



**BROWNFIELD  
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

## THE DEAN TRUST

Dean Trust Academy, Ardwick, Manchester

Geo-Environmental Assessment Report

NS/M4246/8662

July 2019

## EXECUTIVE SUMMARY

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Location and Brief Site Description</b> | <p>The site is located off Stockport Road, Ardwick, M13 0LF. It is situated approximately 2.7 Km south-east of Manchester City Centre, centred on National Grid Reference 386240, 396308.</p> <p>The site is currently an operational secondary school built opened in 2015 and it is proposed to comprise a new two storey extension and undercroft car parking, a single storey dining extension, and a removal of earth bunds for construction of new surface level car park and hard play areas.</p>                                                                                                                                                                                                                 |
| <b>Site History</b>                        | <p>In summary, the map evidence indicates that the site consisted of open fields with ponds in the north, and a small row of residential terraces in the south. By 1890 these ponds had likely been backfilled and the whole site had been developed into residences and a depot. Industrial works replaced the depot by 1922, with various industries occupying the site then until at least 2010. By 2014 the last of the works had been demolished and replaced with the education facility that continues to occupy the site today.</p>                                                                                                                                                                              |
| <b>Geology</b>                             | <p>The site is indicated to be underlain by glacial Till. This stratum typically comprises firm to stiff boulder clay with sand and gravel. The majority of the solid geology underlying the superficial deposits is indicated to be part of the Chester Sandstone Formation and the northern part of the site is indicated to be underlain by the Manchester Marls Formation.</p>                                                                                                                                                                                                                                                                                                                                       |
| <b>Mining</b>                              | <p>The site lies in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site could be affected by past or current coal mining. No issues associated with mining were recorded.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hydrogeology and Hydrology</b>          | <p>The superficial deposits are classified as a Secondary Aquifer (Undifferentiated). The bedrock underlying the site is mostly classified as a Principal Aquifer. The northernmost part of the site underlain by the Manchester Marls Formation is classified as a Secondary (B) Aquifer. The site is not indicated to lie within 500m of a Source Protection Zone (SPZ).</p> <p>The nearest watercourse is the River Medlock located 1409m to the north-west of the site.</p> <p>There are no surface water features within 250m of the site.</p>                                                                                                                                                                      |
| <b>Environmental</b>                       | <p>Potential onsite sources of contamination identified within the desk study assessment include made ground associated with the previous development of the site, ground gas from potentially infilled ponds, and former depots, brewery, works, laundry and electricity substation. The risk to human health from onsite sources of contamination was moderate with a low to moderate risk of ground gas. Offsite sources of contamination include warehouses, garages, works, mills, and electricity substations. The risk to human health from offsite sources of contamination was considered to be low.</p>                                                                                                        |
| <b>Ground Conditions</b>                   | <p>Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 1.00m and &gt;3.90m bgl. Made ground within a large bund in the northeast of the site was noted to comprise brown slightly gravelly slightly sandy clay with brick, clinker, concrete, slate and glass to depths of greater than 3.90m.</p> <p>The natural strata underlying the site was encountered from depths of 1.00m to 2.90m bgl and was generally firm to very stiff clay with varying amounts of silt, sand and gravel as minor constituents.</p>                                                                                                                          |
| <b>Soil Contamination</b>                  | <p>Widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location.</p> <p>Chrysotile asbestos fibres have been detected in five samples at trace levels (&lt;0.001%). Chrysotile and amosite fibres were recorded in a sample taken from the bund in the north-east of the site at 0.002%.</p>                                                                                                                                                                                   |
| <b>Groundwater Contamination</b>           | <p>Whilst minor heavy metal and PAH contamination has been identified within the groundwater beneath the site from previous investigations, based on the assessments and updated CSM, BSL believe the overall risk to controlled waters is low and no further action is required.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Ground Gas</b>                          | <p>Deep made ground was recorded across the site during the works, however, evidence of degradable / putrescible material was localised to WS07 understood to be in proximity to a historic infilled pond. This location is located at greatest distance from the proposed ground floor extension in the north of the site. A round of gas monitoring to confirm the risk did not reveal elevated levels of carbon dioxide or methane and therefore gas protection measures are not required at the site. However, this will need confirmation with the Local Authority as it may be prudent to include for gas protection measures within the extension in line with those in place across the existing structures.</p> |
| <b>Outline Remedial Strategy</b>           | <p>Should new areas of soft landscaping be introduced in the proposed works then remediation measures such as an environmental cover system will be required to mitigate the risk.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | <p>A round of gas monitoring to confirm the risk did not reveal elevated methane or carbon dioxide levels. Based on this, our results indicate that ground gas precautions could potentially be avoided. However, further monitoring and confirmation with the local authority is recommended, as this opposes the previously identified recommendations for precautions in line with Characteristic Situation 2.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Waste</b>                       | <p>Sampling undertaken from the bunds reveals the material would be classified as non-hazardous waste suitable for disposal at a stable non-reactive hazardous landfill.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Foundations and Floor Slabs</b> | <p>It is considered that the most suitable foundations for the two-storey extension with undercroft car parking and single storey extension is piles or vibro stone columns (VSCs) due to the presence of made ground at depths of 1.80mbgl to in excess of 3.00mbgl.</p> <p>Given the depth to bedrock of 17m, preliminary calculations were undertaken for a single 225mm wide square concrete pile approximately 10.00m in length. Allowable loads of approximately 190-200kN should be assumed for a friction pile in the glacial till.</p> <p>The vibro stone columns would need to penetrate through the made ground and underlying any soft cohesive natural strata, down to a competent horizon. Following ground improvement, strip foundations could be used bearing onto the improved ground over the VSCs. Typically, allowable bearing capacities of the order of 150kN/m<sup>2</sup> – 200kN/m<sup>2</sup> can be achieved, keeping total and differential settlements within tolerable limits, although this should be discussed with specialist VSC contractors.</p> <p>Given the thickness of made ground present, and due to the piled/VSC foundation solution, suspended or pre-cast concrete floor slabs could be utilised.</p> |
| <b>Highways</b>                    | <p>Lab remoulded CBR results revealed CBR values of 3.9 and 11.1% in the large bund in the north-east of the site, and 10% in the small bund in the centre of the site, unless proven otherwise by in-situ testing at formation level by a specialist geotechnical engineer. Based on ground conditions encountered across the remainder of the site Equilibrium CBR values are likely to be 2% within the made ground.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Drainage</b>                    | <p>The use of soakaways within the natural ground is not feasible at the site due to the presence of relatively impermeable strata underlying the site.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Further Work</b>                | <ul style="list-style-type: none"> <li>• Supplementary Intrusive site investigations comprising: Window sampling to confirm depth to bearing stratum in the north of the site associated with the single storey dining extension.</li> <li>• Detailed foundation design.</li> <li>• Design of Remedial Strategy and confirmation with the Local Authority (if required).</li> <li>• Asbestos Management Plan for construction phase.</li> <li>• Implementation of the Remedial Strategy and verification of the remedial works (if required).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

This executive summary should be read in conjunction with the full report, reference NS/M4246/8662, and not as a standalone document.

## PROJECT QUALITY CONTROL DATA SHEET

|                       |                                         |            |               |
|-----------------------|-----------------------------------------|------------|---------------|
| <b>Site Name:</b>     | Dean Trust Academy, Ardwick, Manchester |            |               |
| <b>Document Name:</b> | Geo-Environmental Assessment Report     |            |               |
| <b>Reference:</b>     | NS/M4246/8662                           |            |               |
| <b>Status:</b>        | -                                       | 29/07/2019 | Final report. |
|                       |                                         |            |               |
|                       |                                         |            |               |

| <b>Issued By:</b>                                                                                                                                                    | <b>Client:</b>                                                | <b>Engineer:</b>                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Brownfield Solutions Ltd<br>William Smith House<br>173 – 183 Witton Street<br>Northwich<br>Cheshire<br>CW9 5LP<br><br>Tel: 01606 334 844<br>brownfield-solutions.com | The Dean Trust<br>Cecil Avenue<br>Sale<br>Cheshire<br>M33 5BP | Marston & Grundy LLP Consulting<br>Engineers<br>Priory House<br>Ellesmere Avenue<br>Marple<br>Stockport<br>Cheshire<br>SK6 7AN |
|                                                                                                                                                                      | Contact: Mr N David                                           | Contact: Mr A James                                                                                                            |

Written by:



Nicola Swallow  
BSc (Hons) MSc MEnvSc  
Project Engineer

Checked by:



Dan Gates  
MGeoscience FGS  
Senior Project Engineer

Approved by:



A J Stokoe  
BSc (Hons) CSci MEnvSc FGS  
Senior Project Engineer

## CONTENTS

|            |                                                           |           |
|------------|-----------------------------------------------------------|-----------|
| <b>1.0</b> | <b>INTRODUCTION .....</b>                                 | <b>7</b>  |
| 1.1        | CONTEXT .....                                             | 7         |
| 1.2        | OBJECTIVES AND SCOPE.....                                 | 7         |
| 1.3        | PROPOSED DEVELOPMENT .....                                | 7         |
| 1.4        | PREVIOUS REPORTS .....                                    | 7         |
| 1.5        | LIMITATIONS .....                                         | 8         |
| <b>2.0</b> | <b>PREVIOUS REPORTS.....</b>                              | <b>10</b> |
| 2.1        | OVERVIEW .....                                            | 10        |
| 2.2        | ATKINS PHASE 1: GEO-ENVIRONMENTAL ASSESSMENT (2015) ..... | 10        |
| 2.3        | ATKINS GROUND INVESTIGATION REPORT (2014).....            | 11        |
| 2.4        | ATKINS CONTAMINATED LAND RISK ASSESSMENT (2015) .....     | 11        |
| 2.5        | SOLMEK PHASE 2 SITE INVESTIGATION REPORT (2016).....      | 13        |
| 2.6        | ATKINS REMEDIATION STRATEGY (2015) .....                  | 13        |
| 2.7        | ESG REMEDIATION VERIFICATION REPORT (2016).....           | 14        |
| 2.8        | ESG MATERIALS MANAGEMENT PLAN (2016).....                 | 14        |
| 2.9        | ZETICA UXO DESK STUDY (2015).....                         | 15        |
| 2.10       | BSL PHASE I DESK STUDY ASSESSMENT (2019).....             | 15        |
| <b>3.0</b> | <b>METHOD OF INVESTIGATION .....</b>                      | <b>17</b> |
| 3.1        | OBJECTIVES.....                                           | 17        |
| 3.2        | SITE WORKS.....                                           | 17        |
| 3.3        | SAMPLING .....                                            | 17        |
| 3.4        | LABORATORY TESTING.....                                   | 18        |
| 3.5        | MONITORING .....                                          | 18        |
| 3.6        | REINSTATEMENT .....                                       | 19        |
| <b>4.0</b> | <b>GROUND CONDITIONS .....</b>                            | <b>20</b> |
| 4.1        | MADE GROUND.....                                          | 20        |
| 4.2        | NATURAL SUPERFICIAL STRATA .....                          | 20        |
| 4.3        | SOLID GEOLOGY.....                                        | 20        |
| 4.4        | GROUNDWATER.....                                          | 20        |
| 4.5        | OBSERVATIONS .....                                        | 21        |
| <b>5.0</b> | <b>TEST RESULTS .....</b>                                 | <b>22</b> |
| 5.1        | CHEMICAL TEST RESULTS-SOILS .....                         | 22        |
| 5.2        | WASTE ACCEPTANCE CRITERIA (WAC) RESULTS .....             | 24        |
| 5.3        | GEOTECHNICAL TESTING.....                                 | 24        |
| 5.4        | AGGRESSIVE GROUND CONDITIONS .....                        | 25        |
| 7.1        | CBR RESULTS.....                                          | 25        |
| <b>6.0</b> | <b>GEOTECHNICAL ASSESSMENT.....</b>                       | <b>26</b> |
| 6.1        | GROUND MODEL SUMMARY .....                                | 26        |
| 6.2        | SOIL PARAMETERS.....                                      | 26        |
| 6.3        | FOUNDATIONS.....                                          | 27        |
| 6.4        | BUILDING NEAR TREES .....                                 | 29        |
| 6.5        | FLOOR SLABS.....                                          | 29        |
| 6.6        | SITE PREPARATION AND CONSTRUCTION.....                    | 30        |
| 6.7        | CONCRETE CLASSIFICATION .....                             | 30        |
| 6.8        | HIGHWAYS.....                                             | 30        |
| 6.9        | SOAKAWAYS.....                                            | 31        |
| <b>7.0</b> | <b>ENVIRONMENTAL ASSESSMENT .....</b>                     | <b>32</b> |
| 7.1        | CONTAMINATION .....                                       | 32        |

## CONTENTS

|            |                                   |           |
|------------|-----------------------------------|-----------|
| 7.2        | QUALITATIVE RISK ASSESSMENT ..... | 33        |
| 7.3        | SUMMARY OF IDENTIFIED RISKS ..... | 37        |
| 7.4        | REMEDIAL MEASURES .....           | 37        |
| 7.5        | ASBESTOS .....                    | 38        |
| 7.6        | HEALTH AND SAFETY ISSUES .....    | 39        |
| 7.7        | WASTE.....                        | 40        |
| <b>8.0</b> | <b>CONCLUSIONS .....</b>          | <b>43</b> |
| 8.1        | SUMMARY .....                     | 43        |
| 8.2        | FURTHER WORK .....                | 44        |
| <b>9.0</b> | <b>REFERENCES .....</b>           | <b>45</b> |

## DRAWINGS

| Drawing Number            | Rev | Title                            |
|---------------------------|-----|----------------------------------|
| M4246/01                  | -   | Site Location Plan               |
| M4246/02                  | -   | Exploratory Hole Location Plan   |
| Ellis Williams Architects | -   | Proposed Development Layout Plan |

## APPENDICES

| Appendix   | Title                        |
|------------|------------------------------|
| Appendix A | BSL Methodology and Guidance |
| Appendix B | Exploratory Hole Logs        |
| Appendix C | Chemical Testing Results     |
| Appendix D | Geotechnical Testing Results |
| Appendix E | Monitoring Results           |
| Appendix F | Waste Assessment Report      |

## 1.0 INTRODUCTION

### 1.1 Context

This report describes a Geo-Environmental Assessment carried out by Brownfield Solutions Limited (BSL) for The Dean Trust as instructed by Marston and Grundy LLP Consulting on a site off Stockport Road, Ardwick and has been completed in general accordance with the following guidance:

- CLR11 Model Procedures for the Management of Land Contamination.
- BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
- BS5930: 2015 Code of Practice for Ground Investigations.
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design. General rules plus UK National Annex.
- BS EN 1997-2:2007 Eurocode 7 Geotechnical design. Ground investigation and testing plus UK National Annex.

### 1.2 Objectives and Scope

The objectives of this Geo-Environmental Assessment were to determine the environmental setting and ground conditions of the site, highlighting potential risks and areas of concern that may govern the development under the current planning regime. This assessment is also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

The scope of works comprises a Desk Study and site walk-over, with a review of the site, surroundings, historical uses and environmental setting in order to develop a preliminary Conceptual Site Model (CSM). A summary of previous investigations carried out at the site has also been undertaken.

Following the Desk Study, an exploratory intrusive investigation was undertaken to confirm the findings of the preliminary CSM and risk assessment and meet any objectives that had not been satisfied. The exploratory investigation was undertaken using window sampling, gas and groundwater monitoring, laboratory chemical and geotechnical testing, with reporting on the findings.

### 1.3 Proposed Development

The proposed development is indicated to comprise a new two storey extension and undercroft car parking, a single storey dining extension, and a removal of earth bunds for construction of new surface level car park and hard surfaced play areas as shown on the Proposed Development Plan by Ellis Williams Architects provided to BSL by the client, which is presented in the drawings section to the rear of this report.

### 1.4 Previous Reports

The following reports have been produced for the site and should be read in conjunction with this assessment:

|                              |                                                                                                                                                                                                                                                                                           |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1 Desk Study           | <ul style="list-style-type: none"><li>• Brownfield Solutions Ltd Report (GP/M4246/8660) issued July 2019.</li><li>• Atkins Dean Trust Ardwick High School (Revised Scheme) Phase 1: Geo-Environmental Assessment (5130327/DTAHS-RS/002) issued August 2015.</li></ul>                     |
| Phase 2 / Site Investigation | <ul style="list-style-type: none"><li>• Atkins Manchester Schools Basic Needs Programme: Daisy Mill Ground Investigation Report (GTG20140378/5130327/19/Rev 0) issued December 2014.</li><li>• Geotechnics Limited Factual Report on Ground Investigation issued December 2014.</li></ul> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | <ul style="list-style-type: none"> <li>Atkins Dean Trust Ardwick High School (Revised Scheme) Ground Investigation Report – Contaminated Land Risk Assessment (5130327/09/CLRA/Rev 0) issued August 2015.</li> <li>Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015.</li> <li>ESG Factual Report (LO/R5141/001/NB) issued October 2015.</li> <li>ESG Detailed Quantitative Risk Assessment Report (R5141b) issued October 2015.</li> <li>Solmek Phase 2 Site Investigation Report (S160937/SI) issued November 2016.</li> </ul> |
| Remediation / Validation | <ul style="list-style-type: none"> <li>Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015.</li> <li>ESG Remediation Strategy (R5141/2) issued October 2015.</li> <li>ESG Remediation Verification Report (R5141/3) issued December 2016.</li> </ul>                                                                                                                                                                                                                                                                               |
| Other                    | <ul style="list-style-type: none"> <li>ESG Materials Management Plan Dean Trust Ardwick 2016 (R5141/MMP) issued December 2015.</li> <li>Zetica Site Safe UXO Desk Study (P5220-15-R1-A) issued April 2015.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                    |

## 1.5 Limitations

This assessment has been prepared in accordance with the relevant current legislative framework, guidance and risk assessment methodology as outlined in Appendix A. BSL is not liable for any subsequent changes in the guidance and legislation.

The findings and opinions conveyed via this report are based on information obtained from a number of sources as detailed within this report, BSL have assumed this information is correct and reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore have not been considered by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, The Dean Trust. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care.

The investigation carried out on the site has been conducted to provide the best information on the ground conditions within site access and budgetary constraints. The inherent variation of ground conditions allows only for definition of the actual conditions at the locations and depths of exploratory locations at the time of the investigation. Different ground conditions may exist that have not been identified within this investigation.

The recommendations in this report assume that ground levels will remain as existing, unless stated otherwise within the report. If there is to be any re-profiling (e.g. to create development platforms or flood defences) then the recommendations may not apply.

The groundwater results described are only representative of the dates on which they were recorded, and levels may vary seasonally (e.g. due to changes in weather).

This assessment has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Although every effort has been made to position exploratory holes in the least sensitive areas of the site, exploratory hole positions were located approximately as part of this investigation and no guarantee can be given as to their accuracy. Consideration should be given to the possibility that exploratory holes excavated as part of this investigation and indeed any previous ground investigation work by others may be encountered beneath or within the influence of individual foundations. BSL cannot be held responsible for structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

Where it has not been possible to reasonably use an EC7 compliant investigation technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

The chemical testing carried out for this report was not scoped to comply with the requirements of the water supply company and further work may be required, unless otherwise stated.

Notwithstanding site observations concerning the presence or otherwise of archaeological issues, asbestos-containing materials (ACM) or invasive weeds (e.g. Japanese knotweed), this report does not constitute a formal survey of these potential issues.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities prior to implementation to ensure compliance.

## 2.0 PREVIOUS REPORTS

### 2.1 Overview

A number of reports have been issued for the site as detailed in Section 1.4. A number of these reports have been made available to BSL for review as part of the Phase 1 Desk Study Assessment Report, details of the reports provided to BSL, as well as our own desk study assessment are recorded below:

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                    |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1 Desk Study           | <ul style="list-style-type: none"> <li>Brownfield Solutions Ltd Report (GP/M4246/8660) issued July 2019.</li> <li>Atkins Dean Trust Ardwick High School (Revised Scheme) Phase 1: Geo-Environmental Assessment (5130327/DTAHS-RS/002) issued August 2015.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Available</p> <p>Available</p>                                                                                                  |
| Phase 2 / Site Investigation | <ul style="list-style-type: none"> <li>Atkins Manchester Schools Basic Needs Programme: Daisy Mill Ground Investigation Report (GTG20140378/5130327/19/Rev 0) issued December 2014.</li> <li>Geotechnics Limited Factual Report on Ground Investigation issued December 2014.</li> <li>Atkins Dean Trust Ardwick High School (Revised Scheme) Ground Investigation Report – Contaminated Land Risk Assessment (5130327/09/CLRA/Rev 0) issued August 2015.</li> <li>Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015.</li> <li>ESG Factual Report (LO/R5141/001/NB) issued October 2015.</li> <li>ESG Detailed Quantitative Risk Assessment Report (R5141b) issued October 2015.</li> <li>Solmek Phase 2 Site Investigation Report (S160937/SI) issued November 2016.</li> </ul> | <p>Available</p> <p>Not Available</p> <p>Available</p> <p>Available</p> <p>Not Available</p> <p>Not Available</p> <p>Available</p> |
| Remediation / Validation     | <ul style="list-style-type: none"> <li>Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015.</li> <li>ESG Remediation Strategy (R5141/2) issued October 2015.</li> <li>ESG Remediation Verification Report (R5141/3) issued December 2016.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>Available</p> <p>Not Available</p> <p>Available</p>                                                                             |
| Other                        | <ul style="list-style-type: none"> <li>ESG Materials Management Plan Dean Trust Ardwick 2016 (R5141/MMP) issued December 2015.</li> <li>Zetica Site Safe UXO Desk Study (P5220-15-R1-A) issued April 2015.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Available</p> <p>Available</p>                                                                                                  |

### 2.2 Atkins Phase 1: Geo-Environmental Assessment (2015)

A summary of the relevant points from the Phase 1 Geo-Environmental Assessment Report (ref. 5130327/DTAHS-RS/002, dated August 2015) completed by Atkins is presented below:

- The site is currently of mixed use: the north-east of the site is currently in use as a primary school and the south of the site is occupied by the mill building and associated car parking (which is currently only partly in use as an IT data centre). The remainder of the site is open space, used as a public footway and dog walking/play area. The area of open space is across the footprint of a previous mill complex, similar to the existing buildings in the south of the site. No tanks or oil storage areas were seen on site. It is known that, historically, the mill used oil for heating, but no tanks were visible. A pipe, of suitable diameter and construction, for oil transmission was noted that entered the heating plant, but it is unknown whether this is connected to a tank or if it is used in any form currently.
- In 1848, the site predominantly comprised fields, with the southern portion occupied by buildings under the name of “Longsight Terrace” and “Longsight Hall”. By 1893, the site was occupied by numerous

buildings and associated roads (most likely residential streets) and the centre of the site was occupied by a “Carriage and Tramway Company’s Depot” with a brewery present on the north-western boundary. The large “Daisy Works” building was present by 1934 and an electricity substation appeared by 1950. “Longsight School” (the present day “Richmond Park Primary School”) appeared in the north-eastern part of the site by 1976, and the site took on its current layout by 1991.

- The site is underlain by Devensian Till. The Chester Pebble Beds Formation is present across the majority of the site area with the Manchester Marls Formation limited to the northern extent of the site.
- A Coal Authority Mining Report states that the site is located in an area affected by coal mining and is in the likely zone of influence from workings in one seam of coal, at 370 m bgl.
- The closest significant surface water feature to the site is the River Medlock 780 m to the west, flowing east to north-west.
- The bedrock beneath the majority of the site (Chester Pebble Beds Formation) is classified as a Principal aquifer, and the bedrock beneath the north-eastern corner of the site (Manchester Marls Formation) is classified as a Secondary ‘B’ aquifer. There is a point on the south-eastern boundary of the site that is also classified as a Secondary ‘B’ aquifer, and this relates to where the adjacent Manchester Marls Formation Bedrock meets the site boundary.
- The risks posed to receptors by the identified potential sources of historical contamination are considered to be moderate/low from on-site sources and moderate/low from off-site sources with respect to potential ground gas risks; and moderate from on-site sources and moderate from off-site sources for potential health risks to users of the redeveloped site via dermal, dust inhalation and ingestion pathways. Risks to surface water receptors were deemed low to very low, but risks to controlled waters receptors were considered moderate/low from on-site sources and moderate from off-site sources, in relation to the proposed development works.

### 2.3 Atkins Ground Investigation Report (2014)

A summary of the relevant points from the Ground Investigation Report (ref. GTG20140378/5130327/19/Rev 0, dated December 2014) completed by Atkins is presented below:

- 7 No. cable percussive boreholes (BH1 to BH6) to a maximum depth of 21.45m bgl.
- 8 No. window samples boreholes (WS01 to WS08) to depths of between 0.30m and 6.45m bgl.
- 4 No. trial pits (TP01 to TP04) to depths of between 2.30m and 2.90m bgl.
- Ground conditions encountered included topsoil up 0.60m in thickness, granular made ground to depths of between 0.30m and 3.60m bgl, cohesive made ground to depths of between 1.00m and 4.80m bgl. Made ground was underlain by glacial till to between 17.60m and 20.32m bgl underlain by weathered sandstone/mudstone to a maximum proven depth of 21.45m bgl. Peat was recorded in BH03 at a depth of 2.50 to 2.90m bgl.
- Groundwater strikes were encountered in exploratory holes BH02A, BH03, BH05, WS01, WS02 and WS05 and WS02 at depths ranging between 0.90m and 19.70m bgl.
- 12 No. undrained triaxial tests were undertaken in the glacial till and results ranging from 118kPa to 457kPa were recorded at depths of between 3.00m and 16.50m bgl.
- 12 No. bulk density tests in the glacial till recorded results ranging between 2.06Mg/m<sup>3</sup> and 2.29Mg/m<sup>3</sup>.
- Undrained shear strength in the glacial till ranged between 25kPa and 457kPa with an average of 163kPa.
- The Design Sulphate Class for the site is DS-1 and the ACEC Class is AC-1.

### 2.4 Atkins Contaminated Land Risk Assessment (2015)

A summary of the relevant points from the Ground Investigation Report – Contaminated Land Risk Assessment report (ref. 5130327/09/CLRA/Rev 0.0, dated August 2015) completed by Atkins is presented below:

- 47 No. soil samples analysed for a range of determinands including heavy metals, PAHs, TPH CWG, BTEX, PCBs, phenols, moisture content, sulphate, soil organic matter, cyanide and pH.
- 13 No. soil samples analysed for asbestos ID.
- 16 No. soil samples analysed for soil leachate analysis (2:1 dilution).
- 16 No. groundwater samples analysed for metals, PAHs, TPH CWG, BTEX, sulphate cyanide and pH.
- 5 No. soil samples analysed for WAC Analysis.
- Visual and olfactory evidence of contamination was identified within the made ground across much of the site noted to be ash and localised tarmacadam fragments. Hydrocarbon odours were noted in BH01 at 0.30-1.00m bgl, BH06 3.40-4.80m bgl.
- Soil Vapour Headspace Monitoring revealed elevated readings in BH01 at 0.50m bgl (37.0ppm), BH02A at 3.50m bgl (201.0m bgl) and 3.40m bgl (28.3ppm).
- The combined soil sample analysis results for the Sub-Surface and ASL site investigations were compared against relevant assessment criteria including CLEA derived GACs resulted in the following exceedances:

| Contaminant           | Max Concentration (mg/kg) | Number of samples | Screening Value (mg/kg) |
|-----------------------|---------------------------|-------------------|-------------------------|
| Lead                  | 508                       | 42 (8)            | 310                     |
| Benzo(a)anthracene    | 30.67                     | 47 (9)            | 9.04                    |
| Benzo(a)pyrene        | 33.43                     | 47 (20)           | 1.04                    |
| Indeno(123cd)pyrene   | 19.85                     | 47 (5)            | 10.3                    |
| Dibenzo(ah)anthracene | 4.35                      | 47 (9)            | 1.03                    |
| Benzo(b)fluoranthene  | 36                        | 47 (9)            | 10.3                    |
| TPH Aro. >C10-C12     | 1993.4                    | 47 (1)            | 1080                    |
| TPH Aro. >C12-C16     | 7030                      | 47 (1)            | 2040                    |
| TPH Aro. >C16-C21     | 17721                     | 47 (1)            | 1330                    |
| TPH Aro. >C21-C35     | 15179                     | 47 (1)            | 1300                    |

NB: Number in brackets represents the number of results above guideline values.

- In addition to the above the following samples recorded asbestos:

| Location | Depth (m) | Asbestos ID                                       | Asbestos Level | Asbestos Level (%) |
|----------|-----------|---------------------------------------------------|----------------|--------------------|
| TP01     | 1.00-1.20 | Chrysotile free fibres                            | Quantifiable   | <0.001             |
| TP01     | 1.90-2.00 | Chrysotile free fibres                            | Quantifiable   | <0.001             |
| TP02     | 0.50      | Chrysotile free fibres                            | Quantifiable   | 0.002              |
| WS03A    | 0.50      | Chrysotile free fibres                            | Trace          | -                  |
| WS05     | 0.25      | Chrysotile free fibres                            | Trace          | -                  |
| WS05     | 0.90      | Chrysotile free fibres                            | Quantifiable   | 0.031              |
| BH06     | 1.00      | Amosite free fibres                               | Quantifiable   | <0.001             |
| BH06     | 2.00      | Chrysotile free fibres                            | Quantifiable   | <0.001             |
| BH06     | 3.40      | Chrysotile free fibres                            | Trace          | -                  |
| BH06     | 4.00      | Chrysotile free fibres                            | Quantifiable   | 0.005              |
| BH01     | 0.50      | Chrysotile free fibres                            | Quantifiable   | <0.001             |
| BH02     | 1.20-1.65 | Chrysotile cement present and Free Fibres in soil | Quantifiable   | 0.573              |
| BH02A    | 0.70      | Chrysotile free fibres                            | Quantifiable   | 0.055              |
| BH02A    | 2.90      | Chrysotile free fibres                            | Quantifiable   | <0.001             |
| BH02A    | 3.50      | Chrysotile free fibres                            | Trace          | -                  |

- Elevated concentrations of antimony, chromium, copy, iron, manganese, zinc, naphthalene, anthracene, fluoranthene, benzo(a)pyrene,  $\Sigma$ (benzo(b)fluoranthene + benzo(k)fluoranthene),  $\Sigma$ (benzo(ghi)perylene + indeno(123cd)pyrene),  $\Sigma$ (benzo(b)fluoranthene + benzo(k)fluoranthene + benzo(ghi)perylene + indeno(123-cd)pyrene) were recorded in leachate samples taken from across the site.
- Elevated concentrations of cadmium, copper, selenium, zinc, fluoranthene, benzo(a)pyrene, TPH Ali. >C16-C21, TPH Ali. >C21-C35, Total TPH Ali. C12-C35, TPH Aro. >C21-35, Total TPH Aro. C12-C35, TPH and sulphate were recorded in a number of sample locations across the site in the first monitoring visit. The second visit recorded elevated heavy metals.

- Despite some of the exceedances for TPHs, PAHs and heavy metals it is considered that the distances from site to the surface water receptors in the vicinity of the site, is that there is not a sufficient pathway to exist and that the distance would allow attenuation to result in insignificant concentrations at the receptor and therefore present a low potential risk.
- In terms of risks to the aquifer beneath the site, it is located below a clay stratum considered to be that of the unproductive Glacial Till. This identified water is considered to be perched and not reflective of the groundwater within the underlying Principal Aquifer within the underlying Principal Aquifer (Chester Pebble Beds) or Secondary B Aquifer (Manchester Marls) within the bedrock.
- Gas monitoring recorded elevated carbon dioxide concentrations in BH02A and BH03 in the northern half of the site. A peak flow of 10.5l/hr was recorded in BH03. Given this, this area of the site was classified as CS2 and gas protection measures were recommended.
- A moderate risk was considered to exist to human health from the made ground, however, the implementation of an environmental cover system was considered to reduce the risk to moderate/low.
- A moderate/low risk was considered to exist to human health and property as a results of ground gas, however, the implementation of gas protection measures was considered to reduce the risk to low.
- A very low risk was considered to exist to surface water receptors and a low risk was suggested for the risk of contaminated made ground to the Principal and Secondary 'B' Aquifers.

## 2.5 Solmek Phase 2 Site Investigation Report (2016)

A summary of the relevant points from the Phase 2 Site Investigation Report (ref. S160937/SI, dated November 2016) completed by Solmek Ltd is presented below:

- 4 No. window sample boreholes (BH1 to BH4) drilled to a depth of 5.00m bgl.
- 3 No. ground gas and water monitoring installations installed within BH2, BH3 and BH4.
- Made ground was generally encountered as dark brown clayey slightly gravelly sandy topsoil, proven to max 0.50mbgl (BH4) underlain by blackish brown slightly sandy to sandy slightly gravelly clay with brick fragments, proven to a max 1.80mbgl (BH2). Within BH1 to BH3 the above stratum was underlain by stiff consistency dark brown slightly sandy slightly gravelly clay with rare brick fragments proven to max 3.00mbgl (BH2).
- Natural deposits were generally proven as stiff consistency dark brown slightly sandy to sandy slightly gravelly high strength clay of intermediate to high plasticity to a depth of 5.00mbgl.
- Groundwater was not encountered within any of the exploratory borehole positions.
- 3 No. samples of made ground were tested for metals, semi-metals, non-metals, inorganic determinants and Asbestos identification screening.
- 2 No. samples were tested for PAHs and TPH CWG.
- All metals, inorganic and organic determinands were found to be below the relevant thresholds.
- Slightly alkaline pH conditions in made ground, with soluble sulphates below the BRE Special Digest One threshold value of 500mg/l.
- No positive identification of asbestos was made in the samples screened.

## 2.6 Atkins Remediation Strategy (2015)

A summary of the relevant points from the Remediation Strategy Report (ref. 5119532\_1, dated June 2015) completed by Atkins is presented below:

- Assessment of gas monitoring data, outlined above, suggest the concentrations of soils gases across the site to be representative of a Characteristic Situation 2 (CS2) in accordance with CIRIA C665 (Ref 18).
- Sites falling within CS2 are recommended to implement the following protection methods into buildings constructed in the area:
  - a. Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g DPM.
  - b. Beam and block or precast concrete slab and minimum 2000 g DPM/reinforced gas membrane.
  - c. Possibly underfloor venting or pressurisation in combination with a) and b) depending on use.

- All joints and penetrations are to be sealed.
- An environmental cover system is required to break the barrier between the contaminated site soils and the end-user. The cover system should comprise a minimum 150mm compacted clay or subsoil. Above the compacted layer will be a 450mm of a lower layer compacted alleviated subsoil and a minimum of 300mm of topsoil.
- Topsoil shall be imported from a topsoil supplier and tested at a rate of 1 sample per 500m<sup>3</sup> per source of material. All soils shall be free of asbestos and other deleterious and or contaminated materials.
- Where site won topsoil is proposed for reuse on site for landscaping purposes, it shall be tested to BS 3882 2007 to ensure it is suitable. Any materials failing to meet the specification shall be removed to a segregation area and isolated from other stockpiles. The material will then be disposed of off-site to the appropriate licensed facilities.

## 2.7 ESG Remediation Verification Report (2016)

A summary of the relevant points from the Remediation Verification Report (ref. R5141/3, dated December 2016) completed by ESG is presented below:

- The amosite asbestos contamination within the existing Made Ground soils could pose a potential risk to site users within areas of soft landscaping and grass pitches. The Remediation Strategy required that these areas should comprise the installation of a clean cover system, incorporating a minimum of 300mm imported and validated 'clean' soils as agreed between LO'R and Manchester City Council. The clean cover soils should be underlain by a geotextile marker layer to clearly delineate the underlying potentially contaminated soils with the clean imported soils.
- The clean cover system should incorporate a minimum of 150mm of topsoil at the upper limit of the system, conforming to the requirements of the acceptance criteria and the British Standard BS 3882:2015 Specification for Topsoil (multipurpose topsoil). This will ensure that conditions within the cover system are suitable for healthy plant growth.
- A slight design change to the above specification of clean cover in the grassed football pitch was proposed by LO'R during the works and this was agreed by MCC (see Appendix D). The amended clean cover system in the grassed pitch area comprised 100 mm of porous / permeable granular imported sub-base, with only a single (not two as originally specified) geotextile membrane placed between the topsoil and porous granular drainage layer, and 200 mm of topsoil. Multitrack 1000 geotextile membrane was used in the grassed pitch areas and Terram 1000 in the soft landscaping areas.
- Approximately 6850 tonnes (3500m<sup>3</sup>) of topsoil was imported to site in total (1020 tonnes from the Sandbach site, and 5830 tonnes from the Freeland/Astley/Leigh Lane site).
- Following review of the chemical results of the analysis of 35 samples (20 from Freeland Astley/Leigh Lane and 15 from Sandbach) of topsoil samples from the above sources (provided by the groundwork's contractor supplier), visual observations made during the validation visits carried out by ESG in July and August 2016 and subsequent independent chemical laboratory analysis undertaken by ESG on a total of four topsoil samples collected in July and August September 2016, it has been confirmed that the imported / placed topsoil conformed to the requirements of the acceptance criteria detailed in Table 4 below, and in general confirm to the British Standard 3882: 2015 Specification for Topsoil (multipurpose topsoil).
- 26No. hand dug depth validation pits were undertaken revealing topsoil depths of between 190mm and 500mm.
- Validation of the gas membrane installation was undertaken by MEC Environmental Ltd. 3 visits were undertaken and the gas membrane installation was reported to be good quality. A completion certificate was also provided by PAGeoContracting to certify that the works had been completed in accordance with their specification of works and method statement and that any variations have been agreed and recorded.

