report Number : 20-84975**

**Project / Site name:** Bow St

**Samples received on:** 04/02/2020

**Your job number:** 11813

**Samples instructed on:** 04/02/2020

**Your order number:**

**Analysis completed by:** 11/02/2020

**Report Issue Number:** 1

**Report issued on:** 11/02/2020

**Samples Analysed:** 3 soil samples

**Signed:**

Karolina Marek  
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 20-84975-1 Bow St 11813

Analytical Report Number: 20-84975

Project / Site name: Bow St

|                                      |       |                    |                      |               |               |               |  |  |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|---------------|--|--|
| Lab Sample Number                    |       |                    |                      | 1432702       | 1432703       | 1432704       |  |  |
| Sample Reference                     |       |                    |                      | TS101         | TS102         | TS103         |  |  |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Depth (m)                            |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Date Sampled                         |       |                    |                      | 03/02/2020    | 03/02/2020    | 03/02/2020    |  |  |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied | None Supplied |  |  |
| Analytical Parameter (Soil Analysis) |       |                    |                      |               |               |               |  |  |
|                                      | Units | Limit of detection | Accreditation Status |               |               |               |  |  |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         | < 0.1         |  |  |
| Moisture Content                     | %     | N/A                | NONE                 | 10            | 11            | 14            |  |  |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.48          | 0.54          | 0.54          |  |  |

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

#### General Inorganics

|                                                                         |          |         |        |       |       |       |  |  |
|-------------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|--|--|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.7   | 7.8   | 7.9   |  |  |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   | < 1   | < 1   |  |  |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 400   | 490   | 540   |  |  |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 63    | 59    | 120   |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.032 | 0.029 | 0.061 |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 31.6  | 29.4  | 60.5  |  |  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 | 1.0   | < 1.0 |  |  |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 320   | 340   | 390   |  |  |

#### Total Phenols

|                            |       |   |        |       |       |       |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
|----------------------------|-------|---|--------|-------|-------|-------|--|--|

#### Speciated PAHs

|                        |       |      |        |        |        |        |  |  |
|------------------------|-------|------|--------|--------|--------|--------|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 1.1    |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.25   |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | < 0.05 | 0.31   | 0.97   |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | < 0.05 | 0.31   | 0.95   |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.65   |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.63   |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.66   |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.28   |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.58   |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.27   |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | 0.35   |  |  |

#### Total PAH

|                             |       |     |        |        |        |      |  |  |
|-----------------------------|-------|-----|--------|--------|--------|------|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | < 0.80 | < 0.80 | 6.66 |  |  |
|-----------------------------|-------|-----|--------|--------|--------|------|--|--|

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |  |  |
|-----------------------------------|-------|-----|--------|-------|-------|-------|--|--|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 6.3   | 6.2   | 6.2   |  |  |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | < 0.2 |  |  |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 |  |  |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 17    | 18    | 16    |  |  |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 16    | 16    | 17    |  |  |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 30    | 29    | 33    |  |  |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 |  |  |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 13    | 13    | 13    |  |  |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | < 1.0 |  |  |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 57    | 55    | 72    |  |  |

Analytical Report Number: 20-84975

Project / Site name: Bow St

|                                         |               |                       |                         |  |  |
|-----------------------------------------|---------------|-----------------------|-------------------------|--|--|
| Lab Sample Number                       | 1432702       | 1432703               | 1432704                 |  |  |
| Sample Reference                        | TS101         | TS102                 | TS103                   |  |  |
| Sample Number                           | None Supplied | None Supplied         | None Supplied           |  |  |
| Depth (m)                               | None Supplied | None Supplied         | None Supplied           |  |  |
| Date Sampled                            | 03/02/2020    | 03/02/2020            | 03/02/2020              |  |  |
| Time Taken                              | None Supplied | None Supplied         | None Supplied           |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units         | Limit of<br>detection | Accreditation<br>Status |  |  |