## 2.8 ESG Materials Management Plan (2016)

A summary of the relevant points from the Material Management Plan (ref. R5141/MMP, dated December 2015) completed by ESG is presented below:

- The MMP relates to a series of earthworks required to ready the site for development. These included stripping and stockpiling of topsoil material for disposal off-site as waste; a required “cut and fill” operation to lower site levels in the area of the building footprint and raise levels in the southern and north-eastern portions of the site; proof digging beneath the proposed building footprint to enable the processing of obstructions for reuse and the removal of unsuitable materials; replacement and recompaction of materials to create a suitable development platform; and demolition, breaking out and removal from site of buildings, foundations and hardstanding associated with the former Richmond Park Primary School and Daisy Mill Works.
- In summary the MMP scope included:
  - i) Excavation and stockpiling of topsoil materials from across the site for removal off-site under waste management legislation and protocols.
  - ii) Excavation of Made Ground under the building footprint to facilitate the removal and processing of concrete, brick, tile and other obstructions.
  - iii) Replacement and compaction of excavated and processed materials within areas of building footprint to achieve development platform.
  - iv) Stockpiling of excess materials in designated areas to be used as fill and achieve planning based final site levels.
  - v) Reuse of stockpiled materials as fill to achieve final site levels.
- Approximately 5,850m<sup>3</sup> of topsoil material and 20,050m<sup>3</sup> of made ground material were to be excavated to allow for the construction of the building foundations, drainage, services, etc.
- The made ground was to be processed by removing obstructions of concrete, brick and tile, which was crushed for use as granular fill. Additional materials such as wood, plastic, metal and other unsuitable materials (estimated at 850m<sup>3</sup>) was segregated and removed from the site as waste. The processed made ground and granular fill will then be re-compacted in 150 mm layers within the building footprint area to create a suitable development platform.
- Excess made ground materials will be located in two separate stockpiles comprising approximately 7,600m<sup>3</sup> (stockpile SP2) and 7,900m<sup>3</sup> (stockpile SP3). Following demolition, breaking out and removal of the existing Daisy Mill and Richmond Park buildings, foundations and hardstanding, the two stockpiles of made ground were to be used to fill these areas and achieve final site levels.

## 2.9 Zetica UXO Desk Study (2015)

A summary of the relevant points from the Sitesafe UXO Desk Study (ref. P5220-15-R1-A, dated April 2015) completed by Zetica is presented below:

- There is no evidence that the Site was bombed and no other significant sources of UXO have been identified on the Site. It is considered that the Site has a low UXO hazard level.

## 2.10 BSL Phase I Desk Study Assessment (2019)

A summary of the relevant points from the Phase I Desk Study Assessment Report (ref. GP/M4246/8660, dated July 2019) completed by BSL is presented below. The BSL Desk Study was undertaken in relation to proposed extensions to the existing development.

- The site consisted of open fields with ponds in the north, and a small row of residential terraces in the south. By 1890 the ponds had likely been infilled and the whole site had been developed into residences and Daisy Mill. Industrial works replaced the depot by 1922, with various industries including Manchester Carriage & Tramway Company Depot, Brewery, Laundry and wash house occupying the site then until at least 2010. By 2014 the last of the works had been demolished and replaced with the education facility that continues to occupy the site today.
- From the information obtained during the desk study numerous potentially contaminative site uses have occupied the site including the Daisy Works/Mill, depots, brewery, electricity substation, laundry and

washhouse. Offsite sources of contamination including a warehouse/garage, an electricity substation, mineral water works, shield works, garage, and joinery works.

- Geology comprises glacial till (Secondary Undifferentiated Aquifer) comprising clay underlain by the Chester Sandstone Formation (Principal Aquifer), and the Manchester Marl Formation (Secondary B Aquifer) across the north of the site. The site is not indicated to lie within a Source Protection Zone.
- The site is shown to lie atop the East Manchester Fault, a north-west to south-east trending fault that downthrows to the north-east. However, any movements associated with this fault should now have stopped.
- The site is in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site could be affected by past or current coal mining. The Coal Authority Report did not identify any coal mining related issues at the site,
- There are no watercourses within 1000m of the site or any surface water features within 250m of the site.
- The site is not located in a Zone 2 or Zone 3 floodplain.
- No radon protection measures are required.
- The risk to human health is considered to be moderate.
- The risk to controlled waters is low.
- The risk from gas is low to moderate.

### 3.0 METHOD OF INVESTIGATION

#### 3.1 Objectives

To confirm the risks to the identified receptors and confirm the ground conditions in respect to the identified geotechnical and geo-environmental risks, an appropriate intrusive investigation was undertaken as per the recommendations of the Phase I Desk Study Assessment.

The aim of the fieldwork was to:

- Investigate ground conditions on the site and the potential need for detailed investigation.
- Install standpipes to allow future monitoring.
- Assess the potential contamination on the site and obtain samples for contamination screening.
- Assess the potential impact of any contamination on controlled waters.
- Obtain geotechnical information on the ground conditions at the site for preliminary foundation design and preliminary pavement design purposes.
- Give an assessment of the geo-environmental risks associated with redevelopment of the site.

#### 3.2 Site Works

The following site works have been undertaken at the site as part of the intrusive investigation between the dates of 28<sup>th</sup> June 2019.

| Method                                   | No. | Range Depths<br>(m bgl) | Purpose                                                                                                                                                                                                                                |
|------------------------------------------|-----|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Window sample boreholes – Tracked WS rig | 7   | 3.00 – 5.45             | Establish general ground conditions on site.<br>Allow Standard Penetration Tests (SPTs) to be carried out and obtain samples for contamination and geotechnical and testing.<br>Installation of ground gas and water monitoring wells. |
| Hand Excavated Trial Pit                 | 1   | 1.20                    | Obtain samples for contamination and geotechnical and testing.                                                                                                                                                                         |

The surveyed locations of the exploratory holes are indicated on the Exploratory Hole Location Plan, Drawing No M4246/02. The exploratory hole logs are presented in Appendix B.

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

- BS 5930:2015 Code of Practice for Site Investigations.
- BS EN 14688-1:2018 Geotechnical Investigation and Testing – Identification and classification of soil.

#### 3.3 Sampling

During the drilling of the exploratory holes, representative samples were taken at regular intervals to assist in the identification of the soils and to allow subsequent laboratory testing. They were stored and transported in general accordance with BS 10175:2011+A2:2017.

The type of sample was dependent upon the stratum and the purpose of analysis in accordance with current environmental and geotechnical guidance.

The distribution of samples taken across the site is recorded on the exploratory logs and a summary of the samples taken is presented in the table below:

| Type               | Number |
|--------------------|--------|
| Environmental (ES) | 10     |
| Disturbed (D)      | 8      |
| Bulk (B)           | 3      |

### 3.4 Laboratory Testing

As part of the initial assessment for potential contamination of the site, selected samples were taken for the purpose of chemical contamination testing.

Based on the findings of the previous investigation including widespread asbestos contamination in addition to heavy metals, PAH and TPH contamination, six representative soil samples were screened for the following general suite of determinands at a UKAS approved laboratory:

| Determinand                                                                                                                                                                                                                                                       | No of Samples |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| BSL Default Soil Suite: Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), total phenol, free cyanide, water soluble sulphate (2:1 Extract), soil organic matter and pH. | 6             |
| Petroleum Hydrocarbons (TPH CWG) inc BTEX and MTBE.                                                                                                                                                                                                               | 1             |
| Asbestos Screen.                                                                                                                                                                                                                                                  | 6             |
| Asbestos Quantitative Analysis.                                                                                                                                                                                                                                   | 6             |
| Volatile Organic Compounds (VOCs) by GC-MS                                                                                                                                                                                                                        | 1             |
| Waste Acceptance Criteria (WAC).                                                                                                                                                                                                                                  | 1             |

The Chemical Laboratory Testing Results are presented in Appendix C.

Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' and BS EN ISO 17892- Parts 1-12:2018 'Geotechnical investigation and testing. Laboratory testing of soil'.

The following tests were scheduled for geotechnical purposes:

| Description                                      | No of Samples |
|--------------------------------------------------|---------------|
| Natural Water Content.                           | 4             |
| Plasticity Index Analysis.                       | 4             |
| Particle Size Distribution (PSD).                | 3             |
| pH Value.                                        | 4             |
| Water Soluble Sulphate Contents.                 | 4             |
| SD1 BRE Full Suite.                              | 2             |
| Determination of California Bearing Ratio (CBR). | 3             |

The Geotechnical Laboratory Testing Results are presented in Appendix D.

### 3.5 Monitoring

Gas and water monitoring standpipes were installed in three boreholes and subsequently one monitoring visit was undertaken. All gas monitoring was undertaken using GA 2000 infrared gas meter with integral electronic flow analyser.

Flow measurements on each standpipe (l/hr) were taken. Measurements of the percentage volume in air (%v/v) of oxygen (O<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) were recorded in addition to the

percentage Lower Explosive Limit (%LEL) of methane (Note: 100% LEL equates to 5% by volume), the atmospheric pressure (mb) and average temperature during the visit (°C).

Standpipes were constructed in general accordance with the relevant guidance. A summary of the installation construction is presented in the table below:

| Location and Depth | Internal Diameter<br>Pipe | Response Zone<br>(m bgl) | Targeted Strata          | Purpose    |
|--------------------|---------------------------|--------------------------|--------------------------|------------|
| WS03               | 35mm PVC                  | 1.00 – 3.00              | Made Ground              | Ground Gas |
| WS04               | 35mm PVC                  | 1.00 – 4.00              | Made Ground /<br>Natural | Ground Gas |
| WS05               | 35mm PVC                  | 1.00 – 4.00              | Made Ground /<br>Natural | Ground Gas |

The gas monitoring visits recorded peak and steady state conditions. Peak results are those that occur on opening the valve on the borehole tap. Steady state conditions are those that occur a period of time afterwards when the initial (accumulated) gases have been purged from the borehole.

Full ground gas monitoring results are presented in Appendix E of this report.

### 3.6 Reinstatement

A 300mm cover system is in place across soft landscaping areas of the site, noted to comprise 300mm topsoil over a geomembrane. This was encountered during the site investigation, and in order to maintain the cover system, visqueen was utilised to replace the removed geomembrane which was underlain by bentonite to further break the pathway between the clean topsoil and potentially contaminative site soils underneath.

## 4.0 GROUND CONDITIONS

### 4.1 Made Ground

Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 1.00m and >3.90m bgl.

Topsoil was encountered at the surface across the majority of the locations, except from WS04. Topsoil, which typically comprised a gravelly clayey sand, was encountered to depths of approximately 0.40m bgl underlain by a geomembrane. The topsoil was noted to comply with the cover system outlined and validated as part of the ESG Remediation Verification Report (ref. R5141/3, dated December 2016).

Made ground within WS01, WS02 and HP01, taken from bunds in the north-east and south of the site typically comprised brown slightly gravelly slightly sandy clay / sandy clayey gravel with brick, clinker, concrete, slate and glass.

Made ground within WS03 in the north of the site comprised a gravelly clayey sand with brick, tarmacadam, slag, concrete and timber to 2.00m bgl underlain by brick and slag crush. The window sample hole refused on concrete at 3.03mbgl and could not be progressed to natural strata.

Made ground within WS04 in the centre of the site comprised paviers underlain by a sandy gravel subbase to 1.10m bgl underlain by a slightly gravelly slightly sandy clay with brick and clinker to 1.70m bgl with brick crush to 2.50m bgl. Made ground within WS05 also in the centre of the site was encountered to be gravelly sand with brick, concrete, glass, ash and clinker to 1.80m bgl.

Two window sample holes in the south of the site, WS06 and WS07 encountered varying depths of made ground with the former encountering sandy gravel with brick concrete and coal to 1.00m bgl, and the latter encountering sandy gravelly clay with brick, concrete clinker and coal to 1.10m underlain by bands of soft clay and organic clays with coal, brick, and slate fragments to 2.90m bgl.

### 4.2 Natural Superficial Strata

The natural strata underlying the site was generally encountered from depths of 1.00m to 2.90m bgl and was generally firm to very stiff clay with varying amounts of silt, sand and gravel as minor constituents. Natural strata was not encountered in WS03, WS02 and WS01 in the north of the site, with made ground proven to depths of 3.03m bgl and 3.90m bgl, respectively.

### 4.3 Solid Geology

The solid geology of the Chester Pebble Beds Formation and Manchester Marls Formation was not encountered in this investigation.

### 4.4 Groundwater

The depths and locations where groundwater was encountered are shown in the table below:

| Location | Depth during site works (m) | Depth during monitoring period (range) (m) |
|----------|-----------------------------|--------------------------------------------|
| WS01     | -                           | -                                          |
| WS02     | -                           | -                                          |
| WS03     | -                           | NGW*                                       |
| WS04     | 2.00 - Small seepage        | 1.39                                       |
| WS05     | -                           | NGW                                        |
| WS06     | -                           | -                                          |

| Location | Depth during site works (m) | Depth during monitoring period (range) (m) |
|----------|-----------------------------|--------------------------------------------|
| WS07     | -                           | -                                          |
| HP01     | -                           | -                                          |

\*NGW – No groundwater

#### 4.5 Observations

##### *Contamination*

During the works undertaken by BSL, observations for both visual and olfactory evidence of contamination were made.

With the exception of ash and clinker observed as a minor constituent in the made ground soils, no evidence of contamination was recorded at the site.

## 5.0 TEST RESULTS

### 5.1 Chemical Test Results-Soils

The samples were tested for an assessment of the chemical contamination and results were examined with reference to a selection of guidance documents as detailed in Appendix A. In this case the LQM/CIEH S4ULs and DEFRA C4SLs for a residential end use without homegrown produce have been adopted as Tier 1 generic screening values. These criteria have been utilised as a conservative approach given the higher sensitivity of the end use as a school, although occupancy is not envisaged to be at a level to warrant adoption of the most stringent criteria that includes homegrown produce.

The apparent exceedance of the relevant screening value for a residential without homegrown produce end use is taken as indicating further detailed assessment or remedial action is required.

BSL consider the main risk drivers for PAHs to be benzo(a)pyrene (BaP) and naphthalene. This is due to BaP being one of the most toxic of the PAHs, and naphthalene the most volatile and soluble. Category 4 Screening Levels (C4SLs) indicate B(a)P as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible. Given the difference in chemical properties between the two, naphthalene will be treated separately using the LQM S4ULs.

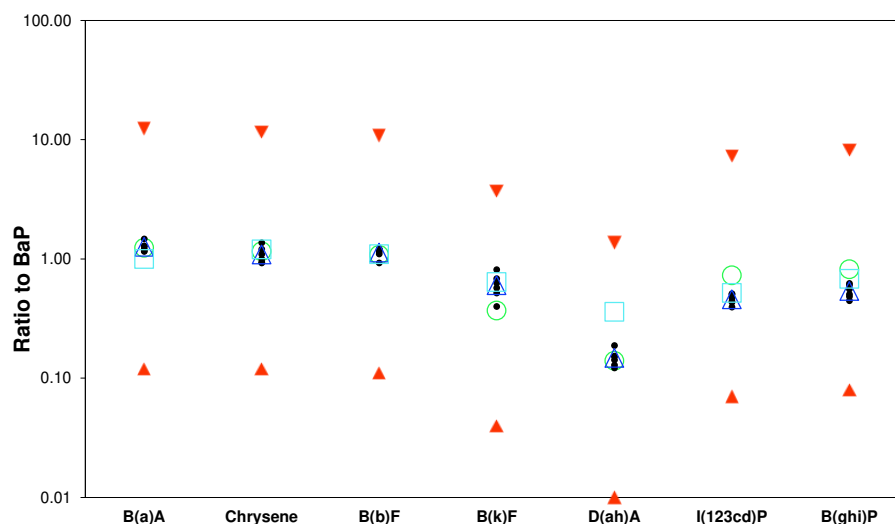
#### *PAHs and B(a)P as a Surrogate Marker*

In line with CL:AIRE and Public Health England (PHE) guidance, benzo(a)pyrene is considered to be one of the most potent PAHs, and it would be appropriate to assume the cancer risk in a mixture is proportional to the concentration of a surrogate marker PAH (benzo(a)pyrene) in the mixture. The ratio of PAHs within the mixture can be assessed to ensure that the profile is similar to that seen for the test material (coal tar mixtures) in the toxicological study by Culp et al. The International Programme on Chemical Safety (IPCS) considered that the PAH profile of the soil sample may deviate from the average profile by about an order of magnitude (up or down).

A more recent study by Bull et al (2013) which analysed PAH concentrations in soil samples from 274 sites, showed that the levels of PAH relative to BaP showed little variability and were similar to that recorded for the coal tar mix used in the Culp et al study. Given this, it was concluded that benzo(a)pyrene is a suitable surrogate marker to represent mixtures of PAH in soil.

In order to risk assess the PAH mixture in the site soil samples using human health guideline values, notably C4SLs, the PAH profile in the soil samples, the ratio of the seven genotoxic PAHs shown below, relative to BaP, should be calculated to ensure it is similar to the test material used in the Culp study (PHE 2010). To be considered sufficiently similar, the ratio relative to BaP should fit within the upper and lower limits (representing an order of magnitude above and below the mean ratio to BaP of test material used in the Culp et al study). In such cases BaP is considered an adequate surrogate marker and the Low Levels of Toxicological concern (LLTC) for BaP may be used in the risk assessment.

The graph below summarises the site data with respect to how the ratios of carcinogenic PAHs relate to BaP, within the confidence limits provided in the PHE documents.


**Key:**

- Ratio to B(a)P for all data
- △ Mean ratio to B(a)P from all data at the site
- ▲ Upper and Lower limits (order of magnitude from Culp data)
- Mean ratio to B(a)P for Culp data
- Mean ratio to B(a)P for UK data presented by PHE

All the data points that could be used to calculate ratios fall inside the upper or lower limits (order of magnitude above or below that of the study material). Based on this distribution of data it is considered that BaP can be used as a surrogate marker for carcinogenic PAHs and the C4SL criteria is suitable for this dataset.

### Metals

One sample tested contained the following elevated determinands:

| Location          | Metal | Concentration (mg/kg) | S4UL (mg/kg) |
|-------------------|-------|-----------------------|--------------|
| WS05 (1.00-1.80m) | Lead  | 430                   | 310          |

### Asbestos

Chrysotile fibres have been detected in all of the six samples analysed further details are presented in the table below:

| Location          | Asbestos Material Type | Asbestos Type        | Total % Asbestos in Sample |
|-------------------|------------------------|----------------------|----------------------------|
| WS01 (0.50m)      | Loose Fibres           | Chrysotile & Amosite | 0.002                      |
| WS02 (0.50-1.50m) | Loose Fibres           | Chrysotile           | < 0.001                    |
| WS03 (1.00m)      | Loose Fibres           | Chrysotile           | < 0.001                    |
| WS05 (1.00-1.80m) | Loose Fibres           | Chrysotile           | < 0.001                    |
| WS07 (0.35-0.70m) | Loose Fibres           | Chrysotile           | < 0.001                    |
| HP01 (0.50m)      | Loose Fibres           | Chrysotile           | < 0.001                    |

### Poly Aromatic Hydrocarbons (PAHs)

Elevated PAH were recorded in six locations to date. The location and elevated species of PAHs are shown in the table below.

| Location          | Species        | Concentration (mg/kg) | S4UL (mg/kg) |
|-------------------|----------------|-----------------------|--------------|
| WS01 (0.50m)      | Benzo(a)pyrene | 8.1                   | 2.7*         |
| WS02 (0.50-1.50m) | Benzo(a)pyrene | 9.1                   | 2.7*         |
| WS03 (1.00m)      | Benzo(a)pyrene | 19.0                  | 2.7*         |

| Location          | Species        | Concentration (mg/kg) | S4UL (mg/kg) |
|-------------------|----------------|-----------------------|--------------|
| WS05 (1.00-1.80m) | Benzo(a)pyrene | 85.0                  | 2.7*         |
| WS07 (0.35-0.70m) | Benzo(a)pyrene | 4.3                   | 2.7*         |
| HP01 (0.50m)      | Benzo(a)pyrene | 14.0                  | 2.7*         |

\* Based on Soil Organic Matter content

#### *Total Petroleum Hydrocarbons (TPH CWG)*

No concentrations of petroleum hydrocarbons have been detected above the selected screening values.

#### *Volatile Organic Compounds (VOCs)*

No concentrations of VOCs have been detected above the laboratory detection levels.

## 5.2 Waste Acceptance Criteria (WAC) Results

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste, Decision 2003/33/EC and Landfill Regulations 2005) led to the establishment of a methodology for classifying wastes. Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. There are three different WAC criteria, these are:

- Inert waste.
- Stable Non-Reactive Hazardous Waste.
- Hazardous waste.

WAC testing is used to determine that the waste is suitable to be disposed of into a landfill site. A waste must comply with the WAC limits for the relevant hazardous or non-hazardous landfill (i.e. non-hazardous or inert), otherwise the soil will need to be pre-treated.

Note wastes should first be classified based on their total concentrations and given the classification of either hazardous or non-hazardous. This is discussed in detail in Section 6.7. WAC testing is only required if the end disposal route is a landfill and WAC analysis must **not** be used for waste classification and hazardous waste assessment purposes.

Solid and eluate WAC analysis was undertaken on one sample, the results of which are presented in the table below.

| Location | Depth (m) | Strata Type                      | WAC Analysis                  | Comments                          |
|----------|-----------|----------------------------------|-------------------------------|-----------------------------------|
| WS01     | 0.50-1.50 | MADE GROUND: Sandy gravelly clay | Stable Non-Reactive Hazardous | Based on PAH<br>Based on Fluoride |

## 5.3 Geotechnical Testing

#### *In Situ Standard Penetration Tests*

Standard Penetration Tests (SPTs) were carried out within the window sample boreholes at regular 1.0m. The results of the individual blows and the N-values are recorded on the Exploratory Hole Logs.

All SPT N values are uncorrected. Density and strength descriptors are reported in accordance with the guidelines stated in BS 5930:2015, incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.

### Plasticity Index Analysis

Plasticity index results ranged between 15% and 18% indicating the clays to be of low plasticity. Associated water contents ranged between 12% and 14%.

After modification of particle size in accordance with BRE 240 the modified plasticity indices are in the range 13.9% to 15% indicating the soils to be of low volume change potential.

## 5.4 Aggressive Ground Conditions

Water soluble sulphate testing was undertaken on seven samples of made ground and three samples of the natural strata.

### Made Ground

The results revealed soluble sulphate (SO<sub>4</sub>) contents of between 0.073g/l and 1.7g/l. Associated pH values were obtained which ranged between 7.6 and 8.5 indicating slightly alkaline conditions.

### Natural Strata

The results revealed soluble sulphate (SO<sub>4</sub>) contents of between 0.029g/l and 0.046g/l. Associated pH values were obtained which ranged between 8.3 and 8.8 indicating slightly alkaline conditions.

BRE SD1 suite testing was undertaken on one sample of made ground and one sample of natural strata. The results are shown in the table below.

| Determinand                            | Made ground | Natural Clay |
|----------------------------------------|-------------|--------------|
| Soluble Chloride mg/l                  | 7.9         | 3.7          |
| Soluble Nitrate mg/l                   | <2.0        | <2.0         |
| Soluble Magnesium mg/l                 | 12          | 15           |
| Soluble Sulphate mg/l                  | 34          | 46           |
| pH                                     | 8.6         | 8.4          |
| Sulphur as S, Total %                  | 0.021       | 0.016        |
| Sulphate, as SO <sub>4</sub> , Total % | 0.030       | 0.029        |

## 7.1 CBR Results

The lab remoulded CBR results (recompacted using standard 2.5kg rammer) are summarised below including recommended values that can be assumed for preliminary design purposes.

| Method            | Location     | Stratum Type                  | CBR (%) |
|-------------------|--------------|-------------------------------|---------|
| Lab Remoulded CBR | HP01 - 0.50m | V. gravelly silty clayey SAND | 10.0    |
|                   | WS01 – 1.00m | V. gravelly silty clayey SAND | 11.1    |
|                   | WS02 – 1.00m | V. gravelly silty clayey SAND | 3.9     |

The results of the lab remoulded CBR results are presented in Appendix D.

## 6.0 GEOTECHNICAL ASSESSMENT

### 6.1 Ground Model Summary

The site is currently an operational secondary school which opened in 2015 and it is proposed to comprise a new two storey extension and undercroft car parking, a single storey dining extension, and a removal of earth bunds for construction of new surface level car park and hard surfaced play areas.

Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 1.00m and >3.90m bgl.

Made ground in vicinity to the proposed two storey extension (WS04 and WS05) was noted to be paviers underlain by a sandy gravel subbase to 1.10m bgl underlain by a slightly gravelly slightly sandy clay with brick and clinker to 1.70m bgl with brick crush to 2.50m bgl. The second exploratory borehole in this area encountered gravelly sand with brick, concrete, glass, ash and clinker to 1.80m bgl.

Made ground in vicinity to the proposed single storey extension (WS03) was noted to be gravelly clayey sand with brick, tarmacadam, slag, concrete and timber to 2.00m bgl underlain by brick and slag crush. The window sample hole refused on concrete at 3.03mbgl.

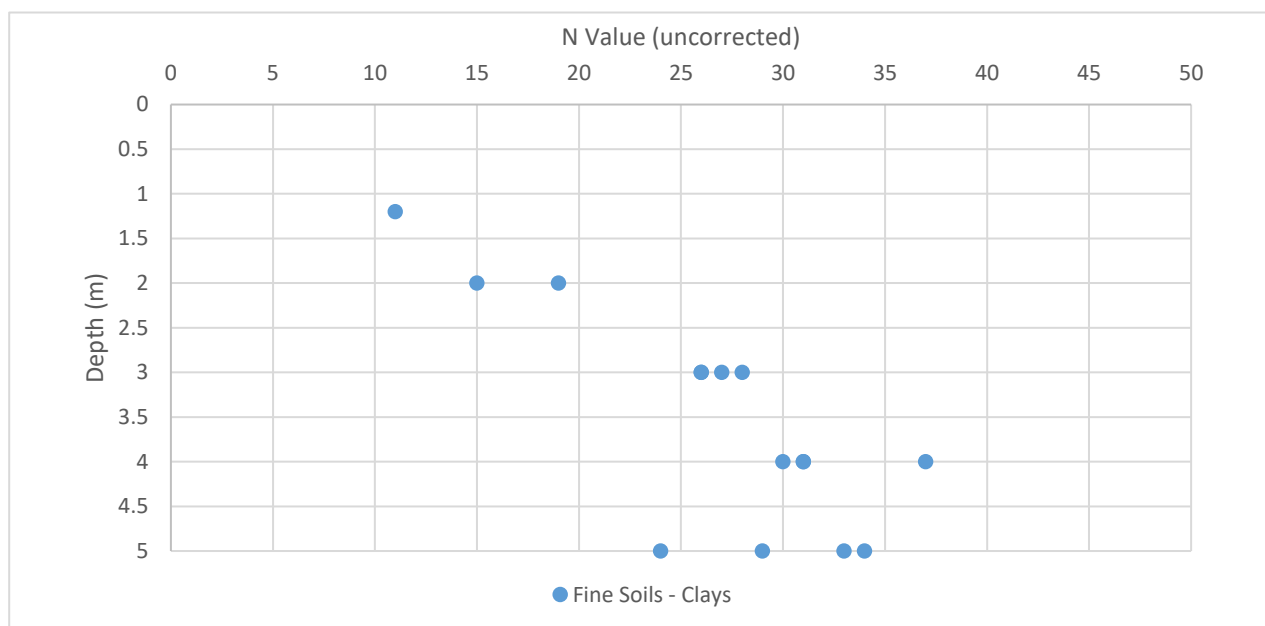
Made ground within a large bund in the northeast of the site (WS01 and WS02) was noted to comprise brown slightly gravelly slightly sandy clay with brick, clinker, concrete, slate and glass to depths of greater than 3.90m.

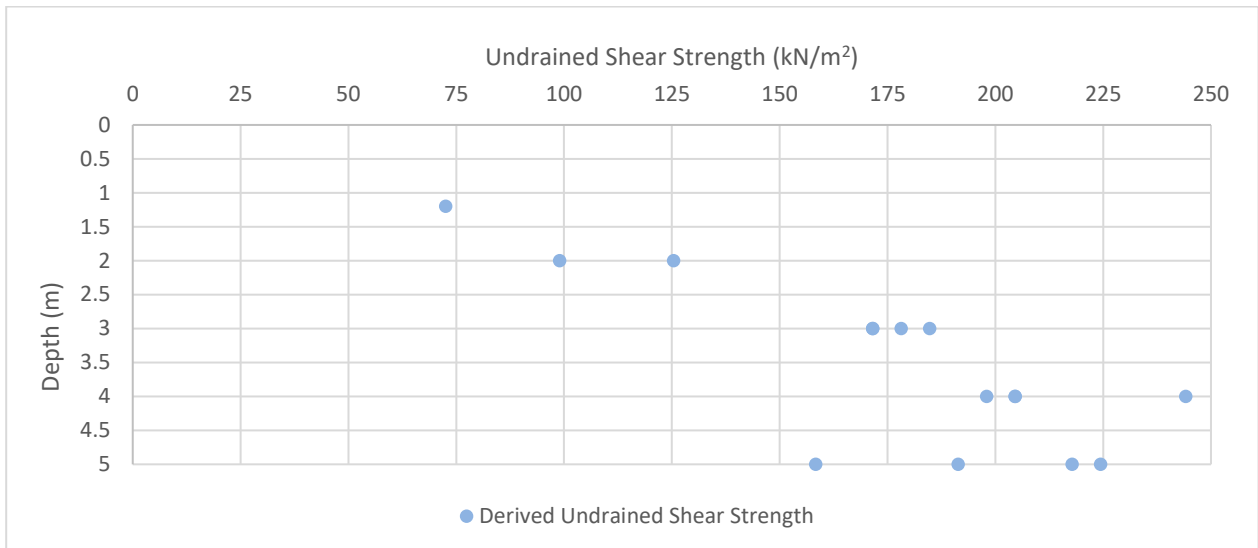
The natural strata underlying the site was encountered from depths of 1.00m to 2.90m bgl and was generally firm to very stiff clay with varying amounts of silt, sand and gravel as minor constituents.

Groundwater strikes recorded during site works was recorded to be 2.00m bgl in WS04 and is considered to represent perched groundwater within the granular made ground encountered at this depth.

### 6.2 Soil Parameters

The test results have been evaluated to derive geotechnical soil parameters for the site. A depth vs SPT N value graph is provided below to provide a profile of the ground conditions underlying the site.





Characterisation of the geotechnical parameters above has been undertaken to obtain a characteristic value, which is a cautious estimate of the value affecting the occurrence of the limit state.

The characteristic SPT N value in clays at 3.00m is interpreted to be 26. Based on the correlation of Stroud (1975) based on 'average' plasticity and adopting an  $f_1$  value of 6.6, this gives a characteristic shear strength of 171kN/m<sup>2</sup>. The characteristic N value at 4.00m increases to 30 which equates to a characteristic shear strength of 198kN/m<sup>2</sup>.

### 6.3 Foundations

The development will comprise a new two storey extension and undercroft car parking and a single storey dining extension and is considered to be classed as Geotechnical Category 2 in accordance with Eurocode 7.

Preliminary design by calculation has been undertaken to determine the design resistance of the bearing strata in the following section. No proposed structural loads were available at the time of writing, therefore the following recommendations are provisional and should be reviewed at the detailed design stage.

Based on the presence of made ground at thickness ranging between 1.80mbgl and in excess of 3.00mbgl and the proposed development of a two-storey extension with undercroft car parking and single storey extension, it is considered that shallow foundations would be unsuitable and a deep foundation solution, such as piles or vibro stone columns (VSCs) would be required.

Note the depth of made ground was not proven in the north of the site in proximity to the proposed single storey extension and therefore further investigative works may be required to determine this.

#### *Piles*

Due to the depth of made ground on site, the use of shallow foundations is not considered feasible for the proposed development. Therefore, the most suitable foundations are considered to be piles extending through the made ground and superficial deposits end bearing within the clay which was observed at depths of between 1.80m and >3.00mbgl. The site investigation undertaken by Atkins recorded glacial till from 1.00m to 17.60m bgl with sands.

No loadings are known at this stage, therefore the recommendations below are provisional and subject to review at the detailed design stage.

Bottom driven pre-cast concrete piles or bored CFA (continuous flight auger) piles are considered the most suitable piling solutions, as these will produce the lowest levels of vibration.

Piles should be extended through the made ground and into the superficial deposits. Depending on the structural loadings and design requirements, piles will likely utilise a combination of skin friction and end-bearing resistance, with the majority of the load transferred through skin friction. Piles should extend a minimum of five pile diameters into the bearing stratum to fully mobilise end-bearing resistance and shaft resistance.

Based on the available information, preliminary calculations were undertaken for a single 225mm wide square concrete pile approximately 10.00m in length. Given the depth to bedrock of approximately 17m, the preliminary allowable loads assume for friction piles which are shown in the table below.

| Borehole              | Proposed Building | Allowable Load (kN) |
|-----------------------|-------------------|---------------------|
| BSL WS04/Atkins BH02A | 2 Storey          | 195                 |
| BSL WS04/Atkins BH04  | 2 Storey          | 191                 |
| BSL WS05/Atkins BH02A | 2 Storey          | 205                 |
| BSL WS05/Atkins BH04  | 2 Storey          | 205                 |

Higher allowable loads could be achieved by increasing the diameter of the piles or by using pile groups.

Information gained from this ground investigation should be assessed by an experienced piling contractor such that appropriate piles are selected and designed given the site conditions that have been encountered.

In accordance with Eurocode 7 it would be prudent to verify the compressive resistance of the strata and the pile design should be by static load testing on working piles 1.5 times the characteristic load on more than 1% of working piles. This will provide an accurate strength of the end bearing stratum.

Discussions should be made with the piling contractor regarding the suitability of driven piles due to the levels of disruption to the adjacent school and residential properties. CFA piles are likely to be a suitable alternative to driven piles to reduce noise levels, although there will be additional costs associated with disposal of excess soils.

The piling work should be undertaken in accordance with BS EN 12699:2015 'Execution of Special Geotechnical Work - Displacement piles', and also relevant standards associated with manufacturing the piles.

#### *Vibro Stone Columns (VSCs)*

Alternatively, vibro stone columns could be utilised which would need to penetrate through the made ground and underlying any soft cohesive natural strata, down to a competent horizon. Following ground improvement, reinforced strip foundations could be used bearing onto the improved ground over the VSCs, effectively forming a ring beam. Typically, allowable bearing capacities of the order of 150kN/m<sup>2</sup> – 200kN/m<sup>2</sup> can be achieved, keeping total and differential settlements within tolerable limits, although this should be discussed with specialist VSC contractors.

#### *Working Platform*

Prior to the commencement of piling works, a working platform will be required for tracked plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on the plant requirements, data and rig loadings.

## 6.4 Building Near Trees

The clay soils on site are of low volume change potential. Where foundation excavations (or piles if adopted) encounter cohesive strata in the vicinity of existing, proposed or recently removed trees, foundations should be adjusted in full accordance with BRE 298. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

A survey of all trees and hedges on the site and within influencing distance of the site boundary should be undertaken to identify tree species and heights by a qualified arboriculturist in accordance with BS 5837:2012. This information will be required in order to assess the effects of trees on the cohesive strata.

Where foundation depths due to trees already present or recently removed exceeds 1.50m there is a possibility for heave to occur on removal of the tree and guidance states that compressible material or void former is required against the inside face of the foundation / ground beam.

## 6.5 Floor Slabs

Given the thickness of made ground present, suspended floor slabs may be adopted at the site in accordance with standards.

Due to the piled/VSC foundation solution, suspended or pre-cast concrete floor slabs could also be utilised.

Where foundation depths due to trees already present exceeds 1.50m there is a possibility for heave to occur on removal of the tree. Guidance states that either a precast concrete floor, a suspended timber or in-situ concrete floor must be used. We recommend the former, where the required void size for beneath floor slabs on this site is 200mm.

Ground bearing floor slabs may also be used, although these would need to be suitably designed to tie in with piles and ring beams, providing the following criteria are satisfied:

- 
- The foundation depth (such as due to the influence of trees) is less than 1.5m.
  - Any fill is suitable, well-compacted granular material placed in an appropriate thickness in accordance with a suitable specification with the end performance validated.
  - It is demonstrated that desiccation in cohesive soils is not present.
  - Any compressible or unsuitable materials are excavated and either improved or removed and replaced with suitable materials.
  - The slab is adequately reinforced.
  - Regular construction joints and ties are provided to allow for differential settlement.
- 

The final floor slab design should be of sufficient thickness and sufficiently reinforced to accept the envisaged applied loads, without unacceptable total or differential movement.

It should be noted that the clays beneath the site are of low volume change potential and heave protection measures may be required, dependant on the floor slab build up.

Prior to the placement of the founding materials and the construction of a ground bearing floor slab, the sub-formation and formation will need to be inspected and checked by a geotechnical engineer to ensure the ground conditions are as expected. If soft spots are identified at the formation level they should be reported to the Geotechnical Engineer immediately and remedial actions agreed.

## 6.6 Site Preparation and Construction

Topsoil and subsoil should be removed from beneath all buildings and hardstanding areas.

There are a number of services crossing the site. To allow remediation and construction, all services will need to be disconnected and any suspected dead services are confirmed as dead by testing.

Instability of excavations through natural soils is not anticipated provided they are not exposed to adverse weather conditions for any substantial period of time. Instability of the made ground should be allowed for. All excavations should be carried out in accordance with CIRIA Report 97 'Trenching Practice'.

Excavation depths should generally be readily achieved using conventional plant (JCB or similar) although high specification plant (tracked 360° or similar) is recommended to maintain the build programme.

The presence of substantial depths of made ground deposits across the site may result in settlement of newly installed drainage. This should be taken into consideration during the design of drainage, which may include flexible joints to allow for some differential settlement.

Recorded post site works groundwater levels were recorded to be 1.39m bgl, however this is considered to be localised perched groundwater within the made ground and therefore a substantial groundwater body is unlikely to be encountered within likely excavation depths. Based on the exploratory hole logs and monitoring, it is considered that methods such as sump pumping are likely to be sufficient to deal with anticipated flows should groundwater be encountered. Further guidance is provided in CIRIA C750 "Groundwater Control: Design and Practice". It should be noted that groundwater levels will vary seasonally and the timing of construction may influence requirements.

## 6.7 Concrete Classification

Laboratory pH and sulphate testing was undertaken on 10 samples of made ground / natural superficial deposits. The data set had over ten results and as such the mean of the highest 20% of the test results has been taken as the characteristic value which is 1.08 g/l. The characteristic value of the lowest 20% of the pH of the samples is 7.85.

The site is underlain by impermeable deposits therefore the groundwater has been classified as static.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1s and sulphate class DS-2 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005. The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

## 6.8 Highways

Lab remoulded CBR results revealed CBR values of 3.9 and 11.1% in the large bund in the north-east of the site, and 10% in the small bund in the centre of the site, and may be assumed for preliminary design purposes on the provision the formation will be proof rolled prior to construction of the pavement, unless proven otherwise by in-situ testing at formation level by a specialist geotechnical engineer. Based on ground conditions encountered across the remainder of the site, an equilibrium CBR values of 2% may be assumed within the made ground.

Where the CBR is found to be less than 2%, the sub-grade is unlikely to be suitable for both the trafficking of site plant and as a permanent highway foundation without improvement of the soils.

To achieve the required design CBR value, improvement works may need to be carried out in accordance with DMRB IAN 73/06 Rev 1 Chapter 5 and may include proof rolling, excavation and re-engineering / replacement of weaker soils, the inclusion of a geogrid or use of stabilisation techniques such as the addition of hydraulic binders (e.g. cement/lime).

Care should be taken to ensure the stratum at formation level is protected against inclement weather, as this is likely to lead to surface deterioration and a decrease in soils strengths.

## **6.9 Soakaways**

The use of soakaways within the natural ground is not feasible at the site due to the presence of relatively impermeable strata underlying the site.

## 7.0 ENVIRONMENTAL ASSESSMENT

### 7.1 Contamination

#### *Soils*

The proposed development is of educational end use therefore residential without plant uptake screening values have been used.

Based on the testing undertaken it would appear that there is widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location. Based on the contamination identified further assessment is required.

Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). Chrysotile and amosite fibres were recorded in a sample taken from the bund in the north-east of the site at 0.002%.

No hydrocarbon contamination has been identified in the sample tested.

#### *Permanent Ground Gases*

In order to assess the ground gas situation and the requirement for ground gas precautionary measures at the site, guidance was taken from CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings' and BS8485:2015+A1:2019 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

As the proposed end-use an educational development (Situation A), CIRIA C665 dictates that the gas monitoring results should be assessed in accordance with the Wilson and Card methodology.

The Wilson and Card methodology uses the concept of a Gas Screening Value (GSV) which is calculated using the following equation:  $(\text{max gas concentration} / 100) \times \text{maximum flow}$ .

A maximum positive flow of 0.3l/hr has been used to calculate the GSVs. The calculated GSV's for the site are presented below.

| Gas            | Calculated GSV (l/h) | Typical Concentration Exceeded | Classification |
|----------------|----------------------|--------------------------------|----------------|
| Methane        | 0.0003               | No                             | CS-1           |
| Carbon Dioxide | 0.0105               | No                             | CS-1           |

From the limited monitoring undertaken to date, the GSV for carbon dioxide places the site into Characteristic Situation 1 (CS1). However, the Atkins investigation recorded elevated carbon dioxide and flow rates in the centre of the site during monitoring visits. As detailed in the remediation strategy and subsequent validation report, gas protection measures in line with CS2 were implemented at the site.

A small single storey extension is proposed for the north of the site, the three nearest exploratory holes did not reveal elevated gas levels. Therefore, and in addition to the above gas monitoring results undertaken during this site investigation it can be determined that gas protection measures are possibly not required within the proposed extension, further monitoring rounds would be required to confirm. However, this will need confirmation with the Local Authority as it may be prudent to include for gas protection measures within the extension in line with those in place across the existing structures.

*Utilities*

The level of protection for the clean potable water supply pipes should be determined using the local water company risk assessment criteria in accordance with UKWIR.

As the site is brownfield, there is the assumption that barrier pipe would be utilised, although requirements should be confirmed by risk assessment and with the water supply company.

## **7.2 Qualitative Risk Assessment**

The CSM has been revised based on the findings of the site investigation and laboratory testing results and these are presented overleaf. Unless stated otherwise, in respect to off-site sources, only risks that are assessed as moderate and above within the preliminary CSM have been carried forward to this section, or where a previously unidentified potential source, pathway and / or receptor has been identified from the recent site works.

| Human Health                                                                                 |                                                                         |                                   |                   |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------|-------------------|----------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential Source                                                                             | Potential Pathway                                                       | Potential Receptor                | Likelihood        | Severity | Level of Risk | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>On site<br/>Made Ground<br/>Metals, PAHs,<br/>asbestos</b>                                | Root uptake,<br>ingestion, direct<br>contact,<br>inhalation of<br>dusts | End-users                         | Likely            | Moderate | Moderate      | Elevated concentrations of lead, benzo(a)pyrene and asbestos were recorded across the site. The proposed development includes a new two storey extension with undercroft parking and a single storey extension. Given this, the development areas of the site will include for the presence of hardstanding / building footprint which will break the pathway to the site end user, the risk in these areas is low. An environmental cover system is present in all existing areas of soft landscaping thus mitigating the risk from onsite contamination in these areas. However, additional works includes for the removal of earth bunds for construction of new surface level car park and hard play areas, should new areas of soft landscaping be introduced in these areas then a moderate risk remains to the end-user and mitigate measures will be required. |
| <b>On site<br/>Made Ground<br/>Metals and<br/>organic<br/>contamination</b>                  | Migration<br>into/chemical<br>attack of water<br>supply pipelines       | Water<br>Pipelines /<br>End users | Unlikely          | Minor    | Moderate      | Heavy metal, PAH, VOC and TPH contamination was recorded during the previous site investigation by Atkins in 2014 and during the recent site works. Contaminants within the soil/groundwater could potentially attack the clean potable water supply pipe, contaminants should be assessed in accordance with the relevant guidance to determine the correct pipe material and level of precautions required.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>On site<br/>Brewery /<br/>Works / Depots<br/>Metals, PAHs,<br/>Asbestos, TPH<br/>etc.</b> | Root uptake,<br>ingestion, direct<br>contact,<br>inhalation of<br>dusts | End-users                         | Likely            | Moderate | Moderate      | Elevated concentrations of lead, benzo(a)pyrene and asbestos were recorded across the site. The proposed development includes a new two storey extension with undercroft parking and a single storey extension. Given this, the development areas of the site will include for the presence of hardstanding / building footprint which will break the pathway to the site end user, the risk in these areas is low. An environmental cover system is present in all existing areas of soft landscaping thus mitigating the risk from onsite contamination in these areas. However, additional works includes for the removal of earth bunds for construction of new surface level car park and hard play areas, should new areas of soft landscaping be introduced in these areas then a moderate risk remains to the end-user and mitigate measures will be required. |
| <b>On site<br/>Electricity<br/>Substation<br/>PCBs</b>                                       | Root uptake,<br>ingestion, direct<br>contact,<br>inhalation of<br>dusts | End-users                         | Low<br>Likelihood | Moderate | Low           | The mobility of this contaminant is low and any volumes present are likely to be small. The substation present onsite was upgraded during the recent redevelopment of the site, therefore unlikely to contain any PCBs. In addition, the proposed development will be covered in hardstanding which will break the pathway to site end users. The risk is considered to be low.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Human Health                                                                                                |                                                                       |                                   |            |          |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------|------------|----------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential Source                                                                                            | Potential Pathway                                                     | Potential Receptor                | Likelihood | Severity | Level of Risk  | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Made Ground / Infilled Ponds</b><br>Ground Gas (carbon dioxide and methane)                              | Migration into confined spaces, inhalation and asphyxiation/explosion | End-users / property / structures | Unlikely   | Severe   | Moderate / Low | <p>Made ground encountered was widely sandy clayey gravels / sandy gravelly clay with limited evidence of degradable/putrescible material which is considered to be of low gas generation potential. Significant depths of made ground was also encountered across the site during previous site investigations identified up to 4.80m in thickness. A localised area of organic clay, likely associated with the former pond recorded in this area on historical mapping was encountered within WS07 in the centre of the site. Peat was also identified within borehole BH03 by Atkins in a similar location. The area of organic made ground/peat is located at the greatest distance from the proposed development.</p> <p>Limited gas monitoring undertaken by BSL at the site have not recorded elevated levels of carbon dioxide and methane.. However, the Atkins investigation recorded elevated carbon dioxide and flow rates in the centre of the site during monitoring visits, noted to be associated with the peat and made ground. In line with the remediation strategy, gas protection measures in line with CS2 were implemented at the site.</p> <p>A small single storey extension is proposed for the north of the site, the three nearest Atkins' exploratory holes and those installed by BSL did not reveal elevated gas levels therefore in line with this gas protection measures would not be required. However, further gas monitoring would be required to confirm this and it will need confirmation with the Local Authority as it may be prudent to include for gas protection measures within the extension in line with those in place across the existing structures.</p> |
| <b>Off site Warehouse / Garage / Works / Mills / Electricity Substation</b><br>PCBs, Metals, PAHs, TPH etc. | Ingestion, direct contact, inhalation of dusts                        | End-users                         | Unlikely   | Moderate | Low            | <p>Offsite sources of contamination are not considered to be greater in significance than those recorded historically at the site. In addition to this, the underlying ground conditions are anticipated to be low permeability glacial till. Given this, lateral migration of contamination onto the site is considered unlikely and therefore the risk is considered to be low.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Controlled Waters                                                             |                                                                      |                                                    |            |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|------------|----------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential Source                                                              | Potential Pathway                                                    | Potential Receptor                                 | Likelihood | Severity | Level of Risk | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Made Ground /<br/>Brewery /<br/>Works / Depots</b><br>PAHs, Metals,<br>TPH | Leaching through unsaturated zone / Migration through saturated zone | Secondary (Undifferentiated) Aquifer (Groundwater) | Unlikely   | Medium   | Low           | Glacial Till is recorded beneath the made ground across the entirety of the site which will break the pathway from the potentially contaminated site soils to the Secondary Undifferentiated Aquifer. Evidence of significant mobile contamination was not recorded during the site works and the site investigation by Atkins in 2014. Localised lead contamination and low level PAH contamination was recorded in a number of the soil samples. Contamination recorded within the groundwater samples during the Atkins investigation was considered to be perched and not reflective of the underlying Aquifers and no remediation was required. In line with the above, the risk to the Secondary Undifferentiated Aquifer is considered to be low.                                                                   |
|                                                                               | Migration through saturated zone                                     | Principal Aquifer (Groundwater)                    | Unlikely   | Medium   | Low           | There are no potable water groundwater abstraction licences or Source Protection Zones near the site. Glacial Till is recorded beneath the made ground across the entirety of the site which will break the pathway from the potentially contaminated site soils to the Secondary Undifferentiated Aquifer. Evidence of significant mobile contamination was not recorded during the site investigation by Atkins in 2014. Localised lead contamination and low level PAH contamination was recorded in a number of the soil samples. Contamination recorded within the groundwater samples during the Atkins investigation was considered to be perched and not reflective of the underlying Aquifers and no remediation was required. In line with the above, the risk to the Principal Aquifer is considered to be low. |

### 7.3 Summary of Identified Risks

#### *Human Health*

Based on the testing undertaken it would appear that there is widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location.

Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). Chrysotile and amosite fibres were recorded in a sample taken from the bund in the north-east of the site at 0.002%.

Should new areas of soft landscaping be introduced in the proposed works then remediation measures will be required to mitigate the risk.

Deep made ground was recorded across the site during the site works, however, evidence of degradable / putrescible material was localised to WS07 understood to be in proximity to a historic infilled pond. This location is located at greatest distance from the proposed ground floor extension in the north of the site. A round of gas monitoring to confirm the risk did not reveal elevated methane or carbon dioxide levels therefore gas protection measures may not be required, however, this is subject to further confirmatory testing and agreement with the Local Authority.

#### *Controlled Waters*

Whilst minor heavy metal and PAH contamination has been identified within the groundwater beneath the site, based on the assessments and updated CSM, BSL believe the overall risk to controlled waters is low and no further action is required.

### 7.4 Remedial Measures

The level of protection for the clean potable water supply pipes should be determined using the local water company risk assessment criteria in accordance with UKWIR.

Where new areas of soft landscaping are to be introduced as part of the proposed works a cover of “clean” subsoil and topsoil should be provided to break the pathway to site end users. The installation of a clean cover system will break the pathway to the end users from the PAH and asbestos contamination and act as a growing medium. The cover layer in soft landscaping areas should comprise (top down):

- 
- 200mm “clean” validated topsoil/subsoil; over
  - 100mm hard dig layer (ideally “clean” quarried MOT Type 1 or similar).
- Or alternatively:
- 150mm “clean” validated topsoil; over
  - 150mm “clean” validated subsoil; over
  - Warning barrier membrane/geotextile.
- 

After installation of the clean cover, soil depths should be verified by a suitably qualified independent geo-environmental engineer, such as BSL.

For areas of proposed trees, a tree pit will need to be excavated and additional subsoil provided above the hard dig layer / membrane.

The above is subject to agreement with the local authority, and requirements should be confirmed at the earliest opportunity.

#### *Gas Protection Measures*

Prior to the schools' construction, the investigation completed by Atkins in 2014 recorded elevated carbon dioxide and flow rates in the centre of the site during monitoring visits, noted to be associated with the peat and made ground. In accordance with the remediation strategy, gas protection measures in line with CS2 were implemented at the site.

A small single storey extension is proposed for the north of the site, the three nearest Atkins' exploratory holes in addition to the round of monitoring by BSL did not reveal elevated gas levels.

Our results indicate that ground gas precautions could potentially be avoided. However further monitoring and confirmation with the local authority is recommended, as this opposes the previously identified recommendations for precautions in line with Characteristic Situation 2.

Where an extension or proposed building is designed with undercroft parking, the requirement for ground gas protection measures will be negated. However, any sections of enclosed building in contact with the ground will still potentially require mitigation measures.

#### *General*

It is recommended that the approval of the Regulators (Local Authority / Environment Agency) is obtained in regard to the above prior to any irrevocable action is taken at the site.

Once the above bodies have approved the above outline remedial proposals, a Remedial Strategy will need to be produced to meet planning requirements and submitted to the regulatory authorities for approval. This will also give guidance to enable a suitably qualified contractor to carry out the works.

A watching brief is recommended during groundworks for any unidentified sources of contamination. If any gross contaminated material is encountered works should cease in that area and BSL consulted.

Once remediation is complete, verification reports will need to be produced by a suitably qualified independent geo-environmental engineer, such as BSL, in order to achieve regulatory sign off.

## **7.5 Asbestos**

The investigation of asbestos issues within structures was beyond the scope of this report. However, guidance from UK Government indicates that asbestos should be assumed to be present in buildings unless proven otherwise.

Any asbestos within structures will require removal prior to re-development. This will need to be done by a suitably qualified experienced and licensed contractor, who ensures that adequate PPE is provided to operatives, and that all the relevant legislation is adhered to.

In addition, the presence of asbestos within the ground will require, a safe system of work to be set up on site to deal with the asbestos risk from the made ground. This should be detailed within an Asbestos Management Plan and may include but be not limited to:

- The use of qualified personnel where required.
- Careful segregation of stockpiles on site.
- Defining transport routes.
- Cleaning down of machinery in designated areas.
- Decontamination unit for ground workers.
- Damping down of soils to prevent dust migration.

Asbestos fibres have been identified in five samples at the site and numerous samples during the Atkins site investigation in 2014 with quantification analysis identifying this to be above trace amounts. The level of precautions required are at the discretion of the principal contractor on site however good site practices including minimising the generation of dusts should be adhered to and sufficient to mitigate against the risk from asbestos. In addition, site personnel should have the risk communicated at the induction stage. It is recommended that the asbestos in construction materials assessment tool is used at the site to inform asbestos licensing and control measures.

Excavations in soils containing asbestos should comply with the CL:AIRE publication 'Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials' (CARSOIL™) and CAR 2012. All such works will need to be agreed with the regulatory bodies (HSE and/or LA).

Additional guidance is provided within the BSL methodology Guidance Note in Appendix A.

## 7.6 Health and Safety Issues

During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

| Potential Source | Potential Pathway                               | Potential Receptor   | Likelihood | Severity | Level of Risk |
|------------------|-------------------------------------------------|----------------------|------------|----------|---------------|
| Made ground      | Ingestion, direct contact, inhalation of dusts. | Construction Workers | Unlikely   | Medium   | Low           |
| Asbestos         | Ingestion, direct contact, inhalation of dusts. | Construction Workers | Likely     | Medium   | Moderate      |
| Ground gas       | Inhalation in confined spaces/trenches          | Construction Workers | Unlikely   | Medium   | Low           |

Chrysotile and Amosite asbestos have been identified in numerous samples of made ground at varying depths across the site. Levels of asbestos in excess of trace levels have been recorded at the site. The risk from asbestos should be highlighted in the method statements and site induction. If further evidence of asbestos is encountered in the soils, work should cease until asbestos control measures have been agreed and put in place.

The risk from other made ground contaminants will be mitigated by standard PPE including gloves. Welfare facilities should be made available to wash before hand to mouth activities.

General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land". In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided.
- Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

## 7.7 Waste

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. It is the responsibility of the waste producer to classify this waste. The classification process is described in the 'Guidance on the classification and assessment of waste' WM3 and aims to determine whether the waste is Hazardous or Non-Hazardous to human health and the environment.

Any material excavated on site may be classified as waste and it is a statutory responsibility of the holder of a material to form their own view on whether or not it constitutes waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. If soils are required to be removed from site, then there are three main options for the disposal of soils:

1. Re-use on another site (subject to suitability of the soils and complying with relevant waste legislation).
2. Disposal to a permitted waste recycling facility.
3. Disposal to a landfill site.

Note that wastes should first be classified based on their total concentrations and given the classification of either hazardous or non-hazardous. WAC testing is then **only** required if the end disposal route is landfill. Leaching test results obtained as part of landfill WAC analysis must **not** be used for waste classification and hazardous waste assessment purposes.

Details of how material should be classified for waste disposal are presented in the BSL Methodology and Guidance in Appendix A and are summarised in the table below.

| Classification based on Total Concentrations <sup>1</sup> | PRIOR TO LEAVING SITE                                        |                                     |                                               |                            |
|-----------------------------------------------------------|--------------------------------------------------------------|-------------------------------------|-----------------------------------------------|----------------------------|
|                                                           | Non-Hazardous Waste                                          |                                     | Hazardous Waste                               |                            |
|                                                           | IF SOILS CANNOT BE RE-USED ELSEWHERE AND MUST GO TO LANDFILL |                                     |                                               |                            |
| WAC testing                                               | Below inert WAC limit values                                 | Above inert WAC limit values        | Below hazardous WAC limit values <sup>4</sup> | > WAC limit values         |
| Landfill requirements                                     | INERT landfill                                               | NON-HAZARDOUS landfill <sup>2</sup> | HAZARDOUS landfill                            | PRE-TREATMENT <sup>3</sup> |

<sup>1</sup> Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).

<sup>2</sup> Individual sites may have certain limit values pre-determined in their licence.

<sup>3</sup> After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

- 4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

Waste classified as non-hazardous can be accepted into a non-hazardous landfill without having to pass any numerical WAC.

Soils above hazardous WAC limit values require pre-treatment prior to disposal. The effective pre-treatment, typically involving separation, sorting and screening, can offer cost savings through reducing the hazardous nature and volumes of soil. Costs for disposal of non-hazardous/hazardous soils are significant compared to the disposal of inert material.

#### *Waste Classification - Total Concentrations*

We have reviewed the testing results and assessed them through a waste classification database which allows users to code and classify waste as defined in the EWC (European Waste Catalogue) based on EC Regulation 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures (CLP) and latest Environment Agency guidance (WM3 "Guidance on the classification and assessment of waste - Technical Guidance").

Six samples were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3.

Based on the waste classification database assessment, the made ground soils have been classified as **non-hazardous**. The Waste Classification Report is presented in Appendix F.

#### *Asbestos*

None of the samples tested for asbestos indicate that the soils are classified as hazardous, however there is potential for cement bound ACMs to be present within the mounds at the site as some ACMs have previously been identified at the site.

The concentrations of fibres in the samples tested ranged from trace to 0.002% which indicate the soils will potentially be accepted at landfill as either inert or stable non-reactive hazardous waste. However, it should be noted that given the findings of the Atkins' report there is potential for asbestos to be present in areas of the site above the hazardous waste threshold of 0.1%. A summary of the waste classification associated with asbestos identified in the soils during our site investigation are presented below:

| Location          | Depth (m)  | ACM                               | Conc. by Weight (%) | Waste Disposal Route |
|-------------------|------------|-----------------------------------|---------------------|----------------------|
| WS01 (0.50m)      | 0.50m      | Chrysotile & Amosite Loose Fibres | 0.002               | SNR Hazardous        |
| WS02 (0.50-1.50m) | 0.50-1.50m | Chrysotile Loose Fibres           | <0.001              | Inert                |
| WS03 (1.00m)      | 1.00m      | Chrysotile Loose Fibres           | <0.001              | Inert                |
| WS05 (1.00-1.80m) | 1.00-1.80m | Chrysotile Loose Fibres           | <0.001              | Inert                |
| WS07 (0.35-0.70m) | 0.35-0.70m | Chrysotile Loose Fibres           | <0.001              | Inert                |
| HP01 (0.50m)      | 0.50m      | Chrysotile Loose Fibres           | <0.001              | Inert                |

A watching brief should be maintained for evidence of Asbestos Containing Materials (ACMs), any ACMs observed should be handpicked and disposed of in accordance with current asbestos disposal regulations.

Testing for total contaminant concentrations on natural soils was not undertaken and they are assumed to be non-hazardous.

The possibility of automatic inert classification of the naturally occurring “clean” soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing. This is the case if:

- 
- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
  - There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill.
- 

#### *Waste Acceptance Criteria (WAC)*

The WAC testing has revealed that if suitable segregation of different types of soil is put into place and the end disposal route of the made ground is landfill, then the soils will potentially be suitable for disposal at a stable non-reactive waste landfill site without pre-treatment.

#### *General*

If any gross hydrocarbon contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

Where it is necessary to dispose material off site it is recommended that materials are segregated and sufficient time is allowed to further classify the actual soil arisings that constitute the waste, including discussion with landfill sites and waste transfer stations to find the best disposal route. It is illegal to dilute and mix soils without a suitable permit.

#### *Re-use of Soils*

By definition in law, any material excavated from the ground becomes waste at the moment of excavation. If that soil (now a “waste”) is then placed on another part of the development site (or used on another development site) without an appropriate materials management plan, permit or exemption being in place, by law this material is defined as “illegally deposited waste”.

Landfill tax rules were updated on 1 April 2018 and as a result of the change, HM Revenue & Customs (HMRC) can now recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site, is now also liable to pay Landfill Tax.

In order to comply with UK legislation and avoid excessive costs, if the re-use of soils is proposed on site, this should be done in accordance with the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP) also known as a Materials Management Plan (MMP). Regardless of implementing the DoWCoP or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs. Further guidance is provided in the BSL Methodology and Guidance in Appendix A.

## 8.0 CONCLUSIONS

### 8.1 Summary

#### *Environmental*

Based on the testing undertaken it would appear that there is widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was also noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location.

Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). Chrysotile and amosite fibres were recorded in a sample taken from the bund in the north-east of the site at 0.002%. During the Atkins investigation asbestos was identified in soils across the site at concentrations of <0.001% to 0.573% with asbestos cement identified in one location.

Should new areas of soft landscaping be introduced in the proposed works then remediation measures will be required to mitigate the risk.

Deep made ground was recorded across the site during the site works, however, evidence of degradable / putrescible material was localised to WS07 understood to be in proximity to a historic infilled pond. This location is located at greatest distance from the proposed ground floor extension in the north of the site. A round of gas monitoring to confirm the risk did not reveal elevated methane or carbon dioxide levels. Based on this, our results indicate that ground gas precautions could potentially be avoided. However, further monitoring and confirmation with the local authority is recommended, as this opposes the previously identified recommendations for precautions in line with Characteristic Situation 2.

Whilst minor heavy metal and PAH contamination has been identified within the groundwater beneath the site, based on the assessments and updated CSM, BSL believe the overall risk to controlled waters is low and no further action is required.

Sampling undertaken from the bunds reveals the material is considered non-hazardous waste suitable for disposal at a stable non-reactive hazardous landfill.

#### *Geotechnical*

The development will comprise a new two storey extension and undercroft car parking and a single storey dining extension and is considered to be classed as Geotechnical Category 2 in accordance with Eurocode 7.

It is considered that the most suitable foundations for the two-storey extension with undercroft car parking and single storey extension is either piles or vibro stone columns (VSCs) due to the presence of made ground at depths of 1.80mbgl to in excess of 3.00mbgl. The depth of made ground was not proven in the north of the site in proximity to the proposed single storey extension and therefore further investigative works may be required to determine this.

Given the depth to bedrock of 17m, preliminary calculations were undertaken for a single 225mm wide square concrete pile approximately 10.00m in length. Allowable loads of approximately 190-200kN should be assumed for a 225mm square section driven pile in the glacial till.

The vibro stone columns would need to penetrate through the made ground and underlying any soft cohesive natural strata, down to a competent horizon. Following ground improvement, strip foundations could be used bearing onto the improved ground over the VSCs. Typically, allowable bearing capacities of the order of 150kN/m<sup>2</sup> – 200kN/m<sup>2</sup> can be achieved, keeping total and differential settlements within tolerable limits, although this should be discussed with specialist VSC contractors.

Given the thickness of made ground present, and due to the piled/VSC foundation solution, suspended or pre-cast concrete floor slabs could be utilised.

Where foundation depths due to trees already present exceeds 1.50m there is a possibility for heave to occur on removal of the tree. Guidance states that either a precast concrete floor, a suspended timber or in-situ concrete floor must be used. We recommend the former, the required void size for beneath floor slabs on this site is 200mm.

Drainage to soakaways will not be suitable on account of the low permeability clays beneath the site.

## **8.2 Further Work**

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

- 
- Supplementary Intrusive site investigations comprising: Window sampling to confirm depth to bearing stratum in the north of the site associated with the single storey dining extension.
  - Detailed foundation design.
  - Design of Remedial Strategy and confirmation with the Local Authority (if required).
  - Asbestos Management Plan for construction phase.
  - Implementation of the Remedial Strategy and verification of the remedial works (if required).
-

## 9.0 REFERENCES

- Association of Ground Investigation Specialists. 'Guidelines for Good Practice in Site Investigation'. Issue 2, March 2006.
- British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R&D Publication 8. 'The physical properties of major aquifers in England and Wales'. 1997.
- British Geological Survey Technical Report WD/00/04. 234pp. Environment Agency R&D Publication 68 'The physical properties of minor aquifers in England and Wales'.
- British Geological Survey 'The advanced soil geochemical atlas of England and Wales'. 2012.
- BS 1377 'Method of Test for Soils for Civil Engineering Purposes'. 1990.
- BS EN 1997-1. 'Eurocode 7 – Geotechnical design - Part 1: General rules'. Plus associated UK National Annex. 2004.
- BS EN 1997-2. 'Eurocode 7 – Geotechnical design - Part 2: 'Geotechnical investigation and testing'. Plus associated UK National Annex. 2007.
- BS 3882: 'Specification for topsoil'. 2015.
- BS 5837: 'Trees in relation to design, demolition and construction Recommendations'. 2012.
- BS 5930: 'Code of Practice for Site Investigations'. 2015.
- BS 6031: 'Code of practice for earthworks'. 2009.
- BS 8004: 'Code of practice for foundations'. 2015.
- BS 8485+A1: 'Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings'. 2019.
- BS 8500-1 AMD 2. Concrete. Complementary BS to BS EN 206. Part 1. 'Method of specifying and guidance for the specifier'. 2018.
- BS 8576 'Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)'. 2013.
- BS 10175:2011+A2 'Investigation of Potentially Contaminated sites - code of practice'. 2017.
- BS EN ISO 14688 'Geotechnical investigation and testing – Identification and classification of soil'. 2018.
- BS EN ISO 17892 'Geotechnical investigation and testing. Laboratory testing of soil.' Parts 1-12 :2018.
- BRE Special Digest 1: 'Concrete in Aggressive Ground' 3rd Ed 2005.
- BRE Report BR211, Scivyer, C. 'Radon – Guidance on protective measures for new buildings' 2015 Edition.
- BRE Digest, vols. 240 and 241 'Low-rise buildings on shrinkable clay soils'. 1993.
- BRE Digest 298 'The influence of trees on house foundations in clay soils'. 1999.
- BRE Digest 365 'Soakaway Design'. 2016.
- BRE Report 414. 'Protective measures for housing on gas contaminated land. Building Research Establishment Report'. 2011.
- BRE Report 465 'Cover Systems for Land Regeneration'. 2004.
- BRE Report 470 'Working platforms for tracked plant: good practice guide to the design, installation, maintenance and repair of ground-supported working platforms'. 2004.
- CIRIA Special Publications 101-112, 'Remedial Treatment for Contaminated Land'. 1998.

- CIRIA Special Publication 124, 'Barriers, liners and cover systems for containment and control of land contamination'. 1996.
- CIRIA R143, 'The Standard Penetration Test (SPT): methods and use'. 1995.
- CIRIA 149 'Protecting Development from Methane'. 1995.
- CIRIA 150 'Methane Investigation Strategies'. 1995.
- CIRIA 151 'Interpreting Measurements of Gas in the Ground'. 1995.
- CIRIA 152 'Risk assessment for Methane and Other Gases from the Ground'. 1995.
- CIRIA 552 'Contaminated Land Risk Assessment – A guide to good practice'. 2001.
- CIRIA C659 'Assessing risks posed by hazardous ground gases to buildings.' 2006.
- CIRIA C665 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'. 2007.
- CIRIA C681 'Unexploded Ordnance (UXO) A guide for the construction industry'. 2009.
- CIRIA C716 'Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination'. 2012.
- CIRIA C733 'Asbestos in Soil And Made Ground: A Guide To Understanding And Managing Risks'. 2014.
- CIRIA C735 'Good Practice on The Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases'. 2014.
- CIRIA C748 'Guidance on the Use of Plastic Membranes as VOC Vapour Barriers'. 2014.
- CIRIA C750 'Groundwater control: design and practice, second edition". 2016.
- CL:AIRE and CIEH. 'Guidance on Comparing Soil Contamination Data with a Critical Concentration'. May 2008.
- CL:AIRE 'The Definition of Waste: Development Industry Code of Practice'. Version 2. March 2011.
- CL:AIRE RB17 'A Pragmatic Approach to Ground Gas Risk Assessment'. 2012.
- CL:AIRE SP1010 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'. Rev 2 2014.
- CL:AIRE 'Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials – CAR-SOILTM'. 2016.
- DEFRA and the Environment Agency, CLR10 'Soil Guideline Value Reports for Individual Soil Contaminants'. 2002-2004.
- DEFRA and the Environment Agency, CLR Report No 11 'Model Procedures for the Management of Contaminated Land'. 2004.
- Department of the Environment, CLR Report No 1 'A framework for assessing the impact of contaminated land on groundwater and surface water'. 1994.
- Department of the Environment, CLR Report No 2 'Guidance on Preliminary Site Inspection of Contaminated Land'. 1994.
- Department of the Environment, CLR Report No 3 'Documentary research on Industrial Sites'. 1994.
- Department of the Environment, CLR Report No 4 'Sampling Strategies for Contaminated Land'. 1994.
- Department of the Environment Waste Management Paper No. 27. 'Landfill Gas: A Technical Memorandum Providing Guidance on the Monitoring and Control of Landfill Gas'. 1992.

- Department of the Environment. 'Industry Profiles' - 48 separate publications available from The Stationery Office, London. 1995.
- DETR. Circular: Contaminated Land. 2006.
- EC Regulation 1272/2008 'The Classification, labelling and packaging of substances and mixtures (CLP)' 2008
- Environment Agency 'Using Soil Guideline Values'. 2009.
- Environment Agency, 'Updated Technical Background to the CLEA model'. 2009.
- Environment Agency, 'Human health toxicological assessment of contaminants in soil'. 2009.
- Environment Agency Hazardous Waste: 'Guidance on the classification and assessment of waste' WM3 ver 1.1 May 2018.
- Environment Agency. 'Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination'. 2006.
- Environment Agency & NHBC. R&D Publication 66. 'Guidance for the Safe Development of Housing on Land Affected by Contamination'. 2008.
- Environment Agency. R&D Publication 20. 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources'. 1999.
- Environment Agency Technical Guidance Note 01. Hydrogeological Risk Assessment for Landfills. [Withdrawn Feb 2016. Replaced with below].
- Environment Agency and DEFRA 'Landfill developments: groundwater risk assessment for leachate'. 2016.
- Environment Agency Petroleum Hydrocarbons in Groundwater 'Supplementary Guidance for Hydrogeological Risk Assessment'. 2009.
- Environment Agency 'Groundwater protection: Principles and practice (GP3)'. 2013. [Superseded 2017 by [www.gov.uk](http://www.gov.uk) online guidance].
- Environmental Permitting Guidance: version 3.1 'The Landfill Directive for the Environmental Permitting (England and Wales) Regulations'. 2010.
- Environmental Quality Standards. 2008.
- European Parliament Directive 2008/98/EC of the Council of 19 November 2008 on waste and repealing certain Directives. 2008.
- European Parliament. Directive 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC.
- Ground Engineering. Wilson & Card 'Proposed method classifying gassing sites' /1999.
- Hazardous Waste (England and Wales) Regulations. 2005.
- Health & Safety Executive (HSE). 'Protection of Workers & the General Public during the Development of Contaminated Land'. 1991.
- Health and Safety Executive (HSE). Control of Asbestos Regulations (CAR). 2012.
- Highways Agency. Design Guidance for Road Pavement Foundations (Draft HD25). Interim Advice Note 73/06. Rev 1. Highway Agency, London. 2009. [Withdrawn 30th May 2017].
- ICE Thomas Telford 'Applications of Dynamic Cone Penetrometer testing in East Anglia'. 1989.

Land Quality Press, Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R. C. and Nathanail, J.F. 'The LQM/CIEH S4ULs for Human Health Risk Assessment.' 2015.

Landfill Directive 'Directive 1999/31/EC on the landfilling of waste'. 1999.

Japanese Geotechnical Society. Hatanaka and Uchida 'Empirical correlation between penetration resistance and effective friction of sandy soil'. Soils & Foundations, 36 (4), 1-9. 1996.

Manual of Contract Documents for Highway Works, Specification for Highway Works: Volume 1, Amendment August 2014. [Withdrawn 30th May 2017].

Manual of Contract Documents for Highway Works, Specification for Highways Works – Series 600 Earthworks November 2006. [Withdrawn 30th May 2017, Replacement unknown].

National Planning Policy Framework (NPPF). July 2018.

National Planning Policy Framework - Technical Guidance. March 2012.

Total Petroleum Hydrocarbon Criteria Working Group Volume 1 'Analysis of Petroleum Hydrocarbons in Environmental Media'. 1999.

Total Petroleum Hydrocarbon Criteria Working Group Volume 2 Composition of Petroleum Mixtures. May 1998.