**Petroleum Hydrocarbons**

|                           |       |     |        |       |       |       |  |  |
|---------------------------|-------|-----|--------|-------|-------|-------|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | 9.3   |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 6.7   | < 1.0 | 18    |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 50    | < 1.0 | 21    |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | 24    | < 10  | < 10  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 83    | < 10  | 50    |  |  |



**Analytical Report Number : 20-84975**

**Project / Site name: Bow 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1432702           | TS101            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1432703           | TS102            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1432704           | TS103            | None Supplied | None Supplied | Brown clay and sand with gravel.                |

**Analytical Report Number : 20-84975**

**Project / Site name: Bow 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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                 | L080-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                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | MCERTS               |

**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.**



**Rob Horseman**

e3p  
Office 4  
Heliport Business Park  
Eccles  
Liverpool Road  
Manchester  
M30 7RU

**t:** 0161 707 9612

**e:** Rhorseman@e3p.co.uk

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404

**f:** 01923 237404

**e:** reception@i2analytical.com

## **Analytical Report Number : 19-55101**

**Project / Site name:** Bowes Street

**Samples received on:** 16/08/2019

**Your job number:**

**Samples instructed on:** 16/08/2019

**Your order number:**

**Analysis completed by:** 23/08/2019

**Report Issue Number:** 1

**Report issued on:** 23/08/2019

**Samples Analysed:** 6 soil samples

**Signed:**

Karolina Marek  
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.



Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                    |       |                    |                      | 1293738       | 1293739       | 1293740       | 1293741       | 1293742       |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                     |       |                    |                      | TS101         | TS102         | TS103         | SS101         | SS102         |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                            |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Date Sampled                         |       |                    |                      | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    | 15/08/2019    |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter (Soil Analysis) | Units | Limit of detection | Accreditation Status |               |               |               |               |               |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         | < 0.1         | < 0.1         | < 0.1         |
| Moisture Content                     | %     | N/A                | NONE                 | 17            | 18            | 18            | 19            | 17            |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.48          | 0.49          | 0.50          | 0.40          | 0.52          |

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

#### General Inorganics

|                                                                         |          |         |        |       |       |       |       |       |
|-------------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|-------|-------|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.7   | 7.7   | 7.7   | 7.8   | 7.7   |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   | < 1   | < 1   | < 1   | < 1   |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 530   | 460   | 620   | 510   | 500   |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 100   | 120   | 99    | 120   | 110   |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.051 | 0.061 | 0.050 | 0.059 | 0.053 |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 50.9  | 60.9  | 49.7  | 58.5  | 53.2  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 350   | 360   | 380   | 360   | 380   |

#### Total Phenols

|                            |       |   |        |       |       |       |       |       |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
|----------------------------|-------|---|--------|-------|-------|-------|-------|-------|

#### Speciated PAHs

|                        |       |      |        |        |        |        |        |        |
|------------------------|-------|------|--------|--------|--------|--------|--------|--------|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.63   | < 0.05 |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | 0.34   | < 0.05 |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 1.3    | 1.0    | 0.75   | 2.5    | 0.83   |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.28   | 0.17   | 0.17   | 0.43   | 0.18   |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 2.2    | 2.0    | 1.4    | 2.6    | 1.6    |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 2.0    | 1.9    | 1.4    | 2.3    | 1.4    |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 1.0    | 1.1    | 0.73   | 1.2    | 0.81   |
| Chrysene               | mg/kg | 0.05 | MCERTS | 0.98   | 0.84   | 0.73   | 1.2    | 0.73   |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 1.3    | 1.1    | 0.89   | 1.3    | 0.99   |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.40   | 0.44   | 0.25   | 0.51   | 0.22   |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 0.98   | 0.84   | 0.68   | 1.0    | 0.70   |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.44   | 0.43   | 0.34   | 0.48   | 0.34   |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.59   | 0.52   | 0.40   | 0.70   | 0.44   |

#### Total PAH

|                             |       |     |        |      |      |      |      |      |
|-----------------------------|-------|-----|--------|------|------|------|------|------|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 11.4 | 10.4 | 7.75 | 15.2 | 8.24 |
|-----------------------------|-------|-----|--------|------|------|------|------|------|