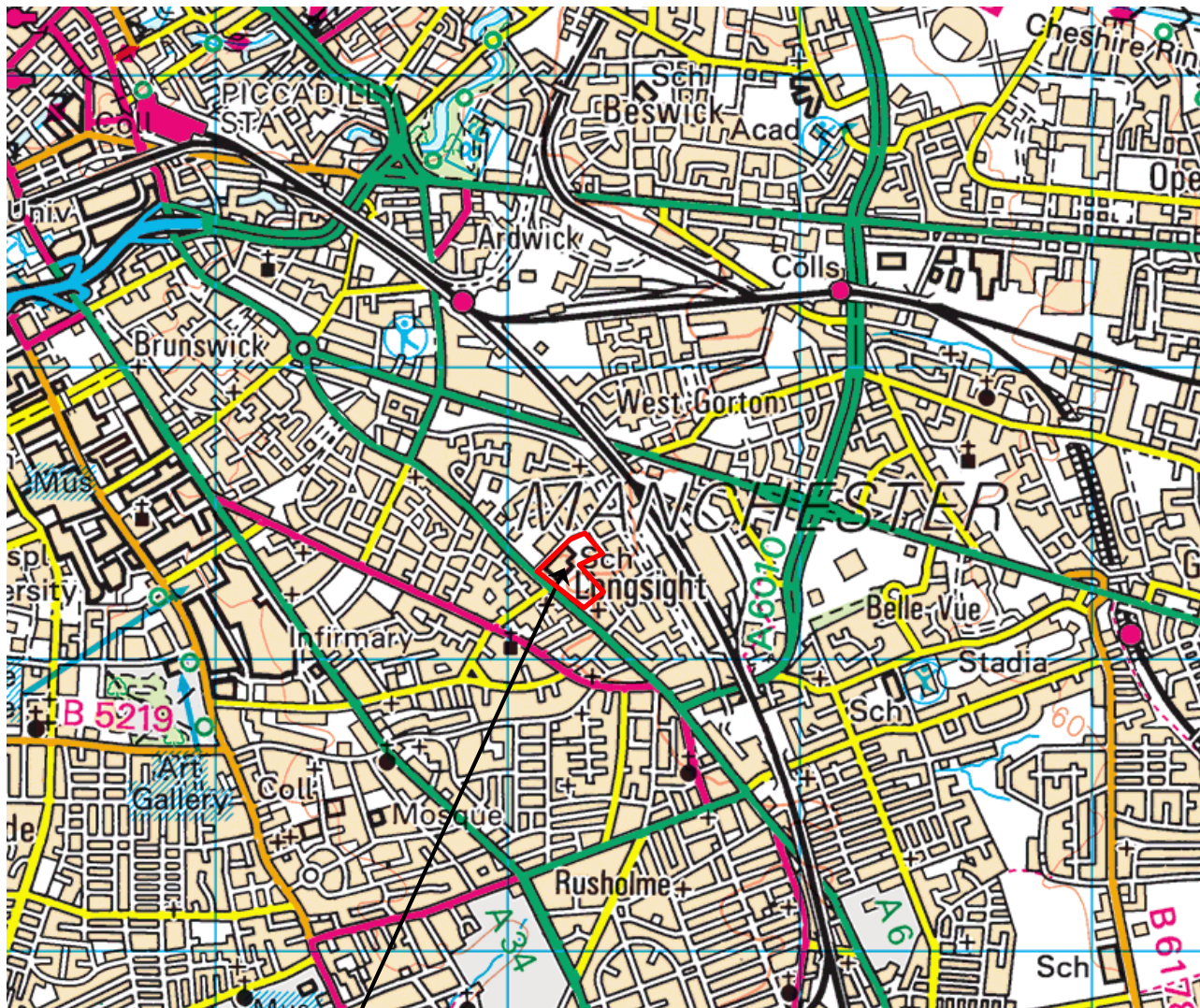
Total Petroleum Hydrocarbon Criteria Working Group Volume 3 'Selection of Representative TPH Fractions Based on Fate and Transport Considerations'. July 1997.

Total Petroleum Hydrocarbon Criteria Working Group Volume 4 'Development of Fraction Specific Reference Doses (RfDs) and Reference Concentrations (RfCs) for Total Petroleum Hydrocarbons (TPH)'. 1997

Total Petroleum Hydrocarbon Criteria Working Group Volume 5 'Human Health Risk-Based Evaluation of Petroleum Release Sites: Implementing the Working Group Approach' June 1999.

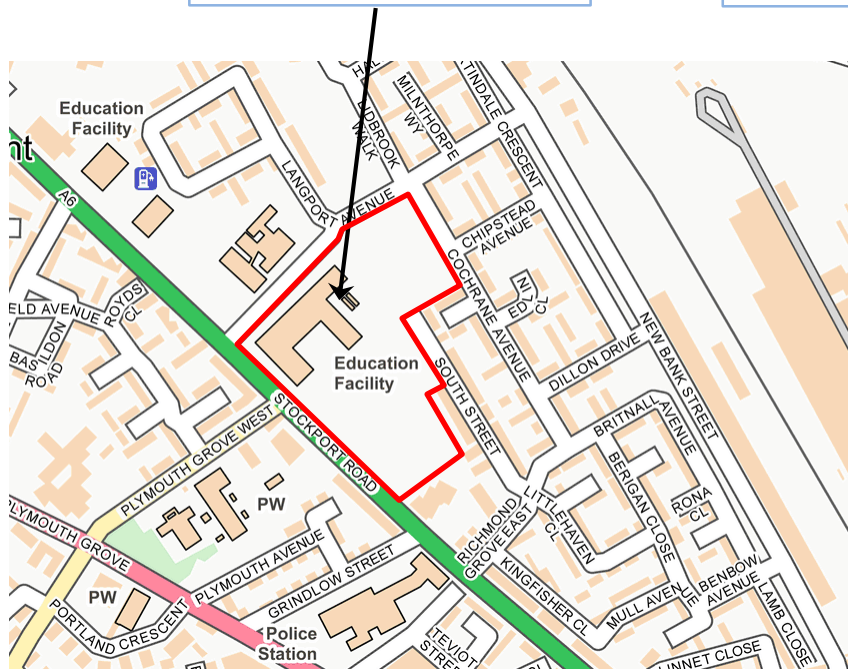
UKWIR Report 10/WM/03/21 2010 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' 2010.

## DRAWINGS



SITE LOCATION

NEAREST POSTCODE: M13 0LF



| REV                                                                                                                                                                                                       | DATE     | DESCRIPTION | BY       | CKD |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|----------|-----|
|                                                                                                                                                                                                           |          |             |          |     |
| <div><div><b>BROWNFIELD<br/>SOLUTIONS LTD</b><br/><small>CEO ENVIRONMENTAL ENGINEERING EXCELLENCE</small></div></div> |          |             |          |     |
| CLIENT                                                                                                                                                                                                    |          |             |          |     |
| THE DEAN TRUST                                                                                                                                                                                            |          |             |          |     |
| PROJECT TITLE                                                                                                                                                                                             |          |             |          |     |
| DEAN TRUST ACADEMY,<br>ARDWICK, MANCHESTER                                                                                                                                                                |          |             |          |     |
| DRAWING TITLE                                                                                                                                                                                             |          |             |          |     |
| SITE LOCATION PLAN                                                                                                                                                                                        |          |             |          |     |
| DRAWING No.                                                                                                                                                                                               | REVISION | SCALE       | DATE     |     |
| M4246/01                                                                                                                                                                                                  | -        | NTS         | 03/07/19 |     |
| DRAWN BY                                                                                                                                                                                                  |          | CHECKED BY  |          |     |
| GRP                                                                                                                                                                                                       |          | DMG         |          |     |



- KEY
- SITE BOUNDARY
  - HPXX HAND EXCAVATED TRIAL PIT
  - WSXX WINDOW SAMPLE BOREHOLE

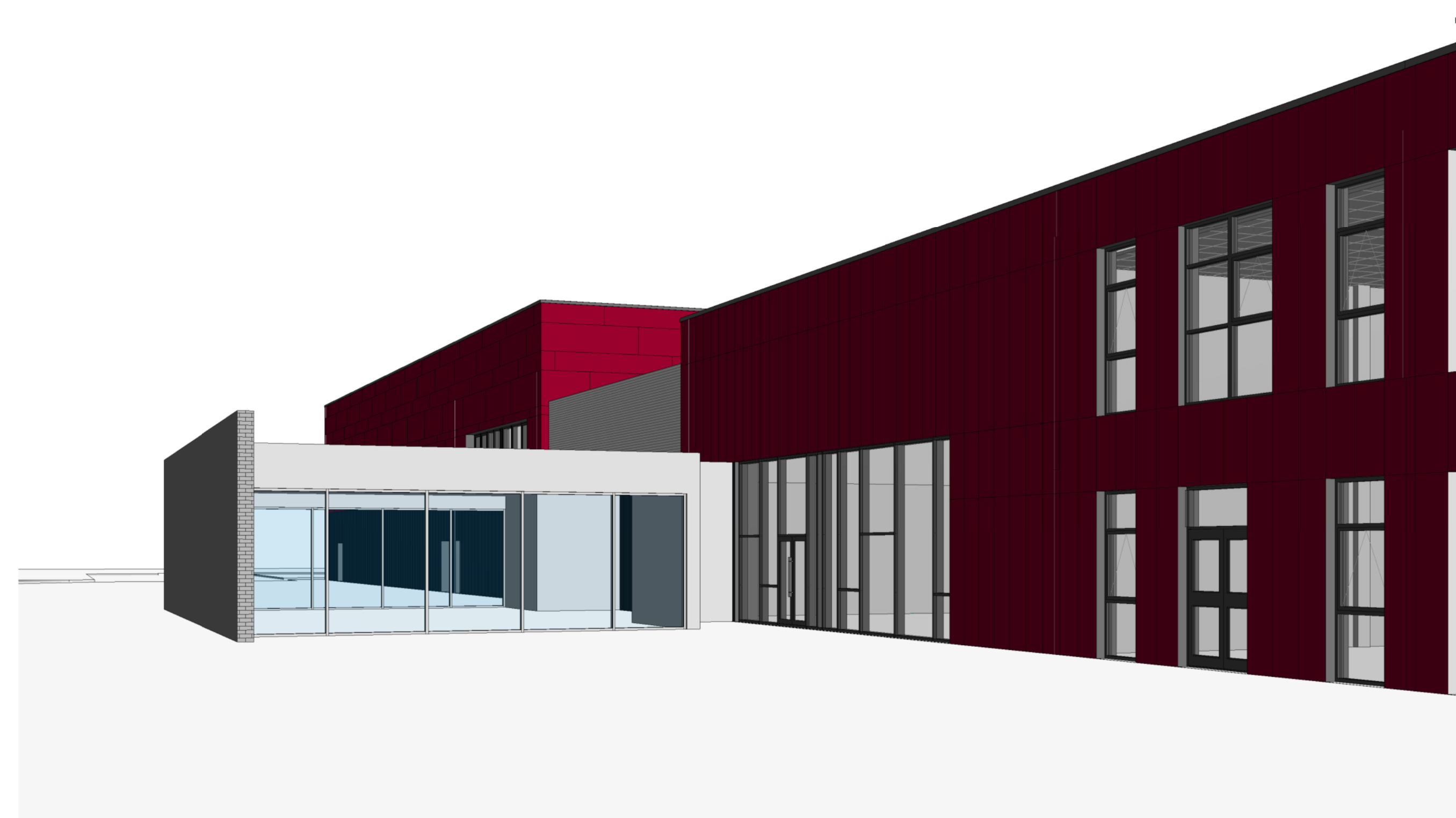
- NOTES
- ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
  - DRAWING NOT FOR CONSTRUCTION PURPOSES.

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



|                                         |          |            |          |
|-----------------------------------------|----------|------------|----------|
| CLIENT                                  |          |            |          |
| THE DEAN TRUST                          |          |            |          |
| PROJECT TITLE                           |          |            |          |
| DEAN TRUST ACADEMY, ARDWICK, MANCHESTER |          |            |          |
| DRAWING TITLE                           |          |            |          |
| EXPLORATORY HOLE LOCATION PLAN          |          |            |          |
| DRAWING No.                             | REVISION | SCALE      | DATE     |
| M4246/02                                | -        | NTS        | 25/07/19 |
| DRAWN BY                                |          | CHECKED BY |          |
| NS                                      |          | DMG        |          |

Copyright: All rights reserved.  
This drawing must not be reproduced without permission.  
This drawing must not be scaled. Dimensions are in millimetres unless specified.

[illegible]

Wellfield Chester Road Preston Brook WA7 3BA  
T: +44 1928 752 200 E:info@ewa.co.uk

REV

SCALE | @ A1  
DATE | 05/20/11

## **APPENDIX A**

### **BSL Methodology and Guidance**

**BSL Methodology and Guidance – Geo-Environmental Assessment Reports**

This Appendix provides information on the approaches, methods and guidance used by Brownfield Solutions Ltd in the preparation of this report.

The term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential soils and groundwater contamination). The term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements). It should be noted that this is an integrated investigation and these two main aspects are related, unless otherwise specified within the report.

Desk Studies are written in broad agreement with BS 10175:2011+A2:2017. The first stage of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011+A2:2017), often referred to as a Phase 1 Desk Study Assessment, comprising a desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed. From this are identified any geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them.

From the geo-environmental perspective, the hazard Identification process uses professional judgement to evaluate all the hazards in terms of possible contaminant linkages (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include the exploratory, main and supplementary Investigations described in BS 10175:2011+A2:2017.

## **Legislative Background**

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

- 1) Significant harm is being caused or there is a significant possibility of such harm being caused;
- 2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

### *Relevant Guidance Documents*

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990.
- CLR11 – Model Procedures.
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002.
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002.
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003).
- BS 10175:2011+A2:2017.

### *Relevant Legislative Documents*

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
  - The Environment Protection Act (1990).
  - The Water Resources Act (1991).
  - The Environment Act (1995).
  - The Contaminated Land (England) Act (2000).
  - The Pollution Prevention and Control (England and Wales) Regulations (2000).
  - The Landfill Regulations (England and Wales) Regulations (2002).
  - The Landfill (England and Wales) (Amendment) Regulations (2004).
  - Contaminated Land (England) Regulations (2012).
  - Health and Safety at Work Act.
-

## Contaminated Land Risk Assessment

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:

Hazard Identification ➡ Hazard Assessment ➡ Risk Estimation ➡ Risk Evaluation

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under CLR11, three tiers of risk assessment exist - Preliminary, Generic Quantitative and Detailed Quantitative.

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552:

- **High likelihood:** There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- **Likely:** There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood:** There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term;
- **Unlikely:** There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

The severity is also classified using a system based on CIRIA C552. The terms and definitions are:

- **Severe:** Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);  
*Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse;*
  - **Medium:** Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);  
*Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve;*
  - **Mild:** Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment;  
*Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.*
  - **Minor:** harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.
-

*Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.*

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

|             |                | Consequences |              |              |              |
|-------------|----------------|--------------|--------------|--------------|--------------|
|             |                | Severe       | Medium       | Mild         | Minor        |
| Probability | Highly likely  | Very high    | High         | Moderate     | Moderate/low |
|             | Likely         | High         | Moderate     | Moderate/low | Low          |
|             | Low likelihood | Moderate     | Moderate/low | Low          | Very low     |
|             | Unlikely       | Moderate/low | Low          | Very Low     | Very low     |
|             | No Linkage     | No risk      |              |              |              |

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

- **Very high:** There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required;
- **High:** Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term;
- **Moderate:** It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term;
- **Low:** It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild;
- **Very Low:** There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Some linkages may be identified which constitutes a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'no linkage' in the summary table and no further action is required.

## Ground Gas Guidance

Redevelopment on brownfield sites is an ever increasing occurrence, including those sites where a potential ground gas issue is present.

BS8485:2015+A1:2019 and CIRIA C665 is the current guidance which gives up-to-date advice on all aspects of ground gas. It outlines good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to gas contaminated land. Two semi-quantitative methods are set out for the assessment of risk:

- 1 For low rise housing with a ventilated under floor void at minimum 150 mm (Boyle and Witherington);
- 2 For all other development types (Wilson and Card).

Both methods use the concept of Gas Screening Values (GSVs) to identify levels of risk. The mitigation and management of potentially unacceptable risk is described with reference to both passive and active systems of gas. Source removal is also discussed as an option.

CIRIA C665 and the advice it contains has been prepared to be generally consistent with CLR11 *Model Procedures for the management of land contamination* (Defra and Environment Agency, 2004a). The aim of CIRIA C665 is a consistent approach to decision making, particularly relating to the scope of protective design measures on a site specific basis.

### *Legislative Framework*

CIRIA C665 provides technical guidance however also recognises the context into which the guidance has to be employed. Government policy is based upon a “suitable for use approach”, which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the “source” in a “pollutant linkage” which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be “contaminated land” under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land* (DETR, 2000a).

### *Frequency and Duration of Monitoring*

The monitoring period for a specific site covers the “worst case” scenario. A “worst case” scenario will occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of the additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with soil gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

### *Typical/idealised periods of monitoring*

|                            |                                 | Generation of Potential Source |          |          |           |           |
|----------------------------|---------------------------------|--------------------------------|----------|----------|-----------|-----------|
|                            |                                 | Very Low                       | Low      | Moderate | High      | Very High |
| Sensitivity of Development | Low (Commercial)                | 1 month                        | 2 months | 3 months | 6 months  | 12 months |
|                            | Moderate (Flats)                | 2 months                       | 3 months | 6 months | 12 months | 24 months |
|                            | High (Residential with Gardens) | 3 months                       | 6 months | 6 months | 12 months | 24 months |

*Typical/idealised frequency of monitoring*

|                            |                                 | Generation of Potential Source |     |          |      |           |
|----------------------------|---------------------------------|--------------------------------|-----|----------|------|-----------|
|                            |                                 | Very Low                       | Low | Moderate | High | Very High |
| Sensitivity of Development | Low (Commercial)                | 4                              | 6   | 6        | 12   | 12        |
|                            | Moderate (Flats)                | 6                              | 6   | 9        | 12   | 24        |
|                            | High (Residential with Gardens) | 6                              | 9   | 12       | 24   | 24        |

**Note**

- 1 NHBC guidance also recommends this period of monitoring (Boyle and Witherington, 2007).
- 2 There is no industry consent over “high”, “medium” or “low” generation potential of source.
- 3 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

## **Contaminated Land Screening Values**

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

### *General*

The current recommended method for assessing contamination is on the basis of:

#### **Source-Pathway-Receptor**

Where any one of these “pollution linkages” is absent there is deemed to be no risk.

Fundamentally receptors can be considered as humans and controlled waters (surface and ground waters).

The purpose of using Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake clean up based on the data to hand is cost effective.

### *Human Health*

Current UK guidance is provided by DEFRA and the Environment Agency (EA). Publications forming part of the guidance include; CLEA Model, toxicological reports and soil guideline values (SGV), collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values for soil contamination based on standard land uses and soil assumptions.

CLEA guidance has gone through a number of revisions, all of the original SGV's that were published have been withdrawn and publication of new SGV's commenced in 2009.

For determinands where no SGVs are available, S4UL values have been published using the CLEA 1.06 Model. These are the third set of generic assessment criteria generated by CIEH, and replace the previous two sets of GACs. The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

No SGV or S4UL is available for lead as this is derived based on blood lead levels. C4SL values for six determinands including lead was published by DEFRA/CL:AIRE in December 2014 and they represent a low risk as opposed to minimal risk. The C4SL values are based on a sandy loam with 6% Soil Organic Matter. These screening values were published by DEFRA for Part 2A use, although with the dual purpose for use under planning. However these have not been officially accepted by Local Government for use under planning. S4ULs remain the first reference due to the broader range of end uses and soil organic content.

The preference from the EA is that site specific screening levels are used wherever possible. Due to numerous factors it is not always possible to utilise site specific values. In these instances the following data sources are used in the order of preference given below:

- CIEH S4UL values (derived by CIEH/LQM)
- DEFRA/CL:AIRE C4SL's
- CL:AIRE GAC values
- Current UK SGV's
- Guidance from other European countries
- Guidance from the outside Europe

### *Controlled Waters*

The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations). The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

---

The chemical standards used in the UK to control impact of contamination on controlled waters are Environmental Quality Standards (EQS). The EQS's cover a large number of compounds.

Where certain compounds are not covered by the EQS these are commonly compared to the UK Drinking Water Standards (DWS).

*Further Assessment*

When screening values are exceeded then further consideration is required. This could include the use of simple measures to break the pollution pathway and mitigate the risk, further more detailed investigation, including the deriving of site specific values to better define the risk and to design appropriate remedial measures.

| Source       | Contaminant                                 | Unit<br>SOM (%) | Proposed End Use                   |         |        |                                       |       |        |            |         |         |                              |        |        |                              |        |        |
|--------------|---------------------------------------------|-----------------|------------------------------------|---------|--------|---------------------------------------|-------|--------|------------|---------|---------|------------------------------|--------|--------|------------------------------|--------|--------|
|              |                                             |                 | Residential with Homegrown Produce |         |        | Residential without Homegrown Produce |       |        | Commercial |         |         | Public Open Space (POS) resi |        |        | Public Open Space (POS) park |        |        |
|              |                                             |                 | 1                                  | 2.5     | 6      | 1                                     | 2.5   | 6      | 1          | 2.5     | 6       | 1                            | 2.5    | 6      | 1                            | 2.5    | 6      |
| LQM S4UL     | Arsenic                                     | mg/kg           | 37                                 | 37      | 37     | 40                                    | 40    | 40     | 640        | 640     | 640     | 79                           | 79     | 79     | 170                          | 170    | 170    |
| LQM S4UL     | Cadmium                                     | mg/kg           | 11                                 | 11      | 11     | 85                                    | 85    | 85     | 190        | 190     | 190     | 120                          | 120    | 120    | 532                          | 532    | 532    |
| LQM S4UL     | Chromium (III)                              | mg/kg           | 910                                | 910     | 910    | 910                                   | 910   | 910    | 8600       | 8600    | 8600    | 1500                         | 1500   | 1500   | 33000                        | 33000  | 33000  |
| LQM S4UL     | Chromium (VI)                               | mg/kg           | 6                                  | 6       | 6      | 6                                     | 6     | 6      | 33         | 33      | 33      | 7.7                          | 7.7    | 7.7    | 220                          | 220    | 220    |
| LQM S4UL     | Copper                                      | mg/kg           | 2400                               | 2400    | 2400   | 7100                                  | 7100  | 7100   | 68000      | 68000   | 68000   | 12000                        | 12000  | 12000  | 44000                        | 44000  | 44000  |
| C4SL         | Lead                                        | mg/kg           | 200                                | 200     | 200    | 330                                   | 330   | 330    | 2300       | 2300    | 2300    | 760                          | 760    | 760    | 1400                         | 1400   | 1400   |
| LQM S4UL     | Mercury, Elemental                          | mg/kg           | 1.2                                | 1.2     | 1.2    | 1.2                                   | 1.2   | 1.2    | 58         | 58      | 58      | 16                           | 16     | 16     | 30                           | 30     | 30     |
| LQM S4UL     | Nickel                                      | mg/kg           | 180                                | 180     | 180    | 180                                   | 180   | 180    | 980        | 980     | 980     | 230                          | 230    | 230    | 3400                         | 3400   | 3400   |
| LQM S4UL     | Selenium                                    | mg/kg           | 250                                | 250     | 250    | 430                                   | 430   | 430    | 12000      | 12000   | 12000   | 1100                         | 1100   | 1100   | 1800                         | 1800   | 1800   |
| LQM S4UL     | Zinc                                        | mg/kg           | 3700                               | 3700    | 3700   | 40000                                 | 40000 | 40000  | 730000     | 730000  | 730000  | 81000                        | 81000  | 81000  | 170000                       | 170000 | 170000 |
| LQM S4UL     | Phenol (total)                              | mg/kg           | 280                                | 550     | 1100   | 750                                   | 1300  | 2300   | 760        | 1500    | 3200    | 760                          | 1500   | 3200   | 760                          | 1500   | 3200   |
| LQM S4UL     | Acenaphthene                                | mg/kg           | 210                                | 510     | 1100   | 3000                                  | 4700  | 6000   | 84000      | 97000   | 100000  | 15000                        | 15000  | 15000  | 29000                        | 30000  | 30000  |
| LQM S4UL     | Acenaphthylene                              | mg/kg           | 170                                | 420     | 920    | 2900                                  | 4600  | 6000   | 83000      | 97000   | 100000  | 15000                        | 15000  | 15000  | 29000                        | 30000  | 30000  |
| LQM S4UL     | Anthracene                                  | mg/kg           | 2400                               | 5400    | 11000  | 31000                                 | 35000 | 37000  | 520000     | 540000  | 540000  | 74000                        | 74000  | 74000  | 150000                       | 150000 | 150000 |
| LQM S4UL     | Benzo(a)anthracene                          | mg/kg           | 7.2                                | 11      | 13     | 11                                    | 14    | 15     | 170        | 170     | 180     | 29                           | 29     | 29     | 49                           | 56     | 62     |
| LQM S4UL     | Benzo(a)pyrene                              | mg/kg           | 2.2                                | 2.7     | 3.0    | 3.2                                   | 3.2   | 3.2    | 35         | 35      | 36      | 5.7                          | 5.7    | 5.7    | 11                           | 12     | 13     |
| LQM S4UL     | Benzo(b)fluoranthene                        | mg/kg           | 2.6                                | 3.3     | 3.7    | 3.9                                   | 4     | 4      | 44         | 44      | 45      | 7.1                          | 7.2    | 7.2    | 13                           | 15     | 16     |
| LQM S4UL     | Benzo(ghi)perylene                          | mg/kg           | 320                                | 340     | 350    | 360                                   | 360   | 360    | 3900       | 4000    | 4000    | 640                          | 640    | 640    | 1400                         | 1500   | 1600   |
| LQM S4UL     | Benzo(k)fluoranthene                        | mg/kg           | 77                                 | 93      | 100    | 110                                   | 110   | 110    | 1200       | 1200    | 1200    | 190                          | 190    | 190    | 370                          | 410    | 440    |
| LQM S4UL     | Chrysene                                    | mg/kg           | 15                                 | 22      | 27     | 30                                    | 31    | 32     | 350        | 350     | 350     | 57                           | 57     | 57     | 93                           | 110    | 120    |
| LQM S4UL     | Dibenz(a,h)anthracene                       | mg/kg           | 0.24                               | 0.28    | 0.30   | 0.31                                  | 0.32  | 0.32   | 3.5        | 3.6     | 3.6     | 0.57                         | 0.57   | 0.58   | 1.1                          | 1.3    | 1.4    |
| LQM S4UL     | Fluoranthene                                | mg/kg           | 280                                | 560     | 890    | 1500                                  | 1600  | 1600   | 23000      | 23000   | 23000   | 3100                         | 3100   | 3100   | 6300                         | 6300   | 6400   |
| LQM S4UL     | Fluorene                                    | mg/kg           | 170                                | 400     | 860    | 2800                                  | 3800  | 4500   | 63000      | 68000   | 71000   | 9900                         | 9900   | 9900   | 20000                        | 20000  | 20000  |
| LQM S4UL     | Indeno(1,2,3,cd)pyrene                      | mg/kg           | 27                                 | 36      | 41     | 45                                    | 46    | 46     | 500        | 510     | 510     | 82                           | 82     | 82     | 150                          | 170    | 180    |
| LQM S4UL     | Naphthalene                                 | mg/kg           | 2.3                                | 5.6     | 13     | 2.3                                   | 5.6   | 13     | 190        | 460     | 1100    | 4900                         | 4900   | 4900   | 1200                         | 1900   | 3000   |
| LQM S4UL     | Phenanthrene                                | mg/kg           | 95                                 | 220     | 440    | 1300                                  | 1500  | 1500   | 22000      | 22000   | 23000   | 3100                         | 3100   | 3100   | 6200                         | 62000  | 6300   |
| LQM S4UL     | Pyrene                                      | mg/kg           | 620                                | 1200    | 2000   | 3700                                  | 3800  | 3800   | 54000      | 54000   | 54000   | 7400                         | 7400   | 7400   | 15000                        | 15000  | 15000  |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 5 - 6   | mg/kg           | 42                                 | 78      | 160    | 42                                    | 78    | 160    | 3200       | 5900    | 12000   | 570000                       | 590000 | 600000 | 95000                        | 130000 | 180000 |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 6 - 8   | mg/kg           | 100                                | 230     | 530    | 100                                   | 230   | 530    | 7800       | 17000   | 40000   | 600000                       | 610000 | 620000 | 150000                       | 220000 | 320000 |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 8 - 10  | mg/kg           | 27                                 | 65      | 150    | 27                                    | 65    | 150    | 2000       | 4800    | 11000   | 13000                        | 13000  | 13000  | 14000                        | 18000  | 21000  |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 10 - 12 | mg/kg           | 130                                | 330     | 760    | 130                                   | 330   | 770    | 9700       | 23000   | 47000   | 13000                        | 13000  | 13000  | 21000                        | 23000  | 24000  |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 12 - 16 | mg/kg           | 1100                               | 2400    | 4300   | 1100                                  | 2400  | 4400   | 59000      | 82000   | 90000   | 13000                        | 13000  | 13000  | 25000                        | 25000  | 26000  |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 16 - 35 | mg/kg           | 65000                              | 92000   | 110000 | 65000                                 | 92000 | 110000 | 1600000    | 1700000 | 1800000 | 250000                       | 250000 | 250000 | 450000                       | 480000 | 490000 |
| LQM S4UL     | Petroleum Hydrocarbons Aliphatic EC 35 - 44 | mg/kg           | 65000                              | 92000   | 110000 | 65000                                 | 92000 | 110000 | 1600000    | 1700000 | 1800000 | 250000                       | 250000 | 250000 | 450000                       | 480000 | 490000 |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 5 - 7    | mg/kg           | 70                                 | 140     | 300    | 370                                   | 690   | 1400   | 26000      | 46000   | 86000   | 56000                        | 56000  | 56000  | 76000                        | 84000  | 92000  |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 7 - 8    | mg/kg           | 130                                | 290     | 660    | 860                                   | 1800  | 3900   | 56000      | 110000  | 180000  | 56000                        | 56000  | 56000  | 87000                        | 95000  | 100000 |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 8 - 10   | mg/kg           | 34                                 | 83      | 190    | 47                                    | 110   | 270    | 3500       | 8100    | 17000   | 5000                         | 5000   | 5000   | 7200                         | 8500   | 9300   |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 10 - 12  | mg/kg           | 74                                 | 180     | 380    | 250                                   | 590   | 1200   | 16000      | 28000   | 34000   | 5000                         | 5000   | 5000   | 9200                         | 9700   | 10000  |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 12 - 16  | mg/kg           | 140                                | 330     | 660    | 1800                                  | 2300  | 2500   | 36000      | 37000   | 38000   | 5100                         | 5100   | 5000   | 10000                        | 10000  | 10000  |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 16 - 21  | mg/kg           | 260                                | 540     | 930    | 1900                                  | 1900  | 1900   | 28000      | 28000   | 28000   | 3800                         | 3800   | 3800   | 7600                         | 7700   | 7800   |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 21 - 35  | mg/kg           | 1100                               | 1500    | 1700   | 1900                                  | 1900  | 1900   | 28000      | 28000   | 28000   | 3800                         | 3800   | 3800   | 7800                         | 7800   | 7900   |
| LQM S4UL     | Petroleum Hydrocarbons Aromatic EC 35 - 44  | mg/kg           | 1100                               | 1500    | 1700   | 1900                                  | 1900  | 1900   | 28200      | 28200   | 28200   | 3800                         | 3800   | 3800   | 7800                         | 7800   | 7900   |
| LQM S4UL     | Benzene                                     | mg/kg           | 0.087                              | 0.17    | 0.37   | 0.38                                  | 0.7   | 1.4    | 27         | 47      | 90      | 72                           | 72     | 73     | 90                           | 100    | 110    |
| LQM S4UL     | Toluene                                     | mg/kg           | 130                                | 290     | 660    | 880                                   | 1900  | 3900   | 56000      | 110000  | 180000  | 56000                        | 56000  | 56000  | 87000                        | 95000  | 100000 |
| LQM S4UL     | Ethyl Benzene                               | mg/kg           | 47                                 | 110     | 260    | 83                                    | 190   | 440    | 5700       | 13000   | 27000   | 24000                        | 24000  | 25000  | 17000                        | 22000  | 27000  |
| LQM S4UL     | Xylene - o                                  | mg/kg           | 60                                 | 140     | 330    | 88                                    | 210   | 480    | 6600       | 15000   | 33000   | 41000                        | 42000  | 43000  | 17000                        | 24000  | 33000  |
| LQM S4UL     | Xylene - m                                  | mg/kg           | 59                                 | 140     | 320    | 82                                    | 190   | 450    | 6200       | 14000   | 31000   | 41000                        | 42000  | 43000  | 17000                        | 24000  | 32000  |
| LQM S4UL     | Xylene - p                                  | mg/kg           | 56                                 | 130     | 310    | 79                                    | 180   | 430    | 5900       | 14000   | 30000   | 41000                        | 42000  | 43000  | 17000                        | 23000  | 31000  |
| CL-AIRE 2010 | MTBE (methyl tert-butyl ether)              | mg/kg           | 49                                 | 84      | 160    | 49                                    | 84    | 160    | 7900       | 13000   | 24000   | 49                           | 84     | 160    | 49                           | 84     | 160    |
| LQM S4UL     | Chloroethene (Vinyl Chloride)               | mg/kg           | 0.00064                            | 0.00087 | 0.0014 | 0.00077                               | 0.001 | 0.0015 | 0.059      | 0.077   | 0.12    | 3.5                          | 3.5    | 3.5    | 4.8                          | 5      | 5.4    |
| LQM S4UL     | 1,2-Dichloroethane (1,2-DCA)                | mg/kg           | 0.0071                             | 0.011   | 0.019  | 0.0092                                | 0.013 | 0.023  | 0.67       | 0.97    | 1.7     | 29                           | 29     | 29     | 21                           | 24     | 28     |
| LQM S4UL     | 1,1,1-Trichloroethane                       | mg/kg           | 8.8                                | 1.8     | 39     | 9                                     | 18    | 40     | 660        | 1300    | 3000    | 14000                        | 14000  | 14000  | 57000                        | 76000  | 100000 |
| LQM S4UL     | 1,1,2,2-Tetrachloroethane                   | mg/kg           | 1.6                                | 3.4     | 7.5    | 3.9                                   | 8     | 17     | 270        | 550     | 11000   | 1400                         | 1400   | 1400   | 1800                         | 2100   | 2300   |
| LQM S4UL     | 1,1,1,2-Tetrachloroethane                   | mg/kg           | 1.2                                | 2.8     | 6.4    | 1.5                                   | 3.5   | 8.2    | 0.79       | 1.9     | 4.4     | 1400                         | 1400   | 1400   | 1500                         | 1800   | 2100   |
| LQM S4UL     | Tetrachloroethene (PCE)                     | mg/kg           | 0.18                               | 0.39    | 0.9    | 0.18                                  | 0.4   | 0.92   | 19         | 42      | 95      | 1400                         | 1400   | 1400   | 810                          | 1100   | 1500   |
| LQM S4UL     | Tetrachloromethane (carbon tetrachloride)   | mg/kg           | 0.026                              | 0.056   | 0.13   | 0.026                                 | 0.056 | 0.13   | 2.9        | 6.3     | 14      | 890                          | 920    | 950    | 190                          | 270    | 400    |

| Source   | Contaminant                   | Unit<br>SOM (%) | Proposed End Use                          |       |       |                                              |       |      |            |       |       |                              |       |       |                              |       |       |
|----------|-------------------------------|-----------------|-------------------------------------------|-------|-------|----------------------------------------------|-------|------|------------|-------|-------|------------------------------|-------|-------|------------------------------|-------|-------|
|          |                               |                 | Residential <u>with</u> Homegrown Produce |       |       | Residential <u>without</u> Homegrown Produce |       |      | Commercial |       |       | Public Open Space (POS) resi |       |       | Public Open Space (POS) park |       |       |
|          |                               |                 | 1                                         | 2.5   | 6     | 1                                            | 2.5   | 6    | 1          | 2.5   | 6     | 1                            | 2.5   | 6     | 1                            | 2.5   | 6     |
| LQM S4UL | Trichloroethene (TCE)         | mg/kg           | 0.016                                     | 0.034 | 0.075 | 0.017                                        | 0.036 | 0.08 | 1.2        | 2.6   | 5.7   | 120                          | 120   | 120   | 70                           | 91    | 120   |
| LQM S4UL | Trichloromethane (chloroform) | mg/kg           | 0.91                                      | 1.7   | 3.4   | 1.2                                          | 2.1   | 4.2  | 99         | 170   | 350   | 2500                         | 2500  | 2500  | 2600                         | 2800  | 3100  |
| LQM S4UL | Chlorobenzene                 | mg/kg           | 0.45                                      | 1     | 2.4   | 0.46                                         | 1     | 2.4  | 56         | 130   | 290   | 11000                        | 13000 | 14000 | 1300                         | 2000  | 2900  |
| LQM S4UL | 1, 2 Dichlorobenzene          | mg/kg           | 23                                        | 55    | 130   | 24                                           | 57    | 130  | 2000       | 4800  | 11000 | 90000                        | 95000 | 98000 | 24000                        | 26000 | 51000 |
| LQM S4UL | 1, 3 Dichlorobenzene          | mg/kg           | 0.4                                       | 1     | 2.3   | 0.44                                         | 1.1   | 2.5  | 30         | 73    | 170   | 300                          | 300   | 300   | 390                          | 440   | 470   |
| LQM S4UL | 1, 4 Dichlorobenzene          | mg/kg           | 61                                        | 150   | 350   | 61                                           | 150   | 340  | 4400       | 10000 | 25000 | 17000                        | 17000 | 17000 | 26000                        | 36000 | 36000 |
| LQM S4UL | 1, 2, 3 Trichlorobenzene      | mg/kg           | 1.5                                       | 3.6   | 8.6   | 1.5                                          | 3.7   | 8.8  | 102        | 250   | 590   | 1800                         | 1800  | 1800  | 770                          | 1100  | 1600  |
| LQM S4UL | 1, 2, 4 Trichlorobenzene      | mg/kg           | 2.6                                       | 6.4   | 15    | 2.6                                          | 6.4   | 15   | 220        | 530   | 1300  | 15000                        | 17000 | 19000 | 1700                         | 2600  | 4000  |
| LQM S4UL | 1, 2, 3, 4 Trichlorobenzene   | mg/kg           | 0.33                                      | 0.81  | 1.9   | 0.33                                         | 0.81  | 1.9  | 23         | 55    | 130   | 1700                         | 1700  | 1800  | 280                          | 580   | 860   |
| LQM S4UL | 1, 2, 3, 4 Tetrachlorobenzene | mg/kg           | 15                                        | 36    | 78    | 24                                           | 56    | 120  | 1700       | 3080  | 4400  | 830                          | 830   | 830   | 1500                         | 1600  | 1600  |
| LQM S4UL | 1, 2, 3, 5 Tetrachlorobenzene | mg/kg           | 0.66                                      | 1.6   | 3.7   | 0.75                                         | 1.9   | 4.3  | 49         | 120   | 240   | 78                           | 79    | 79    | 110                          | 120   | 130   |
| LQM S4UL | 1, 2, 4, 5 Tetrachlorobenzene | mg/kg           | 0.33                                      | 0.77  | 1.6   | 0.73                                         | 1.7   | 3.5  | 42         | 72    | 96    | 13                           | 13    | 13    | 25                           | 26    | 26    |
| LQM S4UL | Pentachlorobenzene            | mg/kg           | 5.8                                       | 12    | 22    | 19                                           | 30    | 38   | 640        | 770   | 830   | 100                          | 100   | 100   | 190                          | 190   | 190   |
| LQM S4UL | Hexachlorobenze               | mg/kg           | 1.8                                       | 3.3   | 4.9   | 4.1                                          | 5.7   | 6.7  | 110        | 120   | 120   | 16                           | 16    | 16    | 30                           | 30    | 30    |

LQM/CIEH S4ULs copyright Land Quality Managment Limited reproduced with permission; Publication Number S4UL3237. All rights reserved.

See LQM/CIEH S4ULs for Human Health Risk Assessment document for notes regarding derivation.

## **Re-Use Of Waste - Guidance Note**

### *Definition of Waste*

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

### *CL:AIRE: Code of Practice*

Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP), also commonly referred to as a “Materials Management Plan”.

The developer/contractor is advised to complete all works under the DoWCoP.

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment.
- Material capable of being used in another place on the same site following ex-situ treatment on site.
- Material capable of being used in another development site without treatment (Direct Transfer).
- Material capable of being used in another development site following ex-situ treatment on another site eg Hub site.

The Code of Practice requires 4 No. Factors to be addressed:

1. Protection of human health and protection of the environment.
2. Suitability of use, without further treatment.
3. Certainty of use.
4. Quantity of material.

In order to satisfy these requirements the following are required:

- i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
- ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
- iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
- iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
- v) Volume calculations.
- vi) Planning permission for the development.
- vii) Contractual details to be clear, regarding who steps in if a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (eg bioremediation, stabilisation) will require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.

Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

---

## Waste Classification For Soils

### Introduction

Waste producers have a duty of care to classify the waste they are producing:

- before it is collected, disposed of or recovered.
- to identify the controls that apply to the movement of the waste.
- to complete waste documents and records.
- to identify suitably authorised waste management options.
- to prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

### Background for Landfill Disposal

In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets his permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

### Key Points

- Not all waste can be landfilled
- Landfills are classified according to whether they can accept **hazardous, non-hazardous** or **inert** wastes.
- Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
- Most wastes must be treated before you can send them to landfill.
- There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

### Classification

Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e the hazard assessment. The most common EWC waste codes related to soil are:

|              |                                                                                           |
|--------------|-------------------------------------------------------------------------------------------|
| <b>17 05</b> | <b>soil (including excavated soil from contaminated sites), stones and dredging spoil</b> |
| 17 05 03*    | soil and stones containing dangerous substances                                           |
| 17 05 04     | soil and stones other than those mentioned in 17 05 03                                    |

Soils may contain certain contaminants (eg asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

#### Waste Definitions

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inert                                | <ul style="list-style-type: none"> <li>Will not undergo any significant physical, chemical or biological transformations.</li> <li>Will not dissolve.</li> <li>Will not burn.</li> <li>Will not physically or chemically react.</li> <li>Will not biodegrade.</li> <li>Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health.</li> <li>Has insignificant total leachability and pollutant content.</li> <li>Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).</li> </ul> |
| Non-Hazardous                        | Is not inert (see above)<br>Is not hazardous (see below)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Hazardous                            | Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Stable Non-reactive hazardous waste# | Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).                                                                                                                                                                                       |

# This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

#### WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) the **WAC is not relevant**. Furthermore the WAC limits **cannot be used to make an assessment of whether a waste is hazardous**. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

| Classification based on Total Concentrations <sup>1</sup> | Non-Hazardous Waste           |                                     | Hazardous Waste                  |                                  |
|-----------------------------------------------------------|-------------------------------|-------------------------------------|----------------------------------|----------------------------------|
|                                                           | Below inert WAC limit values: | Above inert WAC limit values:       | Below hazardous WAC limit values | Above hazardous WAC limit values |
| WAC testing                                               |                               |                                     |                                  |                                  |
| Landfill requirements                                     | INERT landfill                | NON-HAZARDOUS landfill <sup>2</sup> | HAZARDOUS landfill               | PRE-TREATMENT <sup>3</sup>       |

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).

2 Individual sites may have certain limit values pre-determined in their licence.

3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

#### Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

#### Known Oils

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer's or supplier's REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs

to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

#### *Unknown Oils*

Where hydrocarbons are contaminating soils it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

For contaminated land specific consideration must be given to the following before proceeding;

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of **marker compounds** is optional; however it is recommended that where possible the marker compounds should be used. WM3 states:

If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
- This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
- The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

| TPH Concentration (mg/kg) | Petrol or Diesel | BaP (mg/kg)   | Classification |
|---------------------------|------------------|---------------|----------------|
| 10,000                    | No               | 0.9           | Non- Hazardous |
| 1,000                     | No               | Not available | Hazardous      |
| 1,000                     | Yes              | Not relevant  | Hazardous      |

#### *References*

1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
7. 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

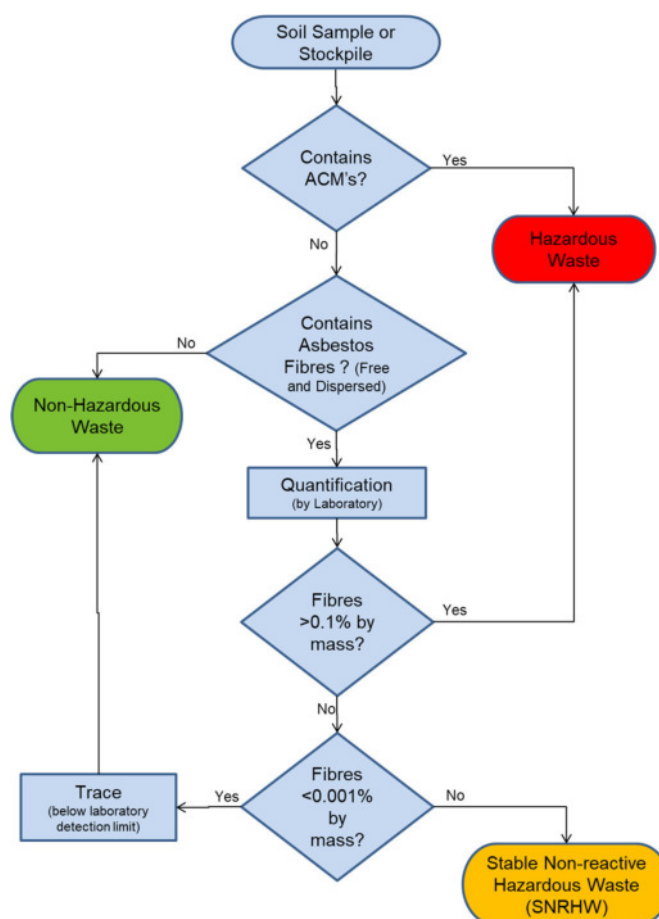
## Additional Asbestos Guidance Notes

### Disposal

The 1st Edition of WM3 “Guidance on the classification and assessment of waste”, details the way in which Asbestos is assessed within soils.

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's)



Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site<sup>1</sup>. These levels are often termed “trace” by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)<sup>1</sup>. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

| 17 06    | Insulation materials and asbestos-containing construction materials         |
|----------|-----------------------------------------------------------------------------|
| 17 06 01 | Insulation materials containing asbestos                                    |
| 17 06 03 | Other insulation materials consisting of or containing hazardous substances |
| 17 06 04 | Insulation materials other than those mentioned in 17 06 01 and 17 06 03    |
| 17 06 05 | Construction material containing asbestos                                   |

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and “*other suitable materials*” may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

#### *Construction*

Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether or not the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four hour period. The control limit is not a ‘safe’ level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 “the release of dispersed asbestos fibres from soil” 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m<sup>3</sup>.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (eg by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

#### *End Use*

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation. There is currently a Joint Industry Working Group (JIWG) tasked with producing a Code of Practice for Asbestos in Soil, Made Ground and Construction & Demolition Material that will clarify in due course the position of the various government agencies.

Asbestos containing materials can remain in situ under a suitable cover system which may be hardsurfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Preliminary publications from JIWG (April 2015) provide guides for decision making in relation to construction. These are at a “Beta” test stage and further publications will be provided in due course.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk. There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required.

The re-use of soils containing asbestos at concentrations above hazardous waste levels is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

---

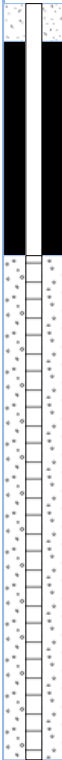
## **APPENDIX B**

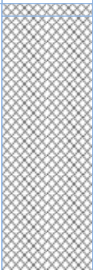
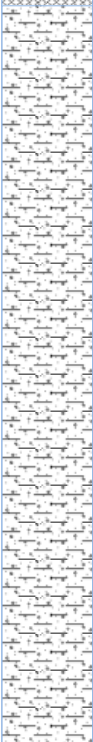
### **Exploratory Hole Logs**

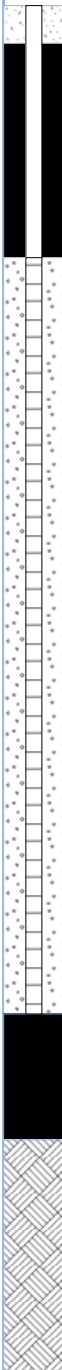
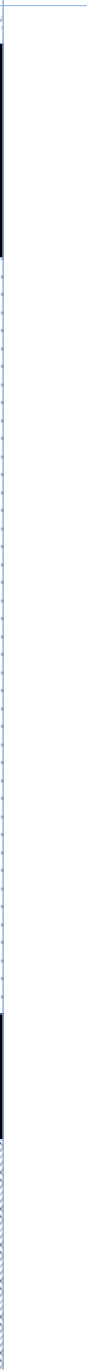
|                                                                                                                                                                                           |                  |                            |      |         |              |                 |                                                                                   |                                                                                                                                                                                                                                                  |                                                 |  |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|------|---------|--------------|-----------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--|---------|
| <div><div><b>BROWNFIELD<br/>SOLUTIONS LTD</b><br/><small>www.brownfield-solutions.com</small></div></div> |                  |                            |      |         |              |                 | <div><h1>Trial Pit Log</h1></div>                                                 |                                                                                                                                                                                                                                                  | <div>No.<br/><b>HP01</b><br/>Sheet 1 of 1</div> |  |         |
| PROJECT NO: M4246                                                                                                                                                                         |                  |                            |      |         |              |                 | CO-ORDS:                                                                          |                                                                                                                                                                                                                                                  | Hole Type<br>TP                                 |  |         |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                                                                                                                                 |                  |                            |      |         |              |                 | LEVEL:                                                                            |                                                                                                                                                                                                                                                  | Scale<br>1:25                                   |  |         |
| CLIENT: THE DEAN TRUST                                                                                                                                                                    |                  |                            |      |         |              |                 | DATES: 28/06/19                                                                   |                                                                                                                                                                                                                                                  | Logged<br>NS                                    |  | Checked |
| Well                                                                                                                                                                                      | Water<br>Strikes | Sample and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m OD) | Legend                                                                            | Stratum Description                                                                                                                                                                                                                              |                                                 |  |         |
|                                                                                                                                                                                           |                  | Depth (m)                  | Type | Results |              |                 |                                                                                   |                                                                                                                                                                                                                                                  |                                                 |  |         |
|                                                                                                                                                                                           |                  | 0.50                       | ES   |         | 0.40         |                 |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).                                                                                              |                                                 |  |         |
|                                                                                                                                                                                           |                  |                            |      |         |              |                 |                                                                                   | MADE GROUND: Brown very gravelly silty clayey sand with brick, concrete and coal. Sand is fine to medium. Gravel is angular to subangular fine to medium of sandstone.<br><i>Geomembrane encountered at the base of the topsoil at 0.40mbgl.</i> |                                                 |  |         |
|                                                                                                                                                                                           |                  |                            |      |         | 1.20         |                 |                                                                                   | End of Borehole at 1.20m                                                                                                                                                                                                                         |                                                 |  |         |
| <div>1.0</div> <div>2.0</div> <div>3.0</div> <div>4.0</div> <div>5.0</div>                                                                                                                |                  |                            |      |         |              |                 |                                                                                   |                                                                                                                                                                                                                                                  |                                                 |  |         |

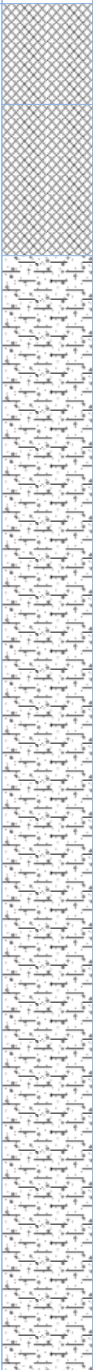
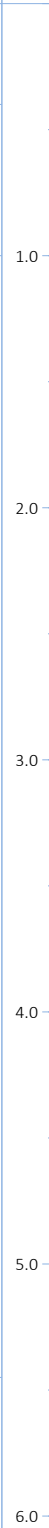
| <div><div>BROWNFIELD<br/>SOLUTIONS LTD</div><div>www.brownfield-solutions.com</div></div> |                                                                                  |                            |      |         |              |                 | Borehole Log                                                                       |                                                                                                                                                     | Window Sampler No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------|------|---------|--------------|-----------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | WS01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | Sheet 1 of 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| PROJECT NO: M4246                                                                                                                                                         |                                                                                  |                            |      |         |              |                 | CO-ORDS: 386272E, 396440N                                                          |                                                                                                                                                     | Hole Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | WS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                                                                                                                 |                                                                                  |                            |      |         |              |                 | LEVEL: 51.24m OD                                                                   |                                                                                                                                                     | Scale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | 1:30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| CLIENT: THE DEAN TRUST                                                                                                                                                    |                                                                                  |                            |      |         |              |                 | DATES: 28/06/19                                                                    |                                                                                                                                                     | Logged                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | Checked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                           |                                                                                  |                            |      |         |              |                 |                                                                                    |                                                                                                                                                     | NS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Well                                                                                                                                                                      | Water<br>Strikes                                                                 | Sample and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m OD) | Legend                                                                             | Stratum Description                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                           |                                                                                  | Depth (m)                  | Type | Results |              |                 |                                                                                    |                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                          |  | 0.50                       | ES   |         | 0.40         | 50.84           |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL). | 1.0<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>< |

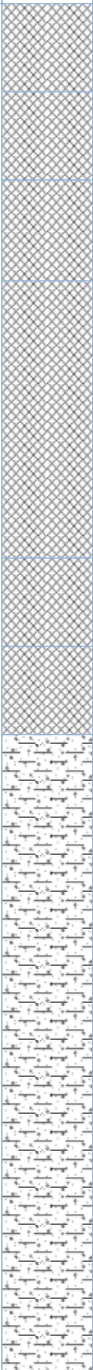
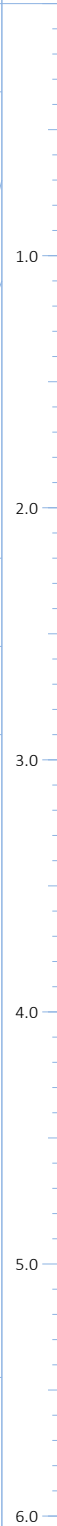
| <div><div>BROWNFIELD<br/>SOLUTIONS LTD</div><div>www.brownfield-solutions.com</div></div> |                                                                                  |                                                                                                                                                                                                   |      |                       |              | <div>Borehole Log</div>   |                                                                                    | Window Sampler No.                                                                                                                                                                                                                                                                        |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------|--------------|---------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    | WS02                                                                                                                                                                                                                                                                                      |         |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    | Sheet 1 of 1                                                                                                                                                                                                                                                                              |         |
| PROJECT NO: M4246                                                                                                                                                         |                                                                                  |                                                                                                                                                                                                   |      |                       |              | CO-ORDS: 386248E, 396423N |                                                                                    | Hole Type                                                                                                                                                                                                                                                                                 |         |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    | WS                                                                                                                                                                                                                                                                                        |         |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                                                                                                                 |                                                                                  |                                                                                                                                                                                                   |      |                       |              | LEVEL: 51.99m OD          |                                                                                    | Scale                                                                                                                                                                                                                                                                                     |         |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    | 1:30                                                                                                                                                                                                                                                                                      |         |
| CLIENT: THE DEAN TRUST                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                   |      |                       |              | DATES: 28/06/19           |                                                                                    | Logged                                                                                                                                                                                                                                                                                    | Checked |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    | NS                                                                                                                                                                                                                                                                                        |         |
| Well                                                                                                                                                                      | Water<br>Strikes                                                                 | Sample and In Situ Testing                                                                                                                                                                        |      |                       | Depth<br>(m) | Level<br>(m OD)           | Legend                                                                             | Stratum Description                                                                                                                                                                                                                                                                       |         |
|                                                                                                                                                                           |                                                                                  | Depth (m)                                                                                                                                                                                         | Type | Results               |              |                           |                                                                                    |                                                                                                                                                                                                                                                                                           |         |
|                                                                                          |  | 0.50-1.50                                                                                                                                                                                         | ES   |                       | 0.40         | 51.59                     |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).                                                                                                                                       |         |
|                                                                                                                                                                           |                                                                                  | 1.00                                                                                                                                                                                              | B    |                       |              |                           |                                                                                    | MADE GROUND: Brown very gravelly silty clayey sand with brick, clinker, concrete, slate and glass. Sand is fine to coarse. Gravel is angular to subangular of sandstone and coal.                                                                                                         | 1.0     |
|                                                                                                                                                                           |                                                                                  | 1.20                                                                                                                                                                                              | SPT  | N=3<br>(1,1/0,1,1,1)  |              |                           |                                                                                    | Geomembrane encountered at the base of the topsoil at 0.40mbgl.                                                                                                                                                                                                                           |         |
|                                                                                                                                                                           |                                                                                  | 2.00                                                                                                                                                                                              | SPT  | N=14<br>(2,2/4,6,2,2) |              |                           |                                                                                    | Clays becoming damp at 2.40m bgl.<br>Decrease in anthropogenic inclusions noted within the made ground from 2.50m bgl.                                                                                                                                                                    | 2.0     |
|                                                                                                                                                                           |                                                                                  | 3.00                                                                                                                                                                                              | SPT  | N=22<br>(2,2/4,4,7,7) |              |                           |                                                                                    |                                                                                                                                                                                                                                                                                           | 3.0     |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       | 3.45         | 48.54                     |                                                                                    | End of Borehole at 3.45m                                                                                                                                                                                                                                                                  |         |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    |                                                                                                                                                                                                                                                                                           | 4.0     |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    |                                                                                                                                                                                                                                                                                           | 5.0     |
|                                                                                                                                                                           |                                                                                  |                                                                                                                                                                                                   |      |                       |              |                           |                                                                                    |                                                                                                                                                                                                                                                                                           | 6.0     |
| Remarks                                                                                                                                                                   |                                                                                  | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Hole backfilled upon completion. 4. Reinstatement of the cover system was done using visqueen and bentonite. |      |                       |              |                           |                                                                                    | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |         |

| <div><div>BROWNFIELD<br/>SOLUTIONS LTD</div><div>www.brownfield-solutions.com</div></div> |               |                                                                                                                                                   |      |                                   |           |              | Borehole Log                                                                       |                                                                                                                                                                            | Window Sampler No.                                                                                                                                                                                                                                                                        |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------|-----------|--------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | WS03                                                                                                                                                                                                                                                                                      |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | Sheet 1 of 1                                                                                                                                                                                                                                                                              |  |
| PROJECT NO: M4246                                                                                                                                                         |               |                                                                                                                                                   |      |                                   |           |              | CO-ORDS: 386148E, 396343N                                                          |                                                                                                                                                                            | Hole Type                                                                                                                                                                                                                                                                                 |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | WS                                                                                                                                                                                                                                                                                        |  |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                                                                                                                 |               |                                                                                                                                                   |      |                                   |           |              | LEVEL: 48.04m OD                                                                   |                                                                                                                                                                            | Scale                                                                                                                                                                                                                                                                                     |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | 1:30                                                                                                                                                                                                                                                                                      |  |
| CLIENT: THE DEAN TRUST                                                                                                                                                    |               |                                                                                                                                                   |      |                                   |           |              | DATES: 28/06/19                                                                    |                                                                                                                                                                            | Logged                                                                                                                                                                                                                                                                                    |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | Checked                                                                                                                                                                                                                                                                                   |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | NS                                                                                                                                                                                                                                                                                        |  |
| Well                                                                                                                                                                      | Water Strikes | Sample and In Situ Testing                                                                                                                        |      |                                   | Depth (m) | Level (m OD) | Legend                                                                             | Stratum Description                                                                                                                                                        |                                                                                                                                                                                                                                                                                           |  |
|                                                                                                                                                                           |               | Depth (m)                                                                                                                                         | Type | Results                           |           |              |                                                                                    |                                                                                                                                                                            |                                                                                                                                                                                                                                                                                           |  |
|                                                                                          |               |                                                                                                                                                   |      |                                   | 0.40      | 47.64        |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).                        | 1.0                                                                                                                                                                                                                                                                                       |  |
|                                                                                                                                                                           |               | 1.00                                                                                                                                              | ES   |                                   |           |              |                                                                                    | MADE GROUND: Brown very gravelly clayey sand with brick, tarmac, slag, concrete and timber. Sand is fine to coarse. Gravel is angular to subangular of sandstone and coal. |                                                                                                                                                                                                                                                                                           |  |
|                                                                                                                                                                           |               | 1.20                                                                                                                                              | SPT  | N=3<br>(1,1/0,1,1,1)              |           |              |                                                                                    | Geomembrane encountered at the base of the topsoil at 0.40mbgl.                                                                                                            |                                                                                                                                                                                                                                                                                           |  |
|                                                                                                                                                                           |               | 2.00                                                                                                                                              | SPT  | N=7<br>(1,1/1,2,2,2)              | 2.00      | 46.04        |                                                                                    | MADE GROUND: Reddish brown sandy gravel of brick and slag.<br>Poor recovery noted between 2.00m and 3.00m bgl.                                                             | 2.0                                                                                                                                                                                                                                                                                       |  |
|                                                                                                                                                                           |               | 3.00                                                                                                                                              | SPT  | N≥50<br>(25 for 10mm/50 for 20mm) | 3.03      | 45.01        |                                                                                    | Concrete encountered within the SPT taken from 3.00m bgl.<br>End of Borehole at 3.03m                                                                                      | 3.0                                                                                                                                                                                                                                                                                       |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | 4.0                                                                                                                                                                                                                                                                                       |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | 5.0                                                                                                                                                                                                                                                                                       |  |
|                                                                                                                                                                           |               |                                                                                                                                                   |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | 6.0                                                                                                                                                                                                                                                                                       |  |
| Remarks                                                                                                                                                                   |               | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Installation to 3.00m: 1m plain pipe and 2.00m slotted pipe. |      |                                   |           |              |                                                                                    |                                                                                                                                                                            | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |  |

| Borehole Log                                                                      |                                                                                   |                                                                                                                                                             |           |                       |           |              | Window Sampler No.                                                                  |                                                                                                                                                                                                                                                                                           |     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------|-----------|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              | WS04                                                                                |                                                                                                                                                                                                                                                                                           |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              | Sheet 1 of 1                                                                        |                                                                                                                                                                                                                                                                                           |     |
| PROJECT NO: M4246                                                                 |                                                                                   |                                                                                                                                                             |           |                       |           |              | CO-ORDS: 386216E, 396361N                                                           |                                                                                                                                                                                                                                                                                           |     |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                         |                                                                                   |                                                                                                                                                             |           |                       |           |              | Hole Type<br>WS                                                                     |                                                                                                                                                                                                                                                                                           |     |
| CLIENT: THE DEAN TRUST                                                            |                                                                                   |                                                                                                                                                             |           |                       |           |              | LEVEL: 48.85m OD                                                                    |                                                                                                                                                                                                                                                                                           |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              | Scale<br>1:30                                                                       |                                                                                                                                                                                                                                                                                           |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              | Logged<br>NS                                                                        | Checked                                                                                                                                                                                                                                                                                   |     |
| Well                                                                              | Water Strikes                                                                     | Sample and In Situ Testing                                                                                                                                  |           |                       | Depth (m) | Level (m OD) | Legend                                                                              | Stratum Description                                                                                                                                                                                                                                                                       |     |
|                                                                                   |                                                                                   | Depth (m)                                                                                                                                                   | Type      | Results               |           |              |                                                                                     |                                                                                                                                                                                                                                                                                           |     |
|  |  | 0.05                                                                                                                                                        |           |                       | 0.05      | 48.80        |    | MADE GROUND: Paviers.<br>MADE GROUND: Yellowish white sandy gravel. Sand is fine to medium. Gravel is angular to subangular fine to medium of limestone.                                                                                                                                  | 1.0 |
|                                                                                   |                                                                                   | 1.10-1.70<br>1.20                                                                                                                                           | ES<br>SPT | N=7<br>(2,1/2,2,1,2)  | 1.10      | 47.75        |                                                                                     | MADE GROUND: Brown slightly gravelly slightly sandy clay with brick and clinker. Sand is fine to coarse. Gravel is angular to subangular of sandstone and coal.                                                                                                                           |     |
|                                                                                   |                                                                                   | 1.70                                                                                                                                                        |           |                       | 1.70      | 47.15        |                                                                                     | MADE GROUND: Reddish brown sandy gravel of brick.                                                                                                                                                                                                                                         |     |
|                                                                                   |                                                                                   | 2.00<br>2.00                                                                                                                                                | D<br>SPT  | N=4<br>(2,1/1,1,1,1)  | 2.50      | 46.35        |  | Stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is subangular fine of sandstone and coal.                                                                                                                                                               | 2.0 |
|                                                                                   |                                                                                   | 3.00<br>3.00                                                                                                                                                | D<br>SPT  | N=28<br>(5,5/5,7,8,8) |           |              |                                                                                     |                                                                                                                                                                                                                                                                                           |     |
|                                                                                   |                                                                                   | 4.00                                                                                                                                                        | SPT       | N=31<br>(5,6/7,7,8,9) |           |              |                                                                                     |                                                                                                                                                                                                                                                                                           |     |
|                                                                                   |                                                                                   | 5.00                                                                                                                                                        | SPT       | N=24<br>(6,7/6,6,6,6) |           |              |                                                                                     | 3.0                                                                                                                                                                                                                                                                                       |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              |                                                                                     | 4.0                                                                                                                                                                                                                                                                                       |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       |           |              |                                                                                     | 5.0                                                                                                                                                                                                                                                                                       |     |
|                                                                                   |                                                                                   |                                                                                                                                                             |           |                       | 5.45      | 43.40        |                                                                                     | End of Borehole at 5.45m                                                                                                                                                                                                                                                                  | 6.0 |
| Remarks                                                                           |                                                                                   | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. Groundwater encountered at 2.00m bgl. 3. Installation to 2.00m: 1m plain pipe and 1.00m slotted pipe. |           |                       |           |              |                                                                                     | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |     |

| <div><div>BROWNFIELD<br/>SOLUTIONS LTD</div><div>www.brownfield-solutions.com</div></div> |                                                                                    |                            |      |                                                                                                                                                   |              |                 | Borehole Log                                                                       |                                                                                                                                                           | Window Sampler No. |     |                                                                                                                                                                                                                                                                                           |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 | WS05                                                                               |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 | Sheet 1 of 1                                                                       |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
| PROJECT NO: M4246                                                                                                                                                         |                                                                                    |                            |      |                                                                                                                                                   |              |                 | CO-ORDS: 386224E, 396333N                                                          |                                                                                                                                                           | Hole Type          |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 |                                                                                    |                                                                                                                                                           | WS                 |     |                                                                                                                                                                                                                                                                                           |  |  |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                                                                                                                 |                                                                                    |                            |      |                                                                                                                                                   |              |                 | LEVEL: 48.90m OD                                                                   |                                                                                                                                                           | Scale              |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 |                                                                                    |                                                                                                                                                           | 1:30               |     |                                                                                                                                                                                                                                                                                           |  |  |
| CLIENT: THE DEAN TRUST                                                                                                                                                    |                                                                                    |                            |      |                                                                                                                                                   |              |                 | DATES: 28/06/19                                                                    |                                                                                                                                                           | Logged             |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 |                                                                                    |                                                                                                                                                           | Checked            |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   |              |                 |                                                                                    |                                                                                                                                                           | NS                 |     |                                                                                                                                                                                                                                                                                           |  |  |
| Well                                                                                                                                                                      | Water<br>Strikes                                                                   | Sample and In Situ Testing |      |                                                                                                                                                   | Depth<br>(m) | Level<br>(m OD) | Legend                                                                             | Stratum Description                                                                                                                                       |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | Depth (m)                  | Type | Results                                                                                                                                           |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                          |  | 0.50-1.00                  | ES   |                                                                                                                                                   | 0.50         | 48.40           |   | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).       |                    | 1.0 |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 1.00-1.80                  | ES   |                                                                                                                                                   |              |                 |                                                                                    | MADE GROUND: Black gravelly sand with brick, concrete, glass, ash and clinker. Sand is fine to coarse. Gravel is angular to subangular fine of sandstone. |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 1.20                       | SPT  | N=4<br>(1,0/1,1,1,1)                                                                                                                              |              |                 |                                                                                    | <i>Geomembrane encountered at the base of the topsoil at 0.50mbgl.<br/>Increase in ash and clinker content noted from 1.00m to 1.80m bgl.</i>             |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 2.00                       | D    |                                                                                                                                                   | 1.80         | 47.10           |  | Stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is subangular fine of sandstone and coal.                               |                    | 2.0 |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 2.00                       | SPT  | N=19<br>(2,3/4,4,5,6)                                                                                                                             |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 2.50                       | D    |                                                                                                                                                   |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 3.00                       | SPT  | N=27<br>(5,6/6,6,7,8)                                                                                                                             |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 4.00                       | SPT  | N=30<br>(5,5/5,7,8,10)                                                                                                                            |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | 5.00                       | SPT  | N=34<br>(7,8/7,9,9,9)                                                                                                                             |              |                 |                                                                                    |                                                                                                                                                           |                    |     |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    |                            |      |                                                                                                                                                   | 5.45         | 43.45           |                                                                                    | End of Borehole at 5.45m                                                                                                                                  |                    | 6.0 |                                                                                                                                                                                                                                                                                           |  |  |
|                                                                                                                                                                           |                                                                                    | Remarks                    |      | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Installation to 4.00m: 1m plain pipe and 3.00m slotted pipe. |              |                 |                                                                                    |                                                                                                                                                           |                    |     | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |  |  |

| Borehole Log                                                                      |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | Window Sampler No.                                                                 |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------|-----------|--------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | WS06                                                                               |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | Sheet 1 of 1                                                                       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
| PROJECT NO: M4246                                                                 |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | CO-ORDS: 386229E, 396285N                                                          |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                         |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | Hole Type                                                                          |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | WS                                                                                 |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | Scale                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | 1:30                                                                               |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
| CLIENT: THE DEAN TRUST                                                            |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | DATES: 28/06/19                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | Logged                                                                             | Checked                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              | NS                                                                                 |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
| Well                                                                              | Water Strikes                                                                    | Sample and In Situ Testing                                                                                                                                                                        |      |                         | Depth (m) | Level (m OD) | Legend                                                                             | Stratum Description                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | Depth (m)                                                                                                                                                                                         | Type | Results                 |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|  |  | 0.40-1.00                                                                                                                                                                                         | ES   |                         | 0.40      | 48.86        |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).                                                                           |                                                                                                                                                                                                       |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              |                                                                                    | MADE GROUND: Brown sandy gravel with brick, concrete and coal. Sand is fine to medium. Gravel is angular to subangular fine to medium of sandstone.<br><i>Geomembrane encountered at the base of the topsoil at 0.40mbgl.</i> |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 1.20                                                                                                                                                                                              | SPT  | N=11<br>(2,2/2,2,3,4)   | 1.00      | 48.26        |                                                                                    | Stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is subangular fine of sandstone and coal.                                                                                                   |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 1.25                                                                                                                                                                                              | D    |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 1.75                                                                                                                                                                                              | D    |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 2.00                                                                                                                                                                                              | SPT  | N=15<br>(2,3/3,3,4,5)   |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 3.00                                                                                                                                                                                              | SPT  | N=26<br>(3,5/5,6,7,8)   |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 4.00                                                                                                                                                                                              | SPT  | N=37<br>(6,6/7,9,10,11) |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  | 5.00                                                                                                                                                                                              | SPT  | N=33<br>(3,6/8,8,8,9)   |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      |                         |           |              |                                                                                    |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                           |  |
|                                                                                   |                                                                                  |                                                                                                                                                                                                   |      | 5.45                    | 43.81     |              | End of Borehole at 5.45m                                                           | 6.0                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                           |  |
| Remarks                                                                           |                                                                                  | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Hole backfilled upon completion. 4. Reinstatement of the cover system was done using visqueen and bentonite. |      |                         |           |              |                                                                                    |                                                                                                                                                                                                                               | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |  |

| Borehole Log                                                                      |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | Window Sampler No.                                                                 |                                                                                                                                                                                |                                                                                      |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------|-----------|--------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | WS07                                                                               |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | Sheet 1 of 1                                                                       |                                                                                                                                                                                |                                                                                      |
| PROJECT NO: M4246                                                                 |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | CO-ORDS: 386216E, 396284N                                                          |                                                                                                                                                                                |                                                                                      |
| PROJECT NAME: DEAN TRUST ACADEMY, ARDWICK                                         |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | Hole Type                                                                          |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | WS                                                                                 |                                                                                                                                                                                |                                                                                      |
| CLIENT: THE DEAN TRUST                                                            |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | Scale                                                                              |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | 1:30                                                                               |                                                                                                                                                                                |                                                                                      |
| DATES: 28/06/19                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | Logged                                                                             | Checked                                                                                                                                                                        |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       |           |              | NS                                                                                 |                                                                                                                                                                                |                                                                                      |
| Well                                                                              | Water Strikes                                                                    | Sample and In Situ Testing                                                                                                                                                                                                                                                                |      |                       | Depth (m) | Level (m OD) | Legend                                                                             | Stratum Description                                                                                                                                                            |                                                                                      |
|                                                                                   |                                                                                  | Depth (m)                                                                                                                                                                                                                                                                                 | Type | Results               |           |              |                                                                                    |                                                                                                                                                                                |                                                                                      |
|  |  | 0.35-0.70                                                                                                                                                                                                                                                                                 | ES   |                       | 0.35      | 48.65        |  | MADE GROUND: Brown slightly gravelly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of sandstone (TOPSOIL).                            |  |
|                                                                                   |                                                                                  | 0.70-1.00                                                                                                                                                                                                                                                                                 | ES   |                       | 0.70      | 48.30        |                                                                                    | MADE GROUND: Brown slightly sandy gravelly clay with brick, concrete, coal, slate and rare clinker. Sand is fine to coarse. Gravel is angular to subangular fine of sandstone. |                                                                                      |
|                                                                                   |                                                                                  | 1.20                                                                                                                                                                                                                                                                                      | SPT  | N=7<br>(1,1/1,2,2,2)  | 1.10      | 47.90        |                                                                                    | Geomembrane encountered at the base of the topsoil at 0.35mbgl.                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  | 1.25                                                                                                                                                                                                                                                                                      | D    |                       |           |              |                                                                                    | MADE GROUND: Firm orange brown slightly gravelly clay with brick and coal. Sand is fine to coarse. Gravel is angular to subangular fine of sandstone.                          |                                                                                      |
|                                                                                   |                                                                                  | 1.75                                                                                                                                                                                                                                                                                      | D    |                       |           |              |                                                                                    | MADE GROUND: Soft black mottled grey organic clay with brick, slate and coal. Sand is fine to coarse. Gravel is angular to subangular fine of sandstone.                       |                                                                                      |
|                                                                                   |                                                                                  | 2.00                                                                                                                                                                                                                                                                                      | SPT  | N=4<br>(1,1/1,1,1,1)  | 2.20      | 46.80        |                                                                                    |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       | 2.55      | 46.45        |                                                                                    | MADE GROUNDL Soft brown slightly gravelly slightly sandy silty clay. Sand is fine to medium. Gravel is subrounded fine to medium of sandstone.                                 |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       | 2.90      | 46.10        |                                                                                    | MADE GROUND: Soft black mottled grey slightly sandy silty organic clay with coal. Sand is fine to coarse. Gravel is angular to subangular fine of sandstone.                   |                                                                                      |
|                                                                                   |                                                                                  | 3.00                                                                                                                                                                                                                                                                                      | SPT  | N=26<br>(3,3/5,6,7,8) |           |              |                                                                                    | Stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is subangular fine of sandstone and coal.                                                    |                                                                                      |
|                                                                                   |                                                                                  | 4.00                                                                                                                                                                                                                                                                                      | SPT  | N=31<br>(3,5/6,7,9,9) |           |              |                                                                                    |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  | 5.00                                                                                                                                                                                                                                                                                      | SPT  | N=29<br>(7,7/7,7,8)   |           |              |                                                                                    |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  |                                                                                                                                                                                                                                                                                           |      |                       | 5.45      | 43.55        |                                                                                    | End of Borehole at 5.45m                                                                                                                                                       |                                                                                      |
| Remarks                                                                           |                                                                                  | 1. Hand dug inspection pit excavated to 1.20m bgl. 2. No groundwater encountered. 3. Hole backfilled upon completion. 4. Reinstatement of the cover system was done using visqueen and bentonite.                                                                                         |      |                       |           |              |                                                                                    |                                                                                                                                                                                |                                                                                      |
|                                                                                   |                                                                                  | ES = Environmental Sample<br>D = Disturbed Sample<br>B = Bulk Sample<br>LB=Large Bulk Sample<br>U = Undisturbed Sample<br>UT = Undisturbed Thin Wall Sample<br>SPT = Standard Penetration Test<br>PID = Photoionization Detector (ppm)<br>PPM = Part Per Million<br>HSV = Hand Shear Vane |      |                       |           |              |                                                                                    |                                                                                                                                                                                |                                                                                      |