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

|                                         |               |                       |                         |               |               |
|-----------------------------------------|---------------|-----------------------|-------------------------|---------------|---------------|
| Lab Sample Number                       | 1293738       | 1293739               | 1293740                 | 1293741       | 1293742       |
| Sample Reference                        | TS101         | TS102                 | TS103                   | SS101         | SS102         |
| Sample Number                           | None Supplied | None Supplied         | None Supplied           | None Supplied | None Supplied |
| Depth (m)                               | None Supplied | None Supplied         | None Supplied           | None Supplied | None Supplied |
| Date Sampled                            | 15/08/2019    | 15/08/2019            | 15/08/2019              | 15/08/2019    | 15/08/2019    |
| 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 |               |               |

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |       |       |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 16    | 16    | 16    | 14    | 17    |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | 0.5   | 0.5   | 0.6   | 0.4   | 0.6   |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 | < 4.0 | < 4.0 |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 22    | 17    | 16    | 17    | 17    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 61    | 54    | 62    | 58    | 63    |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 85    | 76    | 85    | 73    | 80    |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 0.3   | 0.6   | < 0.3 | 0.7   | < 0.3 |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 17    | 17    | 18    | 15    | 18    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | 1.8   | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 88    | 73    | 100   | 86    | 85    |

#### Petroleum Hydrocarbons

|                    |       |     |        |       |       |       |       |       |
|--------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| TPH (C5 - C6)      | mg/kg | 1   | NONE   | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH (C6 - C8)      | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10)     | mg/kg | 0.1 | MCERTS | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12)    | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16)    | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | < 4.0 | 5.7   | < 4.0 |
| TPH (C16 - C21)    | mg/kg | 1   | MCERTS | 12    | 16    | 11    | 19    | 6.8   |
| TPH (C21 - C35)    | mg/kg | 1   | MCERTS | 49    | 29    | 36    | 43    | 10    |
| TPH (C35 - C40)    | mg/kg | 10  | MCERTS | < 10  | < 10  | < 10  | < 10  | < 10  |
| TPH Total C5 - C40 | mg/kg | 10  | MCERTS | 63    | 47    | 49    | 70    | 19    |

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                       |       |                       |                         | 1293743       |  |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|--|--|--|--|
| Sample Reference                        |       |                       |                         | SS103         |  |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied |  |  |  |  |
| Depth (m)                               |       |                       |                         | None Supplied |  |  |  |  |
| Date Sampled                            |       |                       |                         | 15/08/2019    |  |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied |  |  |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |  |  |  |  |
| Stone Content                           | %     | 0.1                   | NONE                    | < 0.1         |  |  |  |  |
| Moisture Content                        | %     | N/A                   | NONE                    | 18            |  |  |  |  |
| Total mass of sample received           | kg    | 0.001                 | NONE                    | 0.52          |  |  |  |  |

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

#### General Inorganics

|                                                                         |          |         |        |       |  |  |  |  |
|-------------------------------------------------------------------------|----------|---------|--------|-------|--|--|--|--|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 7.8   |  |  |  |  |
| Total Cyanide                                                           | mg/kg    | 1       | MCERTS | < 1   |  |  |  |  |
| Total Sulphate as SO <sub>4</sub>                                       | mg/kg    | 50      | MCERTS | 510   |  |  |  |  |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 120   |  |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.060 |  |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 59.8  |  |  |  |  |
| Sulphide                                                                | mg/kg    | 1       | MCERTS | < 1.0 |  |  |  |  |
| Total Sulphur                                                           | mg/kg    | 50      | MCERTS | 410   |  |  |  |  |

#### Total Phenols

|                            |       |   |        |       |  |  |  |  |
|----------------------------|-------|---|--------|-------|--|--|--|--|
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |  |  |  |  |
|----------------------------|-------|---|--------|-------|--|--|--|--|