## **APPENDIX C**

### **Chemical Testing Results**



**Nicola Swallow**

Brownfield Solutions Ltd  
William Smith House  
173 - 183 Witton Street  
Northwich  
Cheshire  
CW9 5LP

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:** n.swallow@brownfield-solutions.co.uk

## **Analytical Report Number : 19-48006**

|                             |                             |                               |            |
|-----------------------------|-----------------------------|-------------------------------|------------|
| <b>Project / Site name:</b> | Dean Trust Academy, Ardwick | <b>Samples received on:</b>   | 01/07/2019 |
| <b>Your job number:</b>     | M4246                       | <b>Samples instructed on:</b> | 01/07/2019 |
| <b>Your order number:</b>   | M4246-104-NS                | <b>Analysis completed by:</b> | 04/07/2019 |
| <b>Report Issue Number:</b> | 1                           | <b>Report issued on:</b>      | 04/07/2019 |
| <b>Samples Analysed:</b>    | 7 soil samples              |                               |            |

**Signed:** *Karolina Marek*

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 19-48006-1 Dean Trust Academy, Ardwick M4246

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

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

Page 1 of 10

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

|                                      |               |                    |                      |               |               |
|--------------------------------------|---------------|--------------------|----------------------|---------------|---------------|
| Lab Sample Number                    | 1257390       | 1257391            | 1257392              | 1257393       | 1257394       |
| Sample Reference                     | WS01          | WS02               | WS03                 | WS04          | WS05          |
| Sample Number                        | None Supplied | None Supplied      | None Supplied        | None Supplied | None Supplied |
| Depth (m)                            | 0.50          | 0.50-1.50          | 1.00                 | 1.10-1.70     | 1.00-1.80     |
| Date Sampled                         | 28/06/2019    | 28/06/2019         | 28/06/2019           | 28/06/2019    | 28/06/2019    |
| 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         |
| Moisture Content                     | %             | N/A                | NONE                 | 12            | 13            |
| Total mass of sample received        | kg            | 0.001              | NONE                 | 0.98          | 1.3           |

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

#### General Inorganics

|                                                                         |          |         |        |      |      |       |     |      |
|-------------------------------------------------------------------------|----------|---------|--------|------|------|-------|-----|------|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 8.1  | 8.1  | 8.5   | 7.6 | 8.4  |
| Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)         | mg/kg    | 2.5     | MCERTS | 570  | 930  | 150   | -   | 250  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.28 | 0.46 | 0.073 | 1.7 | 0.12 |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 283  | 464  | 72.8  | -   | 123  |
| Organic Matter                                                          | %        | 0.1     | MCERTS | 2.2  | 2.7  | 2.2   | -   | 8.1  |

#### Speciated PAHs

|                        |       |      |        |      |      |      |   |     |
|------------------------|-------|------|--------|------|------|------|---|-----|
| Naphthalene            | mg/kg | 0.05 | MCERTS | 0.65 | 1.5  | 11   | - | 8.9 |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | 0.26 | 0.33 | 0.59 | - | 6.7 |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | 2.4  | 4.7  | 20   | - | 26  |
| Fluorene               | mg/kg | 0.05 | MCERTS | 1.6  | 3.2  | 16   | - | 26  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 12   | 21   | 77   | - | 150 |
| Anthracene             | mg/kg | 0.05 | MCERTS | 4.4  | 6.9  | 22   | - | 46  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 21   | 28   | 61   | - | 180 |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 20   | 26   | 56   | - | 170 |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 9.4  | 11   | 28   | - | 100 |
| Chrysene               | mg/kg | 0.05 | MCERTS | 7.6  | 11   | 26   | - | 93  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 7.5  | 11   | 21   | - | 98  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 6.6  | 5.2  | 13   | - | 44  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 8.1  | 9.1  | 19   | - | 85  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 3.8  | 4.6  | 7.5  | - | 37  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | 0.99 | 1.4  | 2.9  | - | 11  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 4.9  | 5.7  | 8.5  | - | 43  |

#### Total PAH

|                             |       |     |        |     |     |     |   |      |
|-----------------------------|-------|-----|--------|-----|-----|-----|---|------|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 112 | 149 | 390 | - | 1130 |
|-----------------------------|-------|-----|--------|-----|-----|-----|---|------|

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

|                                         |               |                       |                         |               |               |
|-----------------------------------------|---------------|-----------------------|-------------------------|---------------|---------------|
| Lab Sample Number                       | 1257390       | 1257391               | 1257392                 | 1257393       | 1257394       |
| Sample Reference                        | WS01          | WS02                  | WS03                    | WS04          | WS05          |
| Sample Number                           | None Supplied | None Supplied         | None Supplied           | None Supplied | None Supplied |
| Depth (m)                               | 0.50          | 0.50-1.50             | 1.00                    | 1.10-1.70     | 1.00-1.80     |
| Date Sampled                            | 28/06/2019    | 28/06/2019            | 28/06/2019              | 28/06/2019    | 28/06/2019    |
| 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 | 13    | 18    | 16    | - | 37    |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | 0.7   | 0.9   | 0.3   | - | 0.8   |
| Chromium (hexavalent)             | mg/kg | 1.2 | MCERTS | < 1.2 | < 1.2 | < 1.2 | - | < 1.2 |
| Chromium (III)                    | mg/kg | 1   | NONE   | 27    | 36    | 14    | - | 20    |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 27    | 36    | 14    | - | 20    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 60    | 84    | 43    | - | 280   |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 190   | 260   | 120   | - | 430   |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | 0.5   | < 0.3 | 1.1   | - | 1.1   |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 21    | 28    | 18    | - | 39    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | < 1.0 | - | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 170   | 320   | 98    | - | 370   |

#### Monoaromatics & Oxygenates

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

#### Petroleum Hydrocarbons

|                                         |       |       |        |   |         |   |   |   |
|-----------------------------------------|-------|-------|--------|---|---------|---|---|---|
| TPH-CWG - Aliphatic >EC5 - EC6          | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aliphatic >EC6 - EC8          | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aliphatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aliphatic >EC10 - EC12        | mg/kg | 1     | MCERTS | - | < 1.0   | - | - | - |
| TPH-CWG - Aliphatic >EC12 - EC16        | mg/kg | 2     | MCERTS | - | 3.0     | - | - | - |
| TPH-CWG - Aliphatic >EC16 - EC21        | mg/kg | 8     | MCERTS | - | < 8.0   | - | - | - |
| TPH-CWG - Aliphatic >EC21 - EC35        | mg/kg | 8     | MCERTS | - | 33      | - | - | - |
| <b>TPH-CWG - Aliphatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | - | 43      | - | - | - |

|                                        |       |       |        |   |         |   |   |   |
|----------------------------------------|-------|-------|--------|---|---------|---|---|---|
| TPH-CWG - Aromatic >EC5 - EC7          | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aromatic >EC7 - EC8          | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aromatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | - | < 0.001 | - | - | - |
| TPH-CWG - Aromatic >EC10 - EC12        | mg/kg | 1     | MCERTS | - | 2.6     | - | - | - |
| TPH-CWG - Aromatic >EC12 - EC16        | mg/kg | 2     | MCERTS | - | 20      | - | - | - |
| TPH-CWG - Aromatic >EC16 - EC21        | mg/kg | 10    | MCERTS | - | 84      | - | - | - |
| TPH-CWG - Aromatic >EC21 - EC35        | mg/kg | 10    | MCERTS | - | 150     | - | - | - |
| <b>TPH-CWG - Aromatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | - | 260     | - | - | - |

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

| Lab Sample Number                       |       |                       |                         | 1257390       | 1257391       | 1257392       | 1257393       | 1257394       |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                        |       |                       |                         | WS01          | WS02          | WS03          | WS04          | WS05          |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                       |                         | 0.50          | 0.50-1.50     | 1.00          | 1.10-1.70     | 1.00-1.80     |
| Date Sampled                            |       |                       |                         | 28/06/2019    | 28/06/2019    | 28/06/2019    | 28/06/2019    | 28/06/2019    |
| 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 |               |               |               |               |               |
| <b>VOCs</b>                             |       |                       |                         |               |               |               |               |               |
| Chloromethane                           | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Chloroethane                            | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| Bromomethane                            | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Vinyl Chloride                          | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| Trichlorofluoromethane                  | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| 1,1-Dichloroethene                      | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| 1,1,2-Trichloro 1,2,2-Trifluoroethane   | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Cis-1,2-dichloroethene                  | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| MTBE (Methyl Tertiary Butyl Ether)      | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1-Dichloroethane                      | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 2,2-Dichloropropane                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Trichloromethane                        | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1,1-Trichloroethane                   | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,2-Dichloroethane                      | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1-Dichloropropene                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Trans-1,2-dichloroethene                | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| Benzene                                 | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Tetrachloromethane                      | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,2-Dichloropropane                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Trichloroethene                         | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Dibromomethane                          | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Bromodichloromethane                    | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Cis-1,3-dichloropropene                 | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Trans-1,3-dichloropropene               | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Toluene                                 | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1,2-Trichloroethane                   | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,3-Dichloropropane                     | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Dibromochloromethane                    | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Tetrachloroethene                       | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| 1,2-Dibromoethane                       | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| Chlorobenzene                           | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1,1,2-Tetrachloroethane               | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Ethylbenzene                            | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| p & m-Xylene                            | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Styrene                                 | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Tri bromomethane                        | µg/kg | 1                     | NONE                    | -             | < 1.0         | -             | -             | -             |
| o-Xylene                                | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,1,2,2-Tetrachloroethane               | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Isopropylbenzene                        | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Bromobenzene                            | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| n-Propylbenzene                         | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| 2-Chlorotoluene                         | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 4-Chlorotoluene                         | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,3,5-Trimethylbenzene                  | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| tert-Butylbenzene                       | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,2,4-Trimethylbenzene                  | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| sec-Butylbenzene                        | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,3-Dichlorobenzene                     | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| p-Isopropyltoluene                      | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| 1,2-Dichlorobenzene                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,4-Dichlorobenzene                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Butylbenzene                            | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,2-Dibromo-3-chloropropane             | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |
| 1,2,4-Trichlorobenzene                  | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| Hexachlorobutadiene                     | µg/kg | 1                     | MCERTS                  | -             | < 1.0         | -             | -             | -             |
| 1,2,3-Trichlorobenzene                  | µg/kg | 1                     | ISO 17025               | -             | < 1.0         | -             | -             | -             |

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

|                                      |       |                    |                      |               |               |  |  |  |
|--------------------------------------|-------|--------------------|----------------------|---------------|---------------|--|--|--|
| Lab Sample Number                    |       |                    |                      | 1257395       | 1257396       |  |  |  |
| Sample Reference                     |       |                    |                      | WS07          | HP01          |  |  |  |
| Sample Number                        |       |                    |                      | None Supplied | None Supplied |  |  |  |
| Depth (m)                            |       |                    |                      | 0.35-0.70     | 0.50          |  |  |  |
| Date Sampled                         |       |                    |                      | 28/06/2019    | 28/06/2019    |  |  |  |
| Time Taken                           |       |                    |                      | None Supplied | None Supplied |  |  |  |
| Analytical Parameter (Soil Analysis) | Units | Limit of detection | Accreditation Status |               |               |  |  |  |
| Stone Content                        | %     | 0.1                | NONE                 | < 0.1         | < 0.1         |  |  |  |
| Moisture Content                     | %     | N/A                | NONE                 | 8.8           | 11            |  |  |  |
| Total mass of sample received        | kg    | 0.001              | NONE                 | 0.96          | 1.1           |  |  |  |

|                                               |      |       |           |            |            |  |  |  |
|-----------------------------------------------|------|-------|-----------|------------|------------|--|--|--|
| Asbestos in Soil Screen / Identification Name | Type | N/A   | ISO 17025 | Chrysotile | Chrysotile |  |  |  |
| Asbestos in Soil                              | Type | N/A   | ISO 17025 | Detected   | Detected   |  |  |  |
| Asbestos Quantification (Stage 2)             | %    | 0.001 | ISO 17025 | < 0.001    | < 0.001    |  |  |  |
| Asbestos Quantification Total                 | %    | 0.001 | ISO 17025 | < 0.001    | < 0.001    |  |  |  |

#### General Inorganics

|                                                                         |          |         |        |      |      |  |  |  |
|-------------------------------------------------------------------------|----------|---------|--------|------|------|--|--|--|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 8.3  | 8.5  |  |  |  |
| Water Soluble Sulphate as SO <sub>4</sub> , 16hr extraction (2:1)       | mg/kg    | 2.5     | MCERTS | 260  | 270  |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.13 | 0.14 |  |  |  |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | mg/l     | 1.25    | MCERTS | 129  | 137  |  |  |  |
| Organic Matter                                                          | %        | 0.1     | MCERTS | 2.9  | 3.6  |  |  |  |

#### Speciated PAHs

|                        |       |      |        |        |     |  |  |  |
|------------------------|-------|------|--------|--------|-----|--|--|--|
| Naphthalene            | mg/kg | 0.05 | MCERTS | < 0.05 | 5.8 |  |  |  |
| Acenaphthylene         | mg/kg | 0.05 | MCERTS | 0.31   | 3.5 |  |  |  |
| Acenaphthene           | mg/kg | 0.05 | MCERTS | 1.0    | 3.2 |  |  |  |
| Fluorene               | mg/kg | 0.05 | MCERTS | 1.0    | 6.0 |  |  |  |
| Phenanthrene           | mg/kg | 0.05 | MCERTS | 7.1    | 38  |  |  |  |
| Anthracene             | mg/kg | 0.05 | MCERTS | 2.2    | 9.9 |  |  |  |
| Fluoranthene           | mg/kg | 0.05 | MCERTS | 11     | 38  |  |  |  |
| Pyrene                 | mg/kg | 0.05 | MCERTS | 11     | 40  |  |  |  |
| Benzo(a)anthracene     | mg/kg | 0.05 | MCERTS | 5.5    | 18  |  |  |  |
| Chrysene               | mg/kg | 0.05 | MCERTS | 4.0    | 14  |  |  |  |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | MCERTS | 5.1    | 17  |  |  |  |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | MCERTS | 2.7    | 5.6 |  |  |  |
| Benzo(a)pyrene         | mg/kg | 0.05 | MCERTS | 4.3    | 14  |  |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 2.2    | 6.2 |  |  |  |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | MCERTS | 0.81   | 2.0 |  |  |  |
| Benzo(ghi)perylene     | mg/kg | 0.05 | MCERTS | 2.4    | 6.8 |  |  |  |

#### Total PAH

|                             |       |     |        |      |     |  |  |  |
|-----------------------------|-------|-----|--------|------|-----|--|--|--|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | MCERTS | 60.7 | 229 |  |  |  |
|-----------------------------|-------|-----|--------|------|-----|--|--|--|

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

|                                         |       |                       |                         |               |               |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|--|--|--|
| Lab Sample Number                       |       |                       |                         | 1257395       | 1257396       |  |  |  |
| Sample Reference                        |       |                       |                         | WS07          | HP01          |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied |  |  |  |
| Depth (m)                               |       |                       |                         | 0.35-0.70     | 0.50          |  |  |  |
| Date Sampled                            |       |                       |                         | 28/06/2019    | 28/06/2019    |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied | 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                  | 12            | 13            |  |  |  |
| Cadmium (aqua regia extractable)        | mg/kg | 0.2                   | MCERTS                  | 0.9           | 0.8           |  |  |  |
| Chromium (hexavalent)                   | mg/kg | 1.2                   | MCERTS                  | < 1.2         | < 1.2         |  |  |  |
| Chromium (III)                          | mg/kg | 1                     | NONE                    | 23            | 31            |  |  |  |
| Chromium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | 23            | 31            |  |  |  |
| Copper (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 63            | 68            |  |  |  |
| Lead (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 190           | 210           |  |  |  |
| Mercury (aqua regia extractable)        | mg/kg | 0.3                   | MCERTS                  | 0.5           | 0.8           |  |  |  |
| Nickel (aqua regia extractable)         | mg/kg | 1                     | MCERTS                  | 20            | 22            |  |  |  |
| Selenium (aqua regia extractable)       | mg/kg | 1                     | MCERTS                  | < 1.0         | < 1.0         |  |  |  |
| Zinc (aqua regia extractable)           | mg/kg | 1                     | MCERTS                  | 290           | 250           |  |  |  |

#### Monoaromatics & Oxygenates

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

#### Petroleum Hydrocarbons

|                                         |       |       |        |   |   |  |  |  |
|-----------------------------------------|-------|-------|--------|---|---|--|--|--|
| TPH-CWG - Aliphatic >EC5 - EC6          | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC6 - EC8          | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC10 - EC12        | mg/kg | 1     | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC12 - EC16        | mg/kg | 2     | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC16 - EC21        | mg/kg | 8     | MCERTS | - | - |  |  |  |
| TPH-CWG - Aliphatic >EC21 - EC35        | mg/kg | 8     | MCERTS | - | - |  |  |  |
| <b>TPH-CWG - Aliphatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | - | - |  |  |  |

|                                        |       |       |        |   |   |  |  |  |
|----------------------------------------|-------|-------|--------|---|---|--|--|--|
| TPH-CWG - Aromatic >EC5 - EC7          | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC7 - EC8          | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC8 - EC10         | mg/kg | 0.001 | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC10 - EC12        | mg/kg | 1     | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC12 - EC16        | mg/kg | 2     | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC16 - EC21        | mg/kg | 10    | MCERTS | - | - |  |  |  |
| TPH-CWG - Aromatic >EC21 - EC35        | mg/kg | 10    | MCERTS | - | - |  |  |  |
| <b>TPH-CWG - Aromatic (EC5 - EC35)</b> | mg/kg | 10    | MCERTS | - | - |  |  |  |

Analytical Report Number: 19-48006

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-104-NS

| Lab Sample Number                       |       |                       |                         | 1257395       | 1257396       |  |  |  |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|--|--|--|
| Sample Reference                        |       |                       |                         | WS07          | HP01          |  |  |  |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied |  |  |  |
| Depth (m)                               |       |                       |                         | 0.35-0.70     | 0.50          |  |  |  |
| Date Sampled                            |       |                       |                         | 28/06/2019    | 28/06/2019    |  |  |  |
| Time Taken                              |       |                       |                         | None Supplied | None Supplied |  |  |  |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |               |               |  |  |  |
| <b>VOCs</b>                             |       |                       |                         |               |               |  |  |  |
| Chloromethane                           | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Chloroethane                            | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| Bromomethane                            | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Vinyl Chloride                          | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| Trichlorofluoromethane                  | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| 1,1-Dichloroethene                      | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| 1,1,2-Trichloro 1,2,2-Trifluoroethane   | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Cis-1,2-dichloroethene                  | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| MTBE (Methyl Tertiary Butyl Ether)      | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1-Dichloroethane                      | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 2,2-Dichloropropane                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Trichloromethane                        | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1,1-Trichloroethane                   | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,2-Dichloroethane                      | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1-Dichloropropene                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Trans-1,2-dichloroethene                | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| Benzene                                 | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Tetrachloromethane                      | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,2-Dichloropropane                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Trichloroethene                         | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Dibromomethane                          | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Bromodichloromethane                    | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Cis-1,3-dichloropropene                 | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Trans-1,3-dichloropropene               | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Toluene                                 | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1,2-Trichloroethane                   | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,3-Dichloropropane                     | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Dibromochloromethane                    | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Tetrachloroethene                       | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| 1,2-Dibromoethane                       | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| Chlorobenzene                           | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1,1,2-Tetrachloroethane               | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Ethylbenzene                            | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| p & m-Xylene                            | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Styrene                                 | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Tribromomethane                         | µg/kg | 1                     | NONE                    | -             | -             |  |  |  |
| o-Xylene                                | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,1,2,2-Tetrachloroethane               | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Isopropylbenzene                        | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Bromobenzene                            | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| n-Propylbenzene                         | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| 2-Chlorotoluene                         | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 4-Chlorotoluene                         | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,3,5-Trimethylbenzene                  | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| tert-Butylbenzene                       | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,2,4-Trimethylbenzene                  | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| sec-Butylbenzene                        | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,3-Dichlorobenzene                     | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| p-Isopropyltoluene                      | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| 1,2-Dichlorobenzene                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,4-Dichlorobenzene                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Butylbenzene                            | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,2-Dibromo-3-chloropropane             | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |
| 1,2,4-Trichlorobenzene                  | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| Hexachlorobutadiene                     | µg/kg | 1                     | MCERTS                  | -             | -             |  |  |  |
| 1,2,3-Trichlorobenzene                  | µg/kg | 1                     | ISO 17025               | -             | -             |  |  |  |



Analytical Report Number: **19-48006**  
Project / Site name: **Dean Trust Academy, Ardwick**  
Your Order No: **M4246-104-NS**

## Certificate of Analysis - Asbestos Quantification

### Methods:

#### Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

#### Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

| Sample Number  | Sample ID | Sample Depth (m) | Sample Weight (g) | Asbestos Containing Material Types Detected (ACM) | PLM Results                     | Asbestos by hand picking/weighing (%) | Total % Asbestos in Sample |
|----------------|-----------|------------------|-------------------|---------------------------------------------------|---------------------------------|---------------------------------------|----------------------------|
| <b>1257390</b> | WS01      | 0.50             | 135               | Loose Fibres                                      | <b>Chrysotile &amp; Amosite</b> | 0.002                                 | <b>0.002</b>               |
| <b>1257391</b> | WS02      | 0.50-1.50        | 134               | Loose Fibres                                      | <b>Chrysotile</b>               | < 0.001                               | <b>&lt; 0.001</b>          |
| <b>1257392</b> | WS03      | 1.00             | 128               | Loose Fibres                                      | <b>Chrysotile</b>               | < 0.001                               | <b>&lt; 0.001</b>          |
| <b>1257394</b> | WS05      | 1.00-1.80        | 130               | Loose Fibres                                      | <b>Chrysotile</b>               | < 0.001                               | <b>&lt; 0.001</b>          |
| <b>1257395</b> | WS07      | 0.35-0.70        | 135               | Loose Fibres                                      | <b>Chrysotile</b>               | < 0.001                               | <b>&lt; 0.001</b>          |
| <b>1257396</b> | HP01      | 0.50             | 149               | Loose Fibres                                      | <b>Chrysotile</b>               | < 0.001                               | <b>&lt; 0.001</b>          |

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

**Analytical Report Number : 19-48006**

**Project / Site name: Dean Trust Academy, Ardwick**

\* 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 *                       |
|-------------------|------------------|---------------|-----------|--------------------------------------------|
| 1257390           | WS01             | None Supplied | 0.50      | Brown clay and loam with brick and clinker |
| 1257391           | WS02             | None Supplied | 0.50-1.50 | Brown clay and loam with brick and gravel  |
| 1257392           | WS03             | None Supplied | 1.00      | Brown loam and sand with gravel and brick. |
| 1257393           | WS04             | None Supplied | 1.10-1.70 | Brown clay and sand with gravel.           |
| 1257394           | WS05             | None Supplied | 1.00-1.80 | Brown clay and sand with gravel.           |
| 1257395           | WS07             | None Supplied | 0.35-0.70 | Brown clay and sand with brick and gravel  |
| 1257396           | HP01             | None Supplied | 0.50      | Brown loam and clay with gravel and brick. |

**Analytical Report Number : 19-48006**

**Project / Site name: Dean Trust Academy, Ardwick**

**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            |
| Asbestos Quantification - Gravimetric              | Asbestos quantification by gravimetric method - in house method based on references.                                                                      | HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).                                                                 | A006-PL       | D                  | ISO 17025            |
| BTEX and MTBE in soil (Monoaromatics)              | Determination of BTEX in soil by headspace GC-MS.                                                                                                         | In-house method based on USEPA8260                                                                                                | L0738-PL      | W                  | MCERTS               |
| Cr (III) in soil                                   | In-house method by calculation from total Cr and Cr VI.                                                                                                   | In-house method by calculation                                                                                                    | L080-PL       | W                  | NONE                 |
| D.O. for Gravimetric Quant if Screen/ID positive   | Dependent option for Gravimetric Quant if Screen/ID positive scheduled.                                                                                   | In house asbestos methods A001 & A006.                                                                                            | A006-PL       | D                  | NONE                 |
| Hexavalent chromium in soil (Lower Level)          | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide 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                 |
| Organic matter (Automated) in soil                 | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.                             | BS1377 Part 3, 1990, Chemical and Electrochemical Tests""                                                                         | L009-PL       | D                  | 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               |
| TPHCWG (Soil)                                      | Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.                                                                                 | In-house method with silica gel split/clean up.                                                                                   | L088/76-PL    | W                  | MCERTS               |
| Volatile organic compounds in soil                 | Determination of volatile organic compounds in soil by headspace GC-MS.                                                                                   | In-house method based on USEPA8260                                                                                                | L0738-PL      | W                  | MCERTS               |

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

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

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



**Nicola Swallow**

Brownfield Solutions Ltd  
William Smith House  
173 - 183 Witton Street  
Northwich  
Cheshire  
CW9 5LP

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:** n.swallow@brownfield-solutions.co.uk

## **Analytical Report Number : 19-48008**

|                             |                             |                               |            |
|-----------------------------|-----------------------------|-------------------------------|------------|
| <b>Project / Site name:</b> | Dean Trust Academy, Ardwick | <b>Samples received on:</b>   | 01/07/2019 |
| <b>Your job number:</b>     | M4246                       | <b>Samples instructed on:</b> | 01/07/2019 |
| <b>Your order number:</b>   | M4246-104-NS                | <b>Analysis completed by:</b> | 08/07/2019 |
| <b>Report Issue Number:</b> | 1                           | <b>Report issued on:</b>      | 08/07/2019 |
| <b>Samples Analysed:</b>    | 1 WAC 10:1 Sample           |                               |            |

**Signed:** 

Zina Abdul Razzak  
Senior Quality Specialist  
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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 19-48008-1 Dean Trust Academy, Ardwick M4246

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

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

Page 1 of 5

## i2 Analytical

7 Woodshots Meadow  
Croxley Green Business Park  
Watford, WD18 8YS

Telephone: 01923 225404  
Fax: 01923 237404  
email: reception@i2analytical.com

| Waste Acceptance Criteria Analytical Results                                                                                                                                                                               |  |                             |  |  |          |                                            |                                                               |                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------|--|--|----------|--------------------------------------------|---------------------------------------------------------------|--------------------------|
| Report No:                                                                                                                                                                                                                 |  | 19-48008                    |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          | Client: BSL                                |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
| Location                                                                                                                                                                                                                   |  | Dean Trust Academy, Ardwick |  |  |          |                                            |                                                               |                          |
| Lab Reference (Sample Number)                                                                                                                                                                                              |  | 1257400 / 1257401           |  |  |          | Landfill Waste Acceptance Criteria         |                                                               |                          |
| Sampling Date                                                                                                                                                                                                              |  | 28/06/2019                  |  |  |          | Inert Waste Landfill                       | Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill | Hazardous Waste Landfill |
| Sample ID                                                                                                                                                                                                                  |  | WS02                        |  |  |          |                                            |                                                               |                          |
| Depth (m)                                                                                                                                                                                                                  |  | 0.50-1.50                   |  |  |          |                                            |                                                               |                          |
| Solid Waste Analysis                                                                                                                                                                                                       |  |                             |  |  |          |                                            |                                                               |                          |
| TOC (%)**                                                                                                                                                                                                                  |  | 1.4                         |  |  |          | 3%                                         | 5%                                                            | 6%                       |
| Loss on Ignition (%) **                                                                                                                                                                                                    |  | 5.4                         |  |  |          | --                                         | --                                                            | 10%                      |
| BTEX (µg/kg) **                                                                                                                                                                                                            |  | < 10                        |  |  |          | 6000                                       | --                                                            | --                       |
| Sum of PCBs (mg/kg) **                                                                                                                                                                                                     |  | 0.028                       |  |  |          | 1                                          | --                                                            | --                       |
| Mineral Oil (mg/kg)                                                                                                                                                                                                        |  | 85                          |  |  |          | 500                                        | --                                                            | --                       |
| Total PAH (WAC-17) (mg/kg)                                                                                                                                                                                                 |  | 130                         |  |  |          | 100                                        | --                                                            | --                       |
| pH (units)**                                                                                                                                                                                                               |  | 7.6                         |  |  |          | --                                         | >6                                                            | --                       |
| Acid Neutralisation Capacity (mol / kg)                                                                                                                                                                                    |  | 17                          |  |  |          | --                                         | To be evaluated                                               | To be evaluated          |
| Eluate Analysis                                                                                                                                                                                                            |  | 10:1                        |  |  | 10:1     | Limit values for compliance leaching test  |                                                               |                          |
| (BS EN 12457 - 2 preparation utilising end over end leaching procedure)                                                                                                                                                    |  | mg/l                        |  |  | mg/kg    | using BS EN 12457-2 at L/S 10 l/kg (mg/kg) |                                                               |                          |
| Arsenic *                                                                                                                                                                                                                  |  | < 0.0011                    |  |  | < 0.0110 | 0.5                                        | 2                                                             | 25                       |
| Barium *                                                                                                                                                                                                                   |  | 0.0556                      |  |  | 0.476    | 20                                         | 100                                                           | 300                      |
| Cadmium *                                                                                                                                                                                                                  |  | < 0.0001                    |  |  | < 0.0008 | 0.04                                       | 1                                                             | 5                        |
| Chromium *                                                                                                                                                                                                                 |  | 0.0015                      |  |  | 0.013    | 0.5                                        | 10                                                            | 70                       |
| Copper *                                                                                                                                                                                                                   |  | 0.0073                      |  |  | 0.063    | 2                                          | 50                                                            | 100                      |
| Mercury *                                                                                                                                                                                                                  |  | < 0.0005                    |  |  | < 0.0050 | 0.01                                       | 0.2                                                           | 2                        |
| Molybdenum *                                                                                                                                                                                                               |  | 0.0170                      |  |  | 0.146    | 0.5                                        | 10                                                            | 30                       |
| Nickel *                                                                                                                                                                                                                   |  | 0.0011                      |  |  | 0.0096   | 0.4                                        | 10                                                            | 40                       |
| Lead *                                                                                                                                                                                                                     |  | 0.0027                      |  |  | 0.023    | 0.5                                        | 10                                                            | 50                       |
| Antimony *                                                                                                                                                                                                                 |  | < 0.0017                    |  |  | < 0.017  | 0.06                                       | 0.7                                                           | 5                        |
| Selenium *                                                                                                                                                                                                                 |  | < 0.0040                    |  |  | < 0.040  | 0.1                                        | 0.5                                                           | 7                        |
| Zinc *                                                                                                                                                                                                                     |  | 0.0021                      |  |  | 0.018    | 4                                          | 50                                                            | 200                      |
| Chloride *                                                                                                                                                                                                                 |  | 2.8                         |  |  | 24       | 800                                        | 4000                                                          | 25000                    |
| Fluoride                                                                                                                                                                                                                   |  | 2.2                         |  |  | 19       | 10                                         | 150                                                           | 500                      |
| Sulphate *                                                                                                                                                                                                                 |  | 45                          |  |  | 380      | 1000                                       | 20000                                                         | 50000                    |
| TDS*                                                                                                                                                                                                                       |  | 140                         |  |  | 1200     | 4000                                       | 60000                                                         | 100000                   |
| Phenol Index (Monohydric Phenols) *                                                                                                                                                                                        |  | < 0.010                     |  |  | < 0.10   | 1                                          | -                                                             | -                        |
| DOC                                                                                                                                                                                                                        |  | 8.48                        |  |  | 72.6     | 500                                        | 800                                                           | 1000                     |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
| Leach Test Information                                                                                                                                                                                                     |  |                             |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
| Stone Content (%)                                                                                                                                                                                                          |  | < 0.1                       |  |  |          |                                            |                                                               |                          |
| Sample Mass (kg)                                                                                                                                                                                                           |  | 1.3                         |  |  |          |                                            |                                                               |                          |
| Dry Matter (%)                                                                                                                                                                                                             |  | 87                          |  |  |          |                                            |                                                               |                          |
| Moisture (%)                                                                                                                                                                                                               |  | 13                          |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
|                                                                                                                                                                                                                            |  |                             |  |  |          |                                            |                                                               |                          |
| Results are expressed on a dry weight basis, after correction for moisture content where applicable. ** = UKAS accredited (liquid eluate analysis only)                                                                    |  |                             |  |  |          |                                            |                                                               |                          |
| Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited                                                                                |  |                             |  |  |          |                                            |                                                               |                          |
| Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.     |  |                             |  |  |          |                                            |                                                               |                          |
| This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous. |  |                             |  |  |          |                                            |                                                               |                          |



**Analytical Report Number : 19-48008**

**Project / Site name: Dean Trust Academy, Ardwick**

\* 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 *                      |
|-------------------|------------------|---------------|-----------|-------------------------------------------|
| 1257400           | WS02             | None Supplied | 0.50-1.50 | Brown clay and loam with brick and gravel |

**Analytical Report Number : 19-48008**

**Project / Site name: Dean Trust Academy, Ardwick**

**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 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Acid neutralisation capacity of soil | Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.                                              | In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance" | L046-PL       | W                  | NONE                 |
| BS EN 12457-2 (10:1) Leachate Prep   | 10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.                              | In-house method based on BSEN12457-2.                                                                  | L043-PL       | W                  | NONE                 |
| BTEX in soil (Monoaromatics)         | Determination of BTEX in soil by headspace GC-MS.                                                                                                      | In-house method based on USEPA8260                                                                     | L0738-PL      | W                  | MCERTS               |
| Chloride 10:1 WAC                    | Determination of Chloride colorimetrically by discrete analyser.                                                                                       | In house based on MEWAM Method ISBN 0117516260.                                                        | L082-PL       | W                  | ISO 17025            |
| Dissolved organic carbon 10:1 WAC    | Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.                                                                      | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L037-PL       | W                  | NONE                 |
| Fluoride 10:1 WAC                    | Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.                                          | In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"    | L0338-PL      | W                  | ISO 17025            |
| Loss on ignition of soil @ 450oC     | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.                                        | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                       | L047-PL       | D                  | MCERTS               |
| Metals in leachate by ICP-OES        | Determination of metals in leachate by acidification followed by ICP-OES.                                                                              | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil"                   | L039-PL       | W                  | ISO 17025            |
| Mineral Oil (Soil) C10 - C40         | Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.                                                                | In-house method with silica gel split/clean up.                                                        | L076-PL       | D                  | NONE                 |
| 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 10:1 WAC          | Determination of phenols in leachate by distillation followed by colorimetry.                                                                          | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL       | W                  | ISO 17025            |
| PCB's By GC-MS in soil               | Determination of PCB by extraction with acetone and hexane followed by GC-MS.                                                                          | In-house method based on USEPA 8082                                                                    | L027-PL       | D                  | MCERTS               |
| pH in soil                           | Determination of pH in soil by addition of water followed by electrometric measurement.                                                                | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                       | L005-PL       | W                  | MCERTS               |
| Speciated WAC-17 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. MCERTS accredited except Coronene.                                | L064-PL       | D                  | NONE                 |
| 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 10:1 WAC                    | Determination of sulphate in leachate by ICP-OES                                                                                                       | In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"                   | L039-PL       | W                  | ISO 17025            |
| Total dissolved solids 10:1 WAC      | Determination of total dissolved solids in water by electrometric measurement.                                                                         | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L004-PL       | W                  | NONE                 |

Iss No 19-48008-1 Dean Trust Academy, Ardwick M4246

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

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

Page 4 of 5

**Analytical Report Number : 19-48008**

**Project / Site name: Dean Trust Academy, Ardwick**

**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 |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Total organic carbon (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate. | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>™</sup> | L009-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.**

## **APPENDIX D**

### **Geotechnical testing Results**



# TEST CERTIFICATE

## Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 09/07/2019  
Sampled By: NS

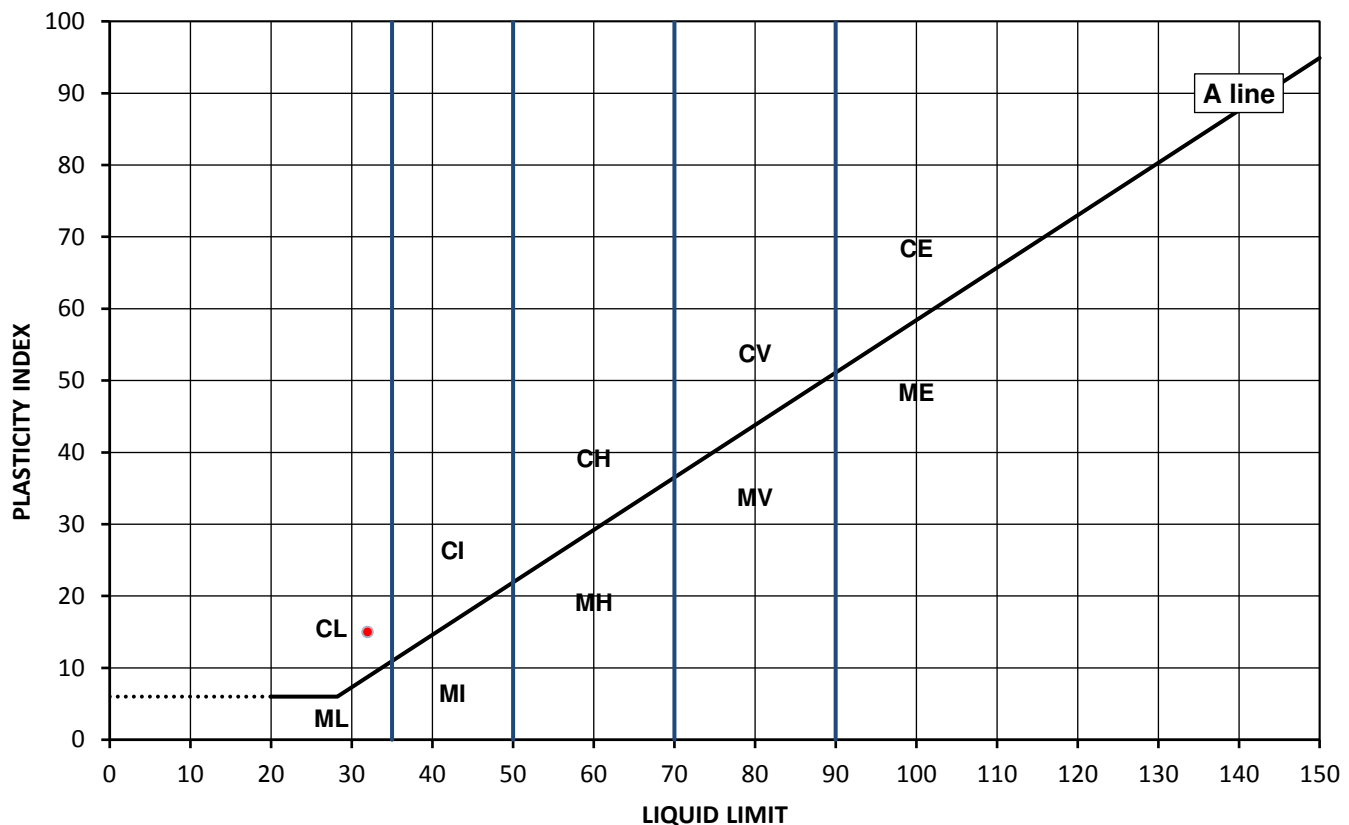
### Test Results:

Laboratory Reference: 1256982  
Hole No.: WS04  
Sample Reference: Not Given  
Soil Description: Reddish brown very sandy CLAY

Depth Top [m]: 2.00  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested in natural condition

| As Received Moisture Content [%] | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index [%] | % Passing 425µm BS Test Sieve |
|----------------------------------|------------------|-------------------|----------------------|-------------------------------|
| 13                               | 32               | 17                | 15                   | 100                           |



Legend, based on BS 5930:2015 Code of practice for site investigations

|   |         |            |                                                          |
|---|---------|------------|----------------------------------------------------------|
| C | Clay    | Plasticity | Liquid Limit                                             |
| M | Silt    | L          | Low                                                      |
|   |         | I          | Medium                                                   |
|   |         | H          | High                                                     |
|   |         | V          | Very high                                                |
|   |         | E          | Extremely high                                           |
|   |         |            | below 35                                                 |
|   |         |            | 35 to 50                                                 |
|   |         |            | 50 to 70                                                 |
|   |         |            | 70 to 90                                                 |
|   |         |            | exceeding 90                                             |
|   | Organic | O          | append to classification for organic material ( eg CHO ) |

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

\*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



# TEST CERTIFICATE

## Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 09/07/2019  
Sampled By: NS

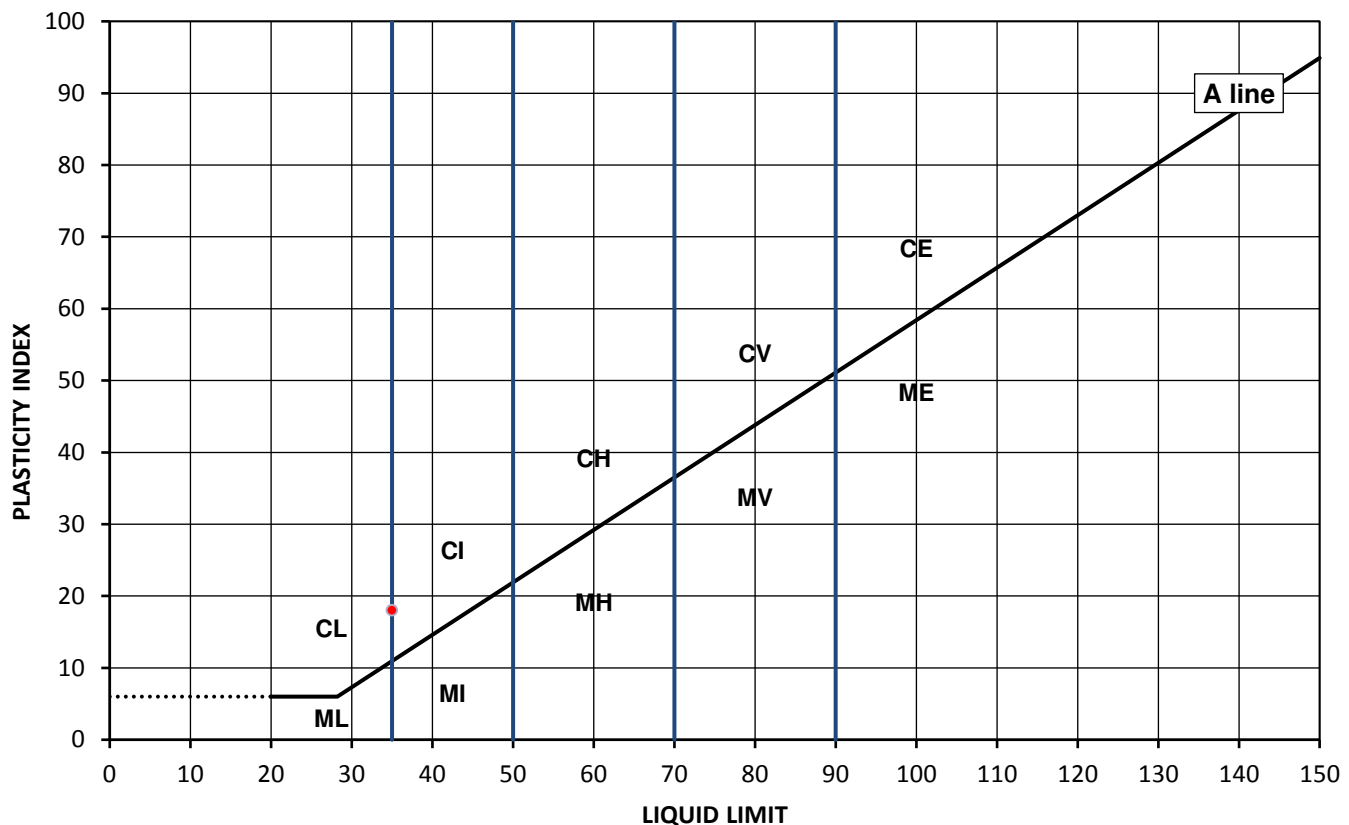
### Test Results:

Laboratory Reference: 1256983  
Hole No.: WS04  
Sample Reference: Not Given  
Soil Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 3.00  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

| As Received Moisture Content [%] | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index [%] | % Passing 425µm BS Test Sieve |
|----------------------------------|------------------|-------------------|----------------------|-------------------------------|
| 14                               | 35               | 17                | 18                   | 93                            |



Legend, based on BS 5930:2015 Code of practice for site investigations

|   |         |            |                                                          |
|---|---------|------------|----------------------------------------------------------|
| C | Clay    | Plasticity | Liquid Limit                                             |
| M | Silt    | L          | Low                                                      |
|   |         | I          | Medium                                                   |
|   |         | H          | High                                                     |
|   |         | V          | Very high                                                |
|   |         | E          | Extremely high                                           |
|   |         |            | below 35                                                 |
|   |         |            | 35 to 50                                                 |
|   |         |            | 50 to 70                                                 |
|   |         |            | 70 to 90                                                 |
|   |         |            | exceeding 90                                             |
|   | Organic | O          | append to classification for organic material ( eg CHO ) |

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

\*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



# TEST CERTIFICATE

## Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 09/07/2019  
Sampled By: NS

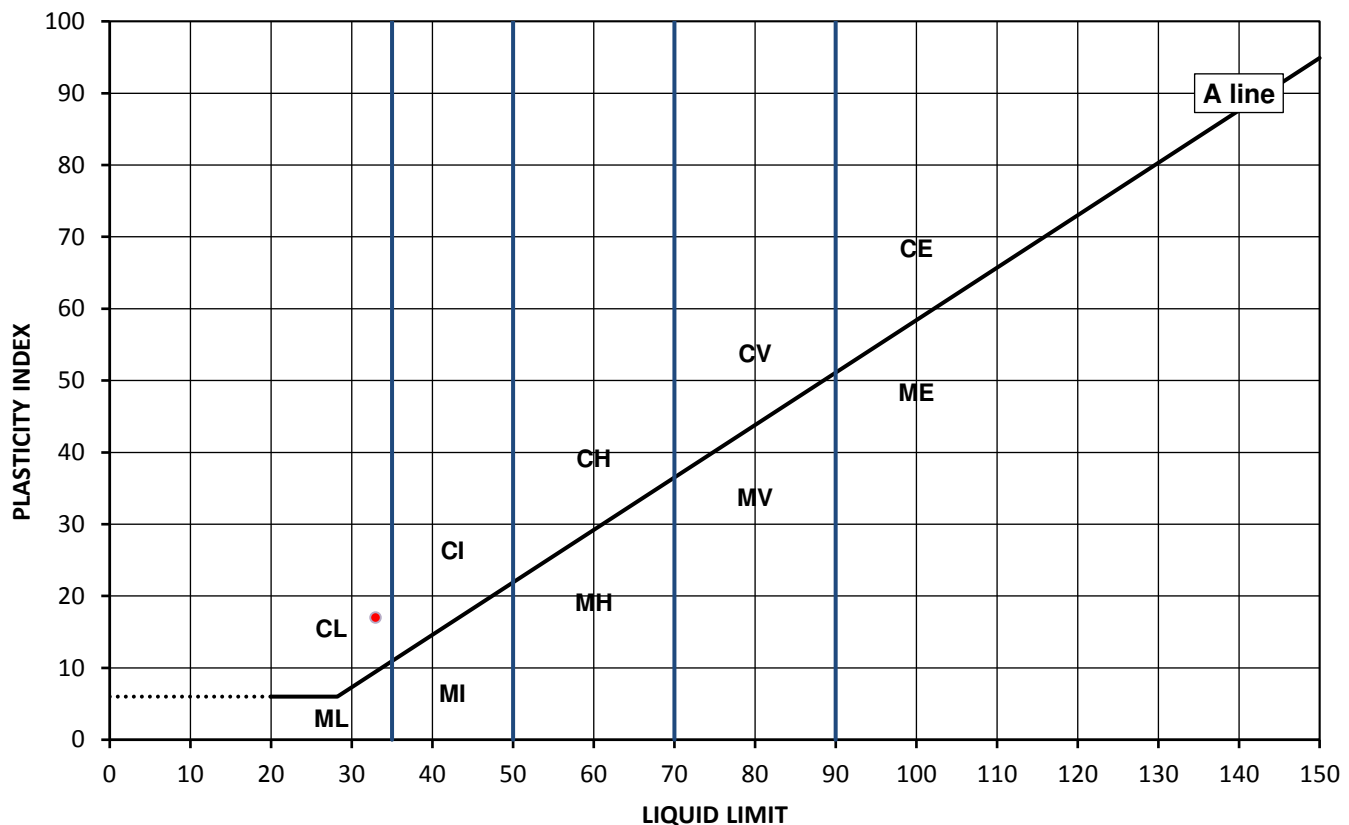
### Test Results:

Laboratory Reference: 1256984  
Hole No.: WS05  
Sample Reference: Not Given  
Soil Description: Greyish brown slightly gravelly very sandy CLAY

Depth Top [m]: 2.00  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

| As Received Moisture Content [%] | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index [%] | % Passing 425µm BS Test Sieve |
|----------------------------------|------------------|-------------------|----------------------|-------------------------------|
| 13                               | 33               | 16                | 17                   | 90                            |



Legend, based on BS 5930:2015 Code of practice for site investigations

|   |         |            |                                                          |
|---|---------|------------|----------------------------------------------------------|
| C | Clay    | Plasticity | Liquid Limit                                             |
| M | Silt    | L          | Low                                                      |
|   |         | I          | Medium                                                   |
|   |         | H          | High                                                     |
|   |         | V          | Very high                                                |
|   |         | E          | Extremely high                                           |
|   |         |            | below 35                                                 |
|   |         |            | 35 to 50                                                 |
|   |         |            | 50 to 70                                                 |
|   |         |            | 70 to 90                                                 |
|   |         |            | exceeding 90                                             |
|   | Organic | O          | append to classification for organic material ( eg CHO ) |

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

\*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



# TEST CERTIFICATE

## Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 09/07/2019  
Sampled By: NS

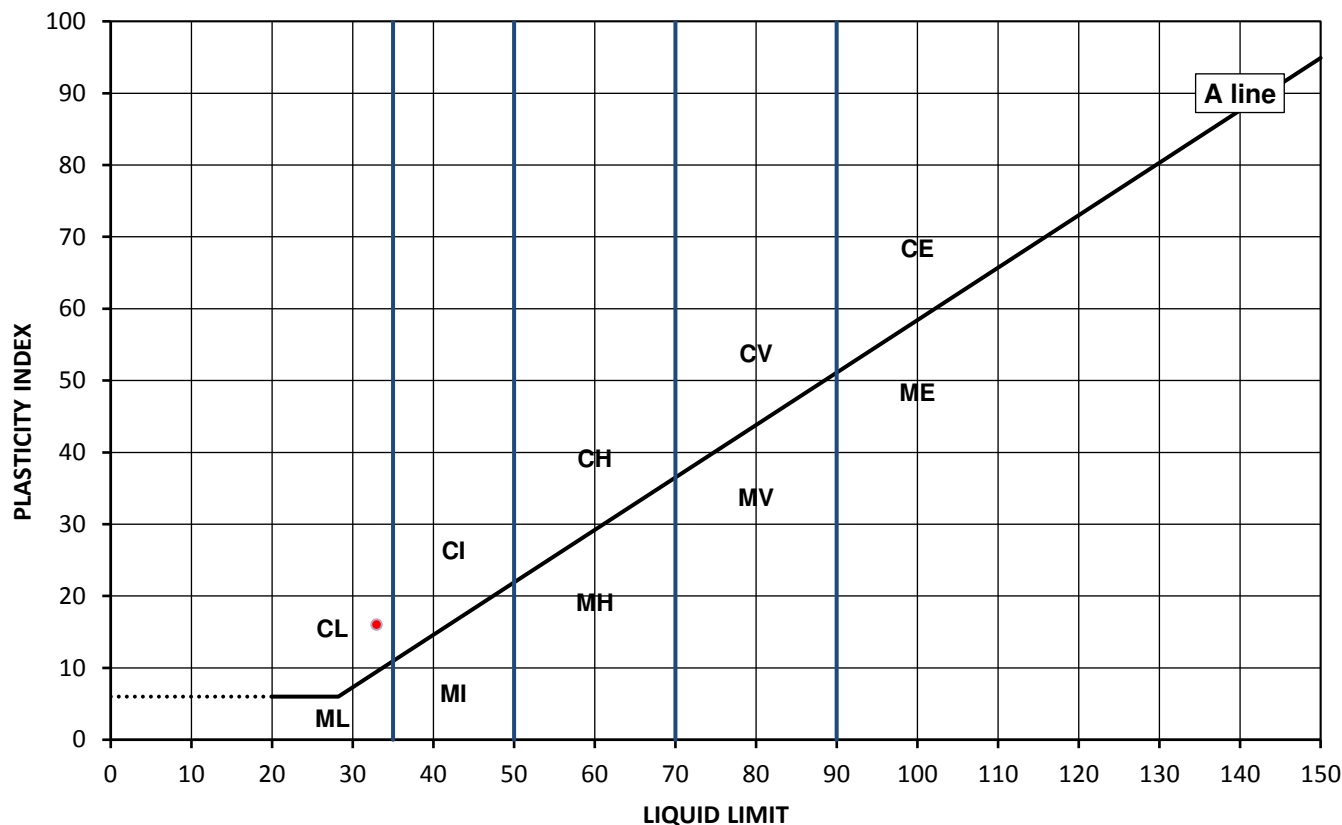
### Test Results:

Laboratory Reference: 1256985  
Hole No.: WS05  
Sample Reference: Not Given  
Soil Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 2.50  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

| As Received Moisture Content [%] | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index [%] | % Passing 425µm BS Test Sieve |
|----------------------------------|------------------|-------------------|----------------------|-------------------------------|
| 12                               | 33               | 17                | 16                   | 87                            |



Legend, based on BS 5930:2015 Code of practice for site investigations

|   |         |            |                                                          |
|---|---------|------------|----------------------------------------------------------|
| C | Clay    | Plasticity | Liquid Limit                                             |
| M | Silt    | L          | Low                                                      |
|   |         | I          | Medium                                                   |
|   |         | H          | High                                                     |
|   |         | V          | Very high                                                |
|   |         | E          | Extremely high                                           |
|   |         |            | below 35                                                 |
|   |         |            | 35 to 50                                                 |
|   |         |            | 50 to 70                                                 |
|   |         |            | 70 to 90                                                 |
|   |         |            | exceeding 90                                             |
|   | Organic | O          | append to classification for organic material ( eg CHO ) |

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

\*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



4041

Client: Brownfield Solutions Ltd  
 Client Address: William Smith House  
 173 - 183 Witton Street  
 Northwich, Cheshire, CW9 5LP

Contact: Nicola Swallow  
 Site Name: Dean Trust, Academy, Ardwick  
 Site Address: Not Given

## SUMMARY REPORT

### Summary of Classification Test Results

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg  
 by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990:  
 Clause 8.2

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



Environmental Science

Client Reference: M4246

Job Number: 19-47921

Date Sampled: 28/06/2019

Date Received: 01/07/2019

Date Tested: 09/07/2019

Sampled By: NS

### Test results

| Laboratory Reference | Hole No. | Sample    |                |                 |      | Description                                     | Remarks           | MC | WC | Atterberg       |    |    |    | Density       |              |             | Total Porosity# |  |  |
|----------------------|----------|-----------|----------------|-----------------|------|-------------------------------------------------|-------------------|----|----|-----------------|----|----|----|---------------|--------------|-------------|-----------------|--|--|
|                      |          | Reference | Depth Top<br>m | Depth Base<br>m | Type |                                                 |                   |    |    | % Passing 425um | LL | PL | PI | bulk<br>Mg/m3 | dry<br>Mg/m3 | PD<br>Mg/m3 |                 |  |  |
| 1256982              | WS04     | Not Given | 2.00           | Not Given       | D    | Reddish brown very sandy CLAY                   | Atterberg 1 Point | 13 |    | 100             | 32 | 17 | 15 |               |              |             |                 |  |  |
| 1256983              | WS04     | Not Given | 3.00           | Not Given       | D    | Brown slightly gravelly very sandy CLAY         | Atterberg 1 Point | 14 |    | 93              | 35 | 17 | 18 |               |              |             |                 |  |  |
| 1256984              | WS05     | Not Given | 2.00           | Not Given       | D    | Greyish brown slightly gravelly very sandy CLAY | Atterberg 1 Point | 13 |    | 90              | 33 | 16 | 17 |               |              |             |                 |  |  |
| 1256985              | WS05     | Not Given | 2.50           | Not Given       | D    | Brown slightly gravelly very sandy CLAY         | Atterberg 1 Point | 12 |    | 87              | 33 | 17 | 16 |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |
|                      |          |           |                |                 |      |                                                 |                   |    |    |                 |    |    |    |               |              |             |                 |  |  |

Note: # Non accredited; NP - Non plastic

Comments:

Approved: Dariusz Piotrowski  
 PL Geotechnical Laboratory Manager  
 Date Reported: 15/07/2019

Signed:

Darren Berrill  
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 234.7

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.  
 This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
 The results included within the report are representative of the samples submitted for analysis.  
 The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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



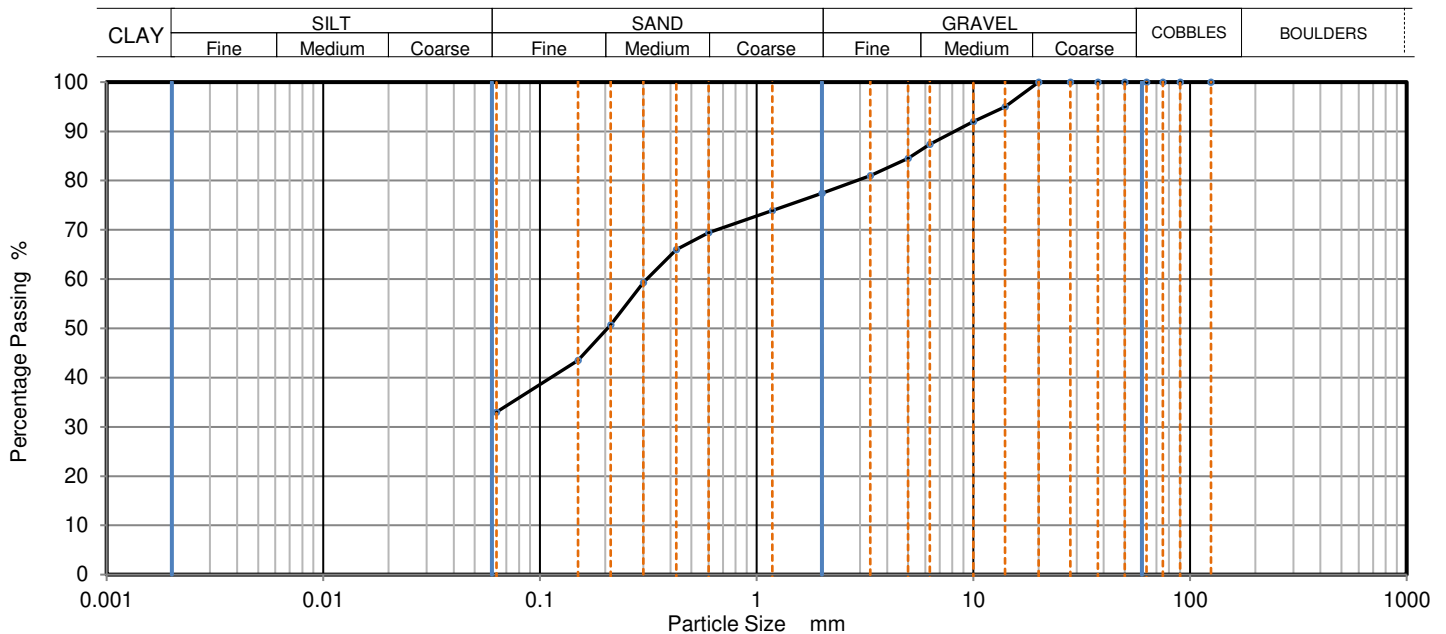
Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 05/07/2019  
Sampled By: NS

### Test Results:

Laboratory Reference: 1256980  
Hole No.: WS01  
Sample Reference: Not Given  
Sample Description: Dark brown very clayey very gravelly SAND

Depth Top [m]: 1.00  
Depth Base [m]: Not Given  
Sample Type: B



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 100       |                  |           |
| 50               | 100       |                  |           |
| 37.5             | 100       |                  |           |
| 28               | 100       |                  |           |
| 20               | 100       |                  |           |
| 14               | 95        |                  |           |
| 10               | 92        |                  |           |
| 6.3              | 87        |                  |           |
| 5                | 85        |                  |           |
| 3.35             | 81        |                  |           |
| 2                | 77        |                  |           |
| 1.18             | 74        |                  |           |
| 0.6              | 69        |                  |           |
| 0.425            | 66        |                  |           |
| 0.3              | 59        |                  |           |
| 0.212            | 51        |                  |           |
| 0.15             | 44        |                  |           |
| 0.063            | 34        |                  |           |

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 0.00       |
| Gravel             | 22.60      |
| Sand               | 43.50      |
| Fines <0.063mm     | 33.90      |

| Grading Analysis       |    |
|------------------------|----|
| D100                   | mm |
| D60                    | mm |
| D30                    | mm |
| D10                    | mm |
| Uniformity Coefficient |    |
| Curvature Coefficient  |    |

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 100.12



# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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



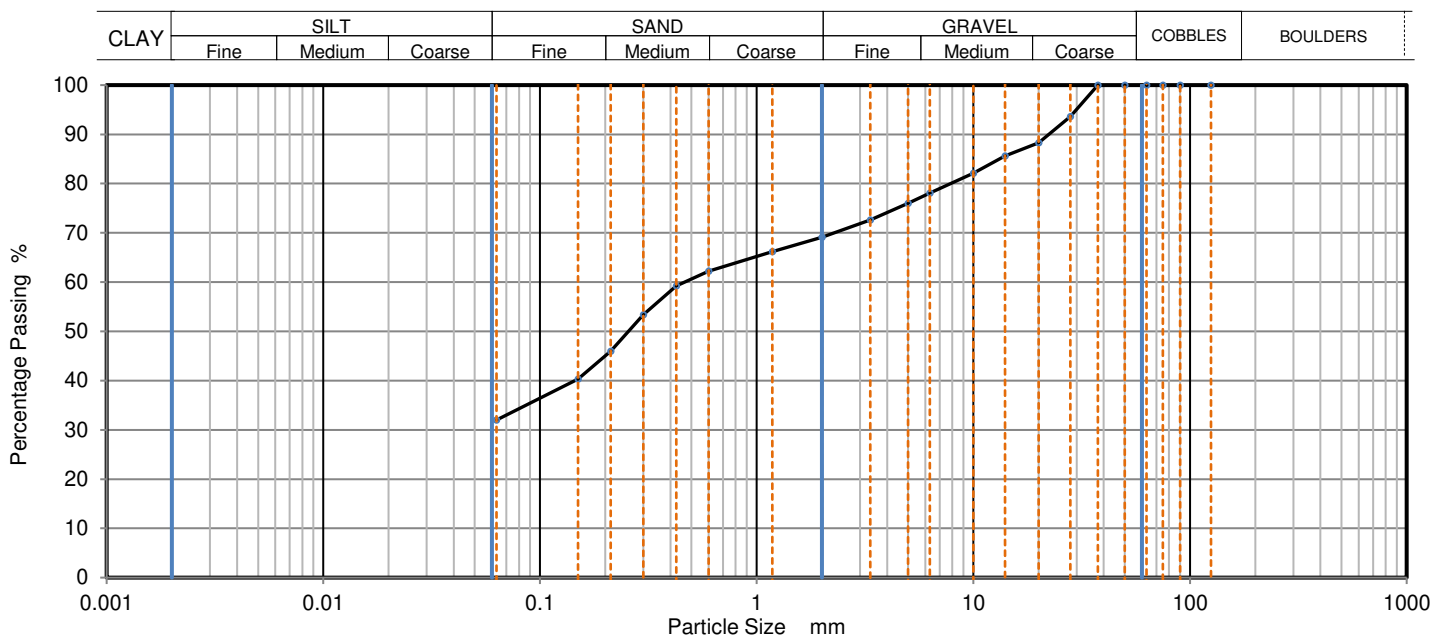
Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 05/07/2019  
Sampled By: NS

### Test Results:

Laboratory Reference: 1256981  
Hole No.: WS02  
Sample Reference: Not Given  
Sample Description: Dark brown very clayey very gravelly SAND

Depth Top [m]: 1.00  
Depth Base [m]: Not Given  
Sample Type: B



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 100       |                  |           |
| 50               | 100       |                  |           |
| 37.5             | 100       |                  |           |
| 28               | 94        |                  |           |
| 20               | 88        |                  |           |
| 14               | 86        |                  |           |
| 10               | 82        |                  |           |
| 6.3              | 78        |                  |           |
| 5                | 76        |                  |           |
| 3.35             | 73        |                  |           |
| 2                | 69        |                  |           |
| 1.18             | 66        |                  |           |
| 0.6              | 62        |                  |           |
| 0.425            | 59        |                  |           |
| 0.3              | 53        |                  |           |
| 0.212            | 46        |                  |           |
| 0.15             | 40        |                  |           |
| 0.063            | 32        |                  |           |

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 0.00       |
| Gravel             | 30.90      |
| Sand               | 36.80      |
| Fines <0.063mm     | 32.30      |

| Grading Analysis       |    |       |
|------------------------|----|-------|
| D100                   | mm | 37.5  |
| D60                    | mm | 0.467 |
| D30                    | mm |       |
| D10                    | mm |       |
| Uniformity Coefficient |    |       |
| Curvature Coefficient  |    |       |

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 100.12



# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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



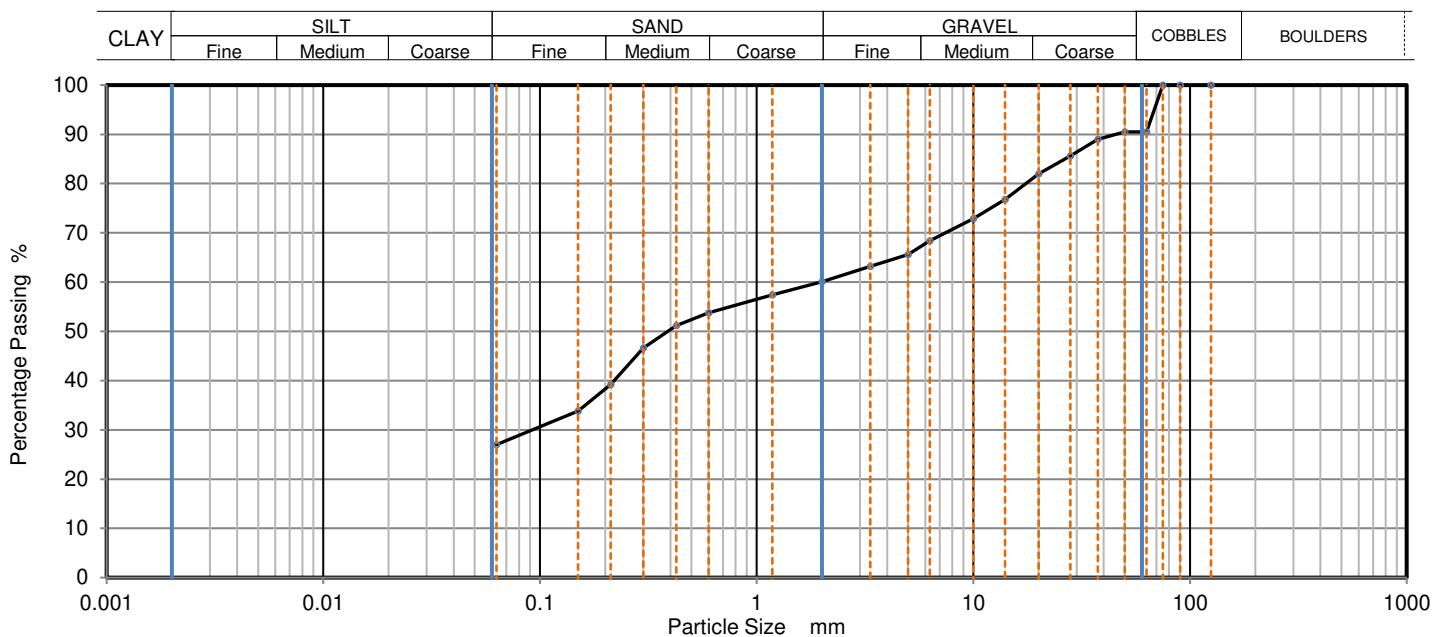
Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 11/07/2019  
Sampled By: NS

### Test Results:

Laboratory Reference: 1256986  
Hole No.: HP01  
Sample Reference: Not Given  
Sample Description: Brown very gravelly very clayey SAND with cobbles

Depth Top [m]: 0.50  
Depth Base [m]: Not Given  
Sample Type: B



| Sieving          |           | Sedimentation    |           |
|------------------|-----------|------------------|-----------|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125              | 100       |                  |           |
| 90               | 100       |                  |           |
| 75               | 100       |                  |           |
| 63               | 91        |                  |           |
| 50               | 91        |                  |           |
| 37.5             | 89        |                  |           |
| 28               | 86        |                  |           |
| 20               | 82        |                  |           |
| 14               | 77        |                  |           |
| 10               | 73        |                  |           |
| 6.3              | 68        |                  |           |
| 5                | 66        |                  |           |
| 3.35             | 63        |                  |           |
| 2                | 60        |                  |           |
| 1.18             | 57        |                  |           |
| 0.6              | 54        |                  |           |
| 0.425            | 51        |                  |           |
| 0.3              | 47        |                  |           |
| 0.212            | 39        |                  |           |
| 0.15             | 34        |                  |           |
| 0.063            | 28        |                  |           |

| Sample Proportions | % dry mass |
|--------------------|------------|
| Very coarse        | 9.50       |
| Gravel             | 30.50      |
| Sand               | 32.30      |
| Fines <0.063mm     | 27.80      |

| Grading Analysis       |    |        |
|------------------------|----|--------|
| D100                   | mm | 75     |
| D60                    | mm | 1.98   |
| D30                    | mm | 0.0864 |
| D10                    | mm |        |
| Uniformity Coefficient |    |        |
| Curvature Coefficient  |    |        |

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

### Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 100.12

\*Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*

\*Any assessment of compliance with specifications based on the analytical results in a report take in to account 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.\*



4041

# TEST CERTIFICATE

## Determination of California Bearing Ratio

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



Tested in Accordance with: BS 1377-4: 1990: Clause 7

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 11/07/2019  
Sampled By: NS

### Test Results:

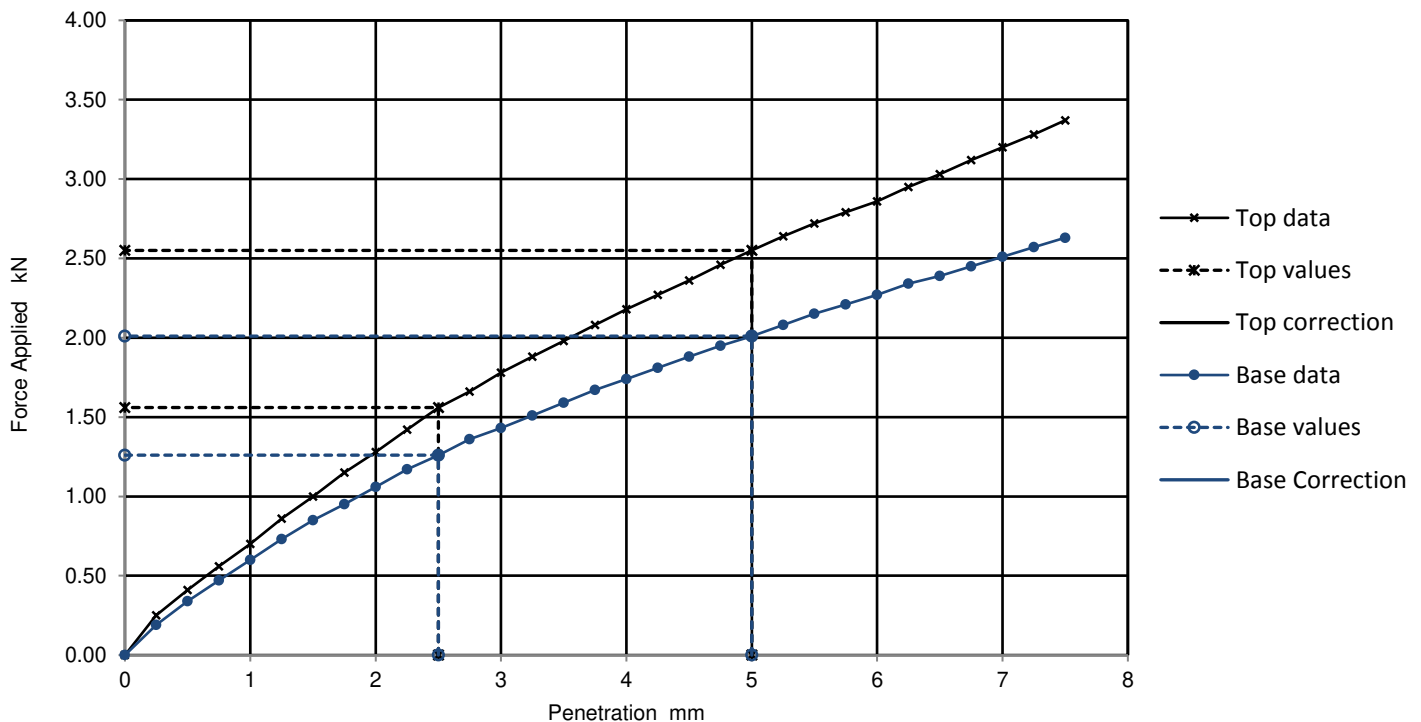
Laboratory Reference: 1256980  
Hole No.: WS01  
Sample Reference: Not Given  
Sample Description: Dark brown very clayey very gravelly SAND

Depth Top [m]: 1.00  
Depth Base [m]: Not Given  
Sample Type: B

### Specimen Preparation:

|                                         |                                                               |                           |                   |
|-----------------------------------------|---------------------------------------------------------------|---------------------------|-------------------|
| Condition                               | Remoulded                                                     | Soaking details           | Not soaked        |
| Details                                 | Recompacted with specified standard effort using 2.5kg rammer | Period of soaking         | days              |
|                                         |                                                               | Time to surface           | days              |
|                                         |                                                               | Amount of swell recorded  | mm                |
|                                         |                                                               | Dry density after soaking | Mg/m <sup>3</sup> |
| Material retained on 20mm sieve removed | 0 %                                                           |                           |                   |
| Initial Specimen details                | Bulk density                                                  | 2.05 Mg/m <sup>3</sup>    | Surcharge applied |
|                                         | Dry density                                                   | 1.76 Mg/m <sup>3</sup>    | 8 kg              |
|                                         | Moisture content                                              | 17 %                      | 4.9 kPa           |