#### Speciated PAHs

|                        |       |      |        |        |  |  |  |  |
|------------------------|-------|------|--------|--------|--|--|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 0.89   |  |  |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | 0.22   |  |  |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 1.7    |  |  |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 1.6    |  |  |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 0.79   |  |  |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | 0.77   |  |  |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.87   |  |  |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 0.41   |  |  |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 0.72   |  |  |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 0.35   |  |  |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | < 0.05 |  |  |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 0.48   |  |  |  |  |

#### Total PAH

|                             |       |     |        |      |  |  |  |  |
|-----------------------------|-------|-----|--------|------|--|--|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 8.76 |  |  |  |  |
|-----------------------------|-------|-----|--------|------|--|--|--|--|

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

| Lab Sample Number                       |       |                       |                         | 1293743       |  |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|--|--|--|--|
| Sample Reference                        |       |                       |                         | SS103         |  |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied |  |  |  |  |
| Depth (m)                               |       |                       |                         | None Supplied |  |  |  |  |
| Date Sampled                            |       |                       |                         | 15/08/2019    |  |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied |  |  |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |  |  |  |  |
| <b>Heavy Metals / Metalloids</b>        |       |                       |                         |               |  |  |  |  |
| Arsenic (aqua regia extractable)        | mg/kg | 1                     | MCERTS                  | 16            |  |  |  |  |
| Cadmium (aqua regia extractable)        | mg/kg | 0.2                   | MCERTS                  | 0.6           |  |  |  |  |
| Chromium (hexavalent)                   | mg/kg | 4                     | MCERTS                  | < 4.0         |  |  |  |  |
| Chromium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | 20            |  |  |  |  |
| Copper (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 70            |  |  |  |  |
| Lead (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 90            |  |  |  |  |
| Mercury (aqua regia extractable)        | mg/kg | 0.3                   | MCERTS                  | < 0.3         |  |  |  |  |
| Nickel (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 20            |  |  |  |  |
| Selenium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | < 1.0         |  |  |  |  |
| Zinc (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 93            |  |  |  |  |

#### Petroleum Hydrocarbons

|                           |       |     |        |       |  |  |  |  |
|---------------------------|-------|-----|--------|-------|--|--|--|--|
| TPH (C5 - C6)             | mg/kg | 1   | NONE   | < 1.0 |  |  |  |  |
| TPH (C6 - C8)             | mg/kg | 0.1 | MCERTS | < 0.1 |  |  |  |  |
| TPH (C8 - C10)            | mg/kg | 0.1 | MCERTS | < 0.1 |  |  |  |  |
| TPH (C10 - C12)           | mg/kg | 2   | MCERTS | < 2.0 |  |  |  |  |
| TPH (C12 - C16)           | mg/kg | 4   | MCERTS | < 4.0 |  |  |  |  |
| TPH (C16 - C21)           | mg/kg | 1   | MCERTS | 5.8   |  |  |  |  |
| TPH (C21 - C35)           | mg/kg | 1   | MCERTS | 25    |  |  |  |  |
| TPH (C35 - C40)           | mg/kg | 10  | MCERTS | < 10  |  |  |  |  |
| <b>TPH Total C5 - C40</b> | mg/kg | 10  | MCERTS | 33    |  |  |  |  |

**Analytical Report Number : 19-55101**

**Project / Site name: Bowes Street**

\* 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 1293738           | TS101            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1293739           | TS102            | None Supplied | None Supplied | Brown clay and loam with gravel and vegetation. |
| 1293740           | TS103            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293741           | SS101            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293742           | SS102            | None Supplied | None Supplied | Brown clay and sand with gravel.                |
| 1293743           | SS103            | None Supplied | None Supplied | Brown loam and clay with vegetation and gravel  |

**Analytical Report Number : 19-55101**

**Project / Site name: Bowes Street**

**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            |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.                  | In-house method                                                                                                                   | L080-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.                                                                                                                          | In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests                                                  | L019-UK/PL    | W                  | NONE                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)                   | L080-PL       | W                  | MCERTS               |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L099-PL       | D                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES. | L038-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                                   | L010-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)                   | L080-PL       | W                  | MCERTS               |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil                      | L038-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                                            | L076-PL       | D                  | MCERTS               |

**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 300C.**