### Force v Penetration Plots



### Results

|      | Curve correction applied | CBR Values, % |      |         |         | Moisture Content % |
|------|--------------------------|---------------|------|---------|---------|--------------------|
|      |                          | 2.5mm         | 5mm  | Highest | Average |                    |
| TOP  | No                       | 12.0          | 13.0 | 13.0    |         | 17                 |
| BASE | No                       | 9.5           | 10.0 | 10.0    |         | 16                 |

Remarks: Insufficient amount of material to test initial MC; Initial MC assumed to be equal to Top MC

Test/ Specimen specific remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 108.11

\*Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



# TEST CERTIFICATE

## Determination of California Bearing Ratio

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



4041

Tested in Accordance with: BS 1377-4: 1990: Clause 7

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 11/07/2019  
Sampled By: NS

### Test Results:

Laboratory Reference: 1256981  
Hole No.: WS02  
Sample Reference: Not Given  
Sample Description: Dark brown very clayey very gravelly SAND

Depth Top [m]: 1.00  
Depth Base [m]: Not Given  
Sample Type: B

### Specimen Preparation:

Condition: Remoulded  
Details: Recompacted with specified standard effort using 2.5kg rammer

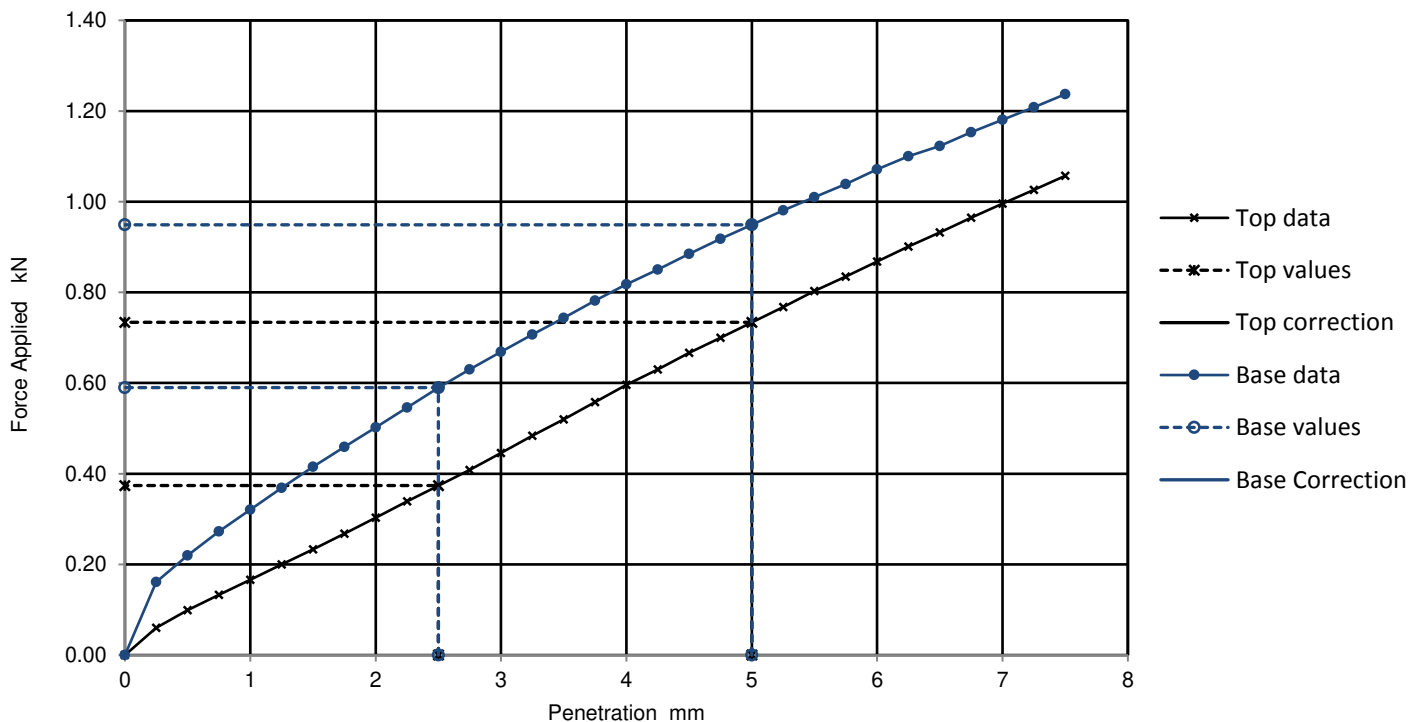
Soaking details: Not soaked  
Period of soaking: days  
Time to surface: days  
Amount of swell recorded: mm  
Dry density after soaking: Mg/m3

Material retained on 20mm sieve removed: 12 %

Initial Specimen details: Bulk density: 2.02 Mg/m3  
Dry density: 1.72 Mg/m3  
Moisture content: 17 %

Surcharge applied: 8 kg  
4.9 kPa

### Force v Penetration Plots



### Results

TOP  
BASE

| Curve correction applied | CBR Values, % |     |         |         |
|--------------------------|---------------|-----|---------|---------|
|                          | 2.5mm         | 5mm | Highest | Average |
| No                       | 2.8           | 3.7 | 3.7     |         |
| No                       | 4.5           | 4.7 | 4.7     |         |

| Moisture Content % |
|--------------------|
| 18                 |
| 18                 |

### Remarks:

### Test/ Specimen specific remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 108.11

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



# TEST CERTIFICATE

## Determination of California Bearing Ratio

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



4041

Tested in Accordance with: BS 1377-4: 1990: Clause 7

Client: Brownfield Solutions Ltd  
Client Address: William Smith House  
173 - 183 Witton Street  
Northwich, Cheshire, CW9 5LP  
Contact: Nicola Swallow  
Site Name: Dean Trust, Academy, Ardwick  
Site Address: Not Given

Client Reference: M4246  
Job Number: 19-47921  
Date Sampled: 28/06/2019  
Date Received: 01/07/2019  
Date Tested: 11/07/2019  
Sampled By: NS

### Test Results:

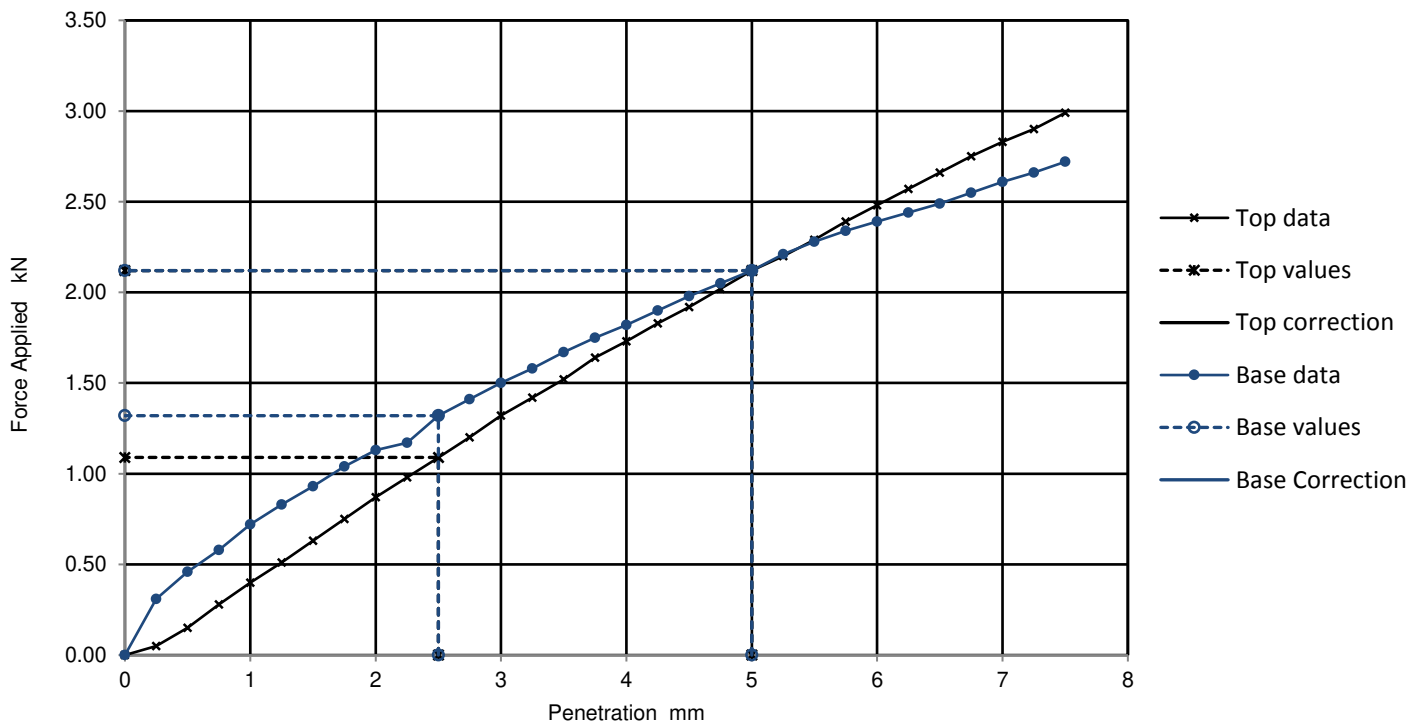
Laboratory Reference: 1256986  
Hole No.: HP01  
Sample Reference: Not Given  
Sample Description: Brown very gravelly very clayey SAND with cobbles

Depth Top [m]: 0.50  
Depth Base [m]: Not Given  
Sample Type: B

### Specimen Preparation:

|                                         |                                                               |                           |                   |
|-----------------------------------------|---------------------------------------------------------------|---------------------------|-------------------|
| Condition                               | Remoulded                                                     | Soaking details           | Not soaked        |
| Details                                 | Recompacted with specified standard effort using 2.5kg rammer | Period of soaking         | days              |
|                                         |                                                               | Time to surface           | days              |
|                                         |                                                               | Amount of swell recorded  | mm                |
|                                         |                                                               | Dry density after soaking | Mg/m <sup>3</sup> |
| Material retained on 20mm sieve removed | 15 %                                                          |                           |                   |
| Initial Specimen details                | Bulk density                                                  | 2.01                      | Mg/m <sup>3</sup> |
|                                         | Dry density                                                   | 1.74                      | Mg/m <sup>3</sup> |
|                                         | Moisture content                                              | 16                        | %                 |
|                                         | Surcharge applied                                             | 8                         | kg                |
|                                         |                                                               | 4.9                       | kPa               |

Force v Penetration Plots



### Results

TOP  
BASE

| Curve correction applied | CBR Values, % |      |         |         |
|--------------------------|---------------|------|---------|---------|
|                          | 2.5mm         | 5mm  | Highest | Average |
| No                       | 8.3           | 11.0 | 11.0    | 11.0    |
| No                       | 10.0          | 11.0 | 11.0    |         |

| Moisture Content % |
|--------------------|
| 16                 |
| 17                 |

### Remarks:

Test/ Specimen  
specific remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 15/07/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 108.11

\*Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.\*



**Nicola Swallow**

Brownfield Solutions Ltd  
William Smith House  
173 - 183 Witton Street  
Northwich  
Cheshire  
CW9 5LP

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:** n.swallow@brownfield-solutions.co.uk

## **Analytical Report Number : 19-47931**

|                             |                             |                               |            |
|-----------------------------|-----------------------------|-------------------------------|------------|
| <b>Project / Site name:</b> | Dean Trust Academy, Ardwick | <b>Samples received on:</b>   | 01/07/2019 |
| <b>Your job number:</b>     | M4246                       | <b>Samples instructed on:</b> | 01/07/2019 |
| <b>Your order number:</b>   | M4246-105-NS                | <b>Analysis completed by:</b> | 12/07/2019 |
| <b>Report Issue Number:</b> | 1                           | <b>Report issued on:</b>      | 12/07/2019 |
| <b>Samples Analysed:</b>    | 5 soil samples              |                               |            |

**Signed:**

Katarzyna Lewicka  
Head of Reporting Section  
**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 19-47931-1 Dean Trust Academy, Ardwick M4246

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

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

Page 1 of 4

Analytical Report Number: 19-47931

Project / Site name: Dean Trust Academy, Ardwick

Your Order No: M4246-105-NS

|                                         |       |                       |                         |               |               |               |               |               |
|-----------------------------------------|-------|-----------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Lab Sample Number                       |       |                       |                         | 1257064       | 1257065       | 1257066       | 1257067       | 1257068       |
| Sample Reference                        |       |                       |                         | WS04          | WS04          | WS05          | WS05          | WS06          |
| Sample Number                           |       |                       |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                       |                         | 2.00          | 3.00          | 2.00          | 2.50          | 1.25          |
| Date Sampled                            |       |                       |                         | 28/06/2019    | 28/06/2019    | 28/06/2019    | 28/06/2019    | 28/06/2019    |
| 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 |               |               |               |               |               |
|                                         |       |                       |                         |               |               |               |               |               |
|                                         |       |                       |                         |               |               |               |               |               |
|                                         |       |                       |                         |               |               |               |               |               |
|                                         |       |                       |                         |               |               |               |               |               |
| Stone Content                           | %     | 0.1                   | NONE                    | < 0.1         | < 0.1         | < 0.1         | < 0.1         | < 0.1         |
| Moisture Content                        | %     | N/A                   | NONE                    | 10            | 6.6           | 8.9           | 9.1           | 11            |
| Total mass of sample received           | kg    | 0.001                 | NONE                    | 0.30          | 0.35          | 0.34          | 0.40          | 0.79          |

#### General Inorganics

|                                                                         |          |         |        |       |       |       |       |       |
|-------------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|-------|-------|
| pH - Automated                                                          | pH Units | N/A     | MCERTS | 8.6   | 8.8   | 8.4   | 8.3   | 8.3   |
| Total Sulphate as SO <sub>4</sub>                                       | %        | 0.005   | MCERTS | 0.030 | -     | 0.029 | -     | -     |
| Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent) | g/l      | 0.00125 | MCERTS | 0.034 | 0.032 | 0.046 | 0.046 | 0.029 |
| Water Soluble Chloride (2:1) (leachate equivalent)                      | mg/l     | 0.5     | MCERTS | 7.9   | -     | 3.7   | -     | -     |
| Total Sulphur                                                           | %        | 0.005   | MCERTS | 0.021 | -     | 0.016 | -     | -     |
| Water Soluble Nitrate (2:1) as N (leachate equivalent)                  | mg/l     | 2       | NONE   | < 2.0 | -     | < 2.0 | -     | -     |

#### Heavy Metals / Metalloids

|                                 |       |     |      |    |   |    |   |   |
|---------------------------------|-------|-----|------|----|---|----|---|---|
| Magnesium (water soluble)       | mg/kg | 5   | NONE | 24 | - | 29 | - | - |
| Magnesium (leachate equivalent) | mg/l  | 2.5 | NONE | 12 | - | 15 | - | - |

**Analytical Report Number : 19-47931**

**Project / Site name: Dean Trust Academy, Ardwick**

\* 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 *             |
|-------------------|------------------|---------------|-----------|----------------------------------|
| 1257064           | WS04             | None Supplied | 2.00      | Brown clay with gravel.          |
| 1257065           | WS04             | None Supplied | 3.00      | Brown clay.                      |
| 1257066           | WS05             | None Supplied | 2.00      | Brown clay.                      |
| 1257067           | WS05             | None Supplied | 2.50      | Brown clay and sand with gravel. |
| 1257068           | WS06             | None Supplied | 1.25      | Brown clay and sand.             |

**Analytical Report Number : 19-47931**

**Project / Site name: Dean Trust Academy, Ardwick**

**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 |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Chloride, water soluble, in soil                   | Determination of Chloride colorimetrically by discrete analyser.                                                                                          | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.                                 | L082-PL       | D                  | MCERTS               |
| Magnesium, water soluble, in soil                  | Determination of water soluble magnesium by extraction with water followed by ICP-OES.                                                                    | In-house method based on TRL 447                                                                                                  | L038-PL       | D                  | NONE                 |
| Moisture Content                                   | Moisture content, determined gravimetrically.                                                                                                             | In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests                                                  | L019-UK/PL    | W                  | NONE                 |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                         | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L099-PL       | D                  | MCERTS               |
| Stones content of soil                             | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.                               | In-house method based on British Standard Methods and MCERTS requirements.                                                        | L019-UK/PL    | D                  | NONE                 |
| 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               |
| Total Sulphate in soil as %                        | 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 <sup>***</sup>                                   | L038-PL       | D                  | MCERTS               |
| Total Sulphur in soil as %                         | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                      | In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil                      | L038-PL       | D                  | MCERTS               |
| Water Soluble Nitrate (2:1) as N in soil           | Determination of nitrate by reaction with sodium salicylate and colorimetry.                                                                              | In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.           | L078-PL       | W                  | NONE                 |

**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 30°C.**

## **APPENDIX E**

### **Monitoring Results**

# Ground Gas Monitoring Results



|                             |            |          |          |                      |         |           |                |        |
|-----------------------------|------------|----------|----------|----------------------|---------|-----------|----------------|--------|
| CLIENT:                     | Date       | Operator | Analysar | Weather Observations |         | Temp (°C) | Pressure Trend | Notes  |
| THE DEAN TRUST              | 08/07/2019 | JM       | GFM436   | Overcast             | No wind | Warm      | 23             | Steady |
| JOB NO.                     |            |          |          |                      |         |           |                |        |
| M4246                       |            |          |          |                      |         |           |                |        |
| SITE:                       |            |          |          |                      |         |           |                |        |
| DEAN TRUST ACADEMY, ARDWICK |            |          |          |                      |         |           |                |        |

Notes: mb = milibars; CH<sub>4</sub> = methane; LEL = lower explosive limit = 5%v/v; CO<sub>2</sub> = carbon dioxide; O<sub>2</sub> = oxygen; CO=carbon monoxide; H<sub>2</sub>S = hydrogen sulphide; TVOC= Total volatile organic compounds; PPM = parts per million. Where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in green). Gas Screening Values (GSVs) are rounded to 3 decimal places. Calibration Records for analysers used available on request.

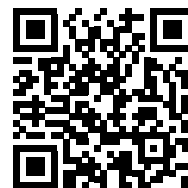
| Date         | Time | Location | Response zone (m) | Pressures (mb)                                                                                    |                        | Gas flows (l/hr) |        | CH <sub>4</sub> (%v/v) |        | CH <sub>4</sub> (%LEL) |        | CO <sub>2</sub> (%v/v) |        | O <sub>2</sub> (%v/v) |        | Other Gases (PPM) |                  |            | Depth to Water (m) | Well Base (m) | Gas Screening Value (CH <sub>4</sub> ) (l/hr) | Gas Screening Value (CO <sub>2</sub> ) (l/hr) | Notes |  |
|--------------|------|----------|-------------------|---------------------------------------------------------------------------------------------------|------------------------|------------------|--------|------------------------|--------|------------------------|--------|------------------------|--------|-----------------------|--------|-------------------|------------------|------------|--------------------|---------------|-----------------------------------------------|-----------------------------------------------|-------|--|
|              |      |          |                   | Atmospheric Pressure                                                                              | Relative Well Pressure | Initial          | Steady | Peak                   | Steady | Peak                   | Steady | Peak                   | Steady | Peak                  | Steady | CO                | H <sub>2</sub> S | TVOC (PID) |                    |               |                                               |                                               |       |  |
|              |      |          |                   | Summary Statistics                                                                                |                        |                  |        |                        |        |                        |        |                        |        |                       |        |                   |                  |            |                    |               |                                               |                                               |       |  |
| Max. values: |      |          |                   | 1015                                                                                              | 0.0                    | 0.3              | 0.3    | 0.0                    | 0.0    | 0.0                    | 0.0    | 3.5                    | 3.1    | 20.7                  | 19.5   | 0.0               | 0.0              | 0.0        | 1.4                | 3.9           | 0.000                                         | 0.011                                         |       |  |
| Min. values: |      |          |                   | 1015                                                                                              | 0.0                    | 0.3              | 0.3    | 0.0                    | 0.0    | 0.0                    | 0.0    | 0.6                    | 15.3   | 16.2                  | 0.0    | 0.0               | 0.0              | 1.4        | 2.9                | 0.000         | 0.003                                         |                                               |       |  |
|              |      |          |                   | Worst-case GSVs based on maximum recorded steady flow and maximum individual peak concentrations: |                        |                  |        |                        |        |                        |        |                        |        |                       |        |                   |                  |            |                    |               |                                               | 0.000                                         | 0.011 |  |
| 08/07/2019   | PM   | Ambient  |                   | 1015                                                                                              |                        |                  |        | 0.0                    |        | 0.0                    |        | 0.0                    |        | 20.6                  |        |                   |                  |            |                    |               |                                               |                                               |       |  |
|              |      | WS03     | 1.00-3.00         | 1015                                                                                              | 0.0                    | 0.3              | 0.3    | 0.0                    | 0.0    | 0.0                    | 0.0    | 3.2                    | 3.0    | 15.3                  | 16.2   | NA                | NA               | NA         | NGW                | 2.90          | 0.000                                         | 0.010                                         |       |  |
|              |      | WS04     | 1.00-4.00         | 1015                                                                                              | 0.0                    | 0.3              | 0.3    | 0.0                    | 0.0    | 0.0                    | 0.0    | 0.9                    | 0.6    | 18.9                  | 19.5   | NA                | NA               | NA         | 1.39               | 3.90          | 0.000                                         | 0.003                                         |       |  |
|              |      | WS05     | 1.00-4.00         | 1015                                                                                              | 0.0                    | 0.3              | 0.3    | 0.0                    | 0.0    | 0.0                    | 0.0    | 3.5                    | 3.1    | 16.3                  | 16.5   | NA                | NA               | NA         | NGW                | 3.90          | 0.000                                         | 0.011                                         |       |  |
|              |      | Ambient  |                   | 1015                                                                                              |                        |                  |        | 0.0                    |        | 0.0                    |        | 0.0                    |        | 20.7                  |        |                   |                  |            |                    |               |                                               |                                               |       |  |

## **APPENDIX F**

### **Waste Assessment Report**



## Waste Classification Report



5HBS8-DRXBD-23AJF

### Job name

Dean Trust Academy, Ardwick

### Description/Comments

### Project

M4246

### Site

Dean Trust Academy, Ardwick

### Related Documents

| #    | Name | Description |
|------|------|-------------|
| None |      |             |

### Waste Stream Template

BSL Suite without Asbestos

### Classified by

Name:  
**Nicola Swallow**  
Date:  
**04 Jul 2019 14:30 GMT**  
Telephone:  
**01606 334 844**

Company:  
**Brownfield Solutions Ltd**  
**William Smith House**  
**173 – 183 Witton Street**  
**Northwich**  
**CW9 5LP**

### Report

Created by: Nicola Swallow  
Created date: 04 Jul 2019 14:30 GMT

### Job summary

| # | Sample Name | Depth [m] | Classification Result | Hazard properties | Page |
|---|-------------|-----------|-----------------------|-------------------|------|
| 1 | WS01        | 0.50      | Non Hazardous         |                   | 3    |
| 2 | WS02        | 0.50-1.50 | Non Hazardous         |                   | 5    |
| 3 | WS03        | 1.00      | Non Hazardous         |                   | 8    |
| 4 | WS04        | 1.10-1.70 | Non Hazardous         |                   | 10   |
| 5 | WS05        | 1.00-1.80 | Non Hazardous         |                   | 11   |
| 6 | WS07        | 0.35-0.70 | Non Hazardous         |                   | 13   |
| 7 | HP01        | 0.50      | Non Hazardous         |                   | 15   |

### Appendices

Appendix A: Classifier defined and non CLP determinands  
Appendix B: Rationale for selection of metal species

Page

17

18



|                                     |      |
|-------------------------------------|------|
| Appendices                          | Page |
| <a href="#">Appendix C: Version</a> | 18   |



## Classification of sample: WS01

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

## Sample details

|                         |                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code:                                                                                 |
| <b>WS01</b>             | Chapter:                                                                                  |
| Sample Depth:           | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| <b>0.50 m</b>           | Entry:                                                                                    |
| Moisture content:       | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>12%</b>              |                                                                                           |
| (wet weight correction) |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.1 pH            |              | 8.1 pH         | 8.1 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 13 mg/kg          | 1.32         | 15.105 mg/kg   | 0.00151 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.7 mg/kg         | 1.285        | 0.792 mg/kg    | 0.0000616 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308 mg/kg   | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 27 mg/kg          | 1.462        | 34.727 mg/kg   | 0.00347 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 60 mg/kg          | 1.126        | 59.447 mg/kg   | 0.00594 %            | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 190 mg/kg         | 1.56         | 260.801 mg/kg  | 0.0167 %             | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | 0.5 mg/kg         | 1.353        | 0.596 mg/kg    | 0.0000596 %          | ✓          |                |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 21 mg/kg          | 1.579        | 29.189 mg/kg   | 0.00292 %            | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554 mg/kg   | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 170 mg/kg         | 2.774        | 415.012 mg/kg  | 0.0415 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | 0.65 mg/kg        |              | 0.572 mg/kg    | 0.0000572 %          | ✓          |                |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 0.26 mg/kg        |              | 0.229 mg/kg    | 0.0000229 %          | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |                      |            |                |



| #      | Determinand                        |              |            | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|--------------|------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|        | CLP index number                   | EC Number    | CAS Number |          |                   |              |                |                      |            |                |
| 14     | acenaphthene                       | 201-469-6    | 83-32-9    |          | 2.4 mg/kg         |              | 2.112 mg/kg    | 0.000211 %           | ✓          |                |
| 15     | fluorene                           | 201-695-5    | 86-73-7    |          | 1.6 mg/kg         |              | 1.408 mg/kg    | 0.000141 %           | ✓          |                |
| 16     | phenanthrene                       | 201-581-5    | 85-01-8    |          | 12 mg/kg          |              | 10.56 mg/kg    | 0.00106 %            | ✓          |                |
| 17     | anthracene                         | 204-371-1    | 120-12-7   |          | 4.4 mg/kg         |              | 3.872 mg/kg    | 0.000387 %           | ✓          |                |
| 18     | fluoranthene                       | 205-912-4    | 206-44-0   |          | 21 mg/kg          |              | 18.48 mg/kg    | 0.00185 %            | ✓          |                |
| 19     | pyrene                             | 204-927-3    | 129-00-0   |          | 20 mg/kg          |              | 17.6 mg/kg     | 0.00176 %            | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9 | 200-280-6  | 56-55-3  | 9.4 mg/kg         |              | 8.272 mg/kg    | 0.000827 %           | ✓          |                |
| 21     | chrysene                           | 601-048-00-0 | 205-923-4  | 218-01-9 | 7.6 mg/kg         |              | 6.688 mg/kg    | 0.000669 %           | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3 | 200-028-5  | 50-32-8  | 7.5 mg/kg         |              | 6.6 mg/kg      | 0.00066 %            | ✓          |                |
| 23     | indeno[123-cd]pyrene               | 205-893-2    | 193-39-5   |          | 6.6 mg/kg         |              | 5.808 mg/kg    | 0.000581 %           | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2 | 200-181-8  | 53-70-3  | 8.1 mg/kg         |              | 7.128 mg/kg    | 0.000713 %           | ✓          |                |
| 25     | benzo[ghi]perylene                 | 205-883-8    | 191-24-2   |          | 3.8 mg/kg         |              | 3.344 mg/kg    | 0.000334 %           | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4 | 205-911-9  | 205-99-2 | 0.99 mg/kg        |              | 0.871 mg/kg    | 0.0000871 %          | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5 | 205-916-6  | 207-08-9 | 4.9 mg/kg         |              | 4.312 mg/kg    | 0.000431 %           | ✓          |                |
| Total: |                                    |              |            |          |                   |              |                | 0.0825 %             |            |                |

**Key**

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
|             | User supplied data                                                                                                              |
|             | Determinand values ignored for classification, see column 'Conc. Not Used' for reason                                           |
| •           | Determinand defined or amended by HazWasteOnline (see Appendix A)                                                               |
| •           | Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| <LOD        | Below limit of detection                                                                                                        |
| CLP: Note 1 | Only the metal concentration has been used for classification                                                                   |



## Classification of sample: WS02

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

## Sample details

|                         |           |                                                                                           |
|-------------------------|-----------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code: |                                                                                           |
| <b>WS02</b>             | Chapter:  | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth:           | Entry:    | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>0.50-1.50 m</b>      |           |                                                                                           |
| Moisture content:       |           |                                                                                           |
| <b>13%</b>              |           |                                                                                           |
| (wet weight correction) |           |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.1 pH            |              | 8.1 pH         | 8.1 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 18 mg/kg          | 1.32         | 20.676 mg/kg   | 0.00207 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.9 mg/kg         | 1.285        | 1.006 mg/kg    | 0.0000783 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308 mg/kg   | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 36 mg/kg          | 1.462        | 45.776 mg/kg   | 0.00458 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 84 mg/kg          | 1.126        | 82.28 mg/kg    | 0.00823 %            | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 260 mg/kg         | 1.56         | 352.83 mg/kg   | 0.0226 %             | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | <0.3 mg/kg        | 1.353        | <0.406 mg/kg   | <0.0000406 %         |            | <LOD           |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 28 mg/kg          | 1.579        | 38.477 mg/kg   | 0.00385 %            | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554 mg/kg   | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 320 mg/kg         | 2.774        | 772.322 mg/kg  | 0.0772 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | 1.5 mg/kg         |              | 1.305 mg/kg    | 0.000131 %           | ✓          |                |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 0.33 mg/kg        |              | 0.287 mg/kg    | 0.0000287 %          | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |                      |            |                |



| #      |                                    | Determinand      |                                                                  |                                                              | CLP Note | User entered data |       | Conv. Factor | Compound conc. |       | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|------------------|------------------------------------------------------------------|--------------------------------------------------------------|----------|-------------------|-------|--------------|----------------|-------|----------------------|------------|----------------|
|        |                                    | CLP index number | EC Number                                                        | CAS Number                                                   |          |                   |       |              |                |       |                      |            |                |
| 14     | acenaphthene                       |                  | 201-469-6                                                        | 83-32-9                                                      |          | 4.7               | mg/kg |              | 4.089          | mg/kg | 0.000409 %           | ✓          |                |
| 15     | fluorene                           |                  | 201-695-5                                                        | 86-73-7                                                      |          | 3.2               | mg/kg |              | 2.784          | mg/kg | 0.000278 %           | ✓          |                |
| 16     | phenanthrene                       |                  | 201-581-5                                                        | 85-01-8                                                      |          | 21                | mg/kg |              | 18.27          | mg/kg | 0.00183 %            | ✓          |                |
| 17     | anthracene                         |                  | 204-371-1                                                        | 120-12-7                                                     |          | 6.9               | mg/kg |              | 6.003          | mg/kg | 0.0006 %             | ✓          |                |
| 18     | fluoranthene                       |                  | 205-912-4                                                        | 206-44-0                                                     |          | 28                | mg/kg |              | 24.36          | mg/kg | 0.00244 %            | ✓          |                |
| 19     | pyrene                             |                  | 204-927-3                                                        | 129-00-0                                                     |          | 26                | mg/kg |              | 22.62          | mg/kg | 0.00226 %            | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9     | 200-280-6                                                        | 56-55-3                                                      |          | 11                | mg/kg |              | 9.57           | mg/kg | 0.000957 %           | ✓          |                |
| 21     | chrysene                           | 601-048-00-0     | 205-923-4                                                        | 218-01-9                                                     |          | 11                | mg/kg |              | 9.57           | mg/kg | 0.000957 %           | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3     | 200-028-5                                                        | 50-32-8                                                      |          | 11                | mg/kg |              | 9.57           | mg/kg | 0.000957 %           | ✓          |                |
| 23     | indeno[123-cd]pyrene               |                  | 205-893-2                                                        | 193-39-5                                                     |          | 5.2               | mg/kg |              | 4.524          | mg/kg | 0.000452 %           | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2     | 200-181-8                                                        | 53-70-3                                                      |          | 9.1               | mg/kg |              | 7.917          | mg/kg | 0.000792 %           | ✓          |                |
| 25     | benzo[ghi]perylene                 |                  | 205-883-8                                                        | 191-24-2                                                     |          | 4.6               | mg/kg |              | 4.002          | mg/kg | 0.0004 %             | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4     | 205-911-9                                                        | 205-99-2                                                     |          | 1.4               | mg/kg |              | 1.218          | mg/kg | 0.000122 %           | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5     | 205-916-6                                                        | 207-08-9                                                     |          | 5.7               | mg/kg |              | 4.959          | mg/kg | 0.000496 %           | ✓          |                |
| 28     | TPH (C6 to C40) petroleum group    |                  |                                                                  | TPH                                                          |          | 303               | mg/kg |              | 263.61         | mg/kg | 0.0264 %             | ✓          |                |
| 29     | benzene                            | 601-020-00-8     | 200-753-7                                                        | 71-43-2                                                      |          | <1                | mg/kg |              | <1             | mg/kg | <0.0001 %            |            | <LOD           |
| 30     | toluene                            | 601-021-00-3     | 203-625-9                                                        | 108-88-3                                                     |          | <1                | mg/kg |              | <1             | mg/kg | <0.0001 %            |            | <LOD           |
| 31     | ethylbenzene                       | 601-023-00-4     | 202-849-4                                                        | 100-41-4                                                     |          | <1                | mg/kg |              | <1             | mg/kg | <0.0001 %            |            | <LOD           |
| 32     | xylene                             | 601-022-00-9     | 202-422-2 [1]<br>203-396-5 [2]<br>203-576-3 [3]<br>215-535-7 [4] | 95-47-6 [1]<br>106-42-3 [2]<br>108-38-3 [3]<br>1330-20-7 [4] |          | <1                | mg/kg |              | <1             | mg/kg | <0.0001 %            |            | <LOD           |
| Total: |                                    |                  |                                                                  |                                                              |          |                   |       |              |                |       | 0.159 %              |            |                |

#### Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

### Supplementary Hazardous Property Information

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

**Force this Hazardous property to non hazardous because** The absence of a free draining liquid and the relatively low concentrations of short-chain hydrocarbons reported indicates that this hazard property is not applicable to this waste.



---

Hazard Statements hit:

---

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

---

Because of determinand:

---

TPH (C6 to C40) petroleum group: (conc.: 0.0264%)



## Classification of sample: WS03



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

## Sample details

|                         |        |           |                                                                   |                                                                                           |
|-------------------------|--------|-----------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Sample Name:            | WS03   | LoW Code: | Chapter:                                                          | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth:           | 1.00 m | Entry:    | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |                                                                                           |
| Moisture content:       | 8.6%   |           |                                                                   |                                                                                           |
| (wet weight correction) |        |           |                                                                   |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 8.6% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. |       | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|-------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |       |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.5 pH            |              | 8.5            | pH    | 8.5 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 16 mg/kg          | 1.32         | 19.308         | mg/kg | 0.00193 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |       |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.3 mg/kg         | 1.285        | 0.352          | mg/kg | 0.0000274 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |       |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308         | mg/kg | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |       |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 14 mg/kg          | 1.462        | 18.702         | mg/kg | 0.00187 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |       |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 43 mg/kg          | 1.126        | 44.25          | mg/kg | 0.00442 %            | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |       |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 120 mg/kg         | 1.56         | 171.081        | mg/kg | 0.011 %              | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |       |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | 1.1 mg/kg         | 1.353        | 1.361          | mg/kg | 0.000136 %           | ✓          |                |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |       |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 18 mg/kg          | 1.579        | 25.986         | mg/kg | 0.0026 %             | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |       |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554         | mg/kg | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |       |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 98 mg/kg          | 2.774        | 248.486        | mg/kg | 0.0248 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |       |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | 11 mg/kg          |              | 10.054         | mg/kg | 0.00101 %            | ✓          |                |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |       |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 0.59 mg/kg        |              | 0.539          | mg/kg | 0.0000539 %          | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |       |                      |            |                |



| #      | Determinand                        |              |            | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|--------------|------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|        | CLP index number                   | EC Number    | CAS Number |          |                   |              |                |                      |            |                |
| 14     | acenaphthene                       | 201-469-6    | 83-32-9    |          | 20 mg/kg          |              | 18.28 mg/kg    | 0.00183 %            | ✓          |                |
| 15     | fluorene                           | 201-695-5    | 86-73-7    |          | 16 mg/kg          |              | 14.624 mg/kg   | 0.00146 %            | ✓          |                |
| 16     | phenanthrene                       | 201-581-5    | 85-01-8    |          | 77 mg/kg          |              | 70.378 mg/kg   | 0.00704 %            | ✓          |                |
| 17     | anthracene                         | 204-371-1    | 120-12-7   |          | 22 mg/kg          |              | 20.108 mg/kg   | 0.00201 %            | ✓          |                |
| 18     | fluoranthene                       | 205-912-4    | 206-44-0   |          | 61 mg/kg          |              | 55.754 mg/kg   | 0.00558 %            | ✓          |                |
| 19     | pyrene                             | 204-927-3    | 129-00-0   |          | 56 mg/kg          |              | 51.184 mg/kg   | 0.00512 %            | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9 | 200-280-6  | 56-55-3  | 28 mg/kg          |              | 25.592 mg/kg   | 0.00256 %            | ✓          |                |
| 21     | chrysene                           | 601-048-00-0 | 205-923-4  | 218-01-9 | 26 mg/kg          |              | 23.764 mg/kg   | 0.00238 %            | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3 | 200-028-5  | 50-32-8  | 21 mg/kg          |              | 19.194 mg/kg   | 0.00192 %            | ✓          |                |
| 23     | indeno[123-cd]pyrene               | 205-893-2    | 193-39-5   |          | 13 mg/kg          |              | 11.882 mg/kg   | 0.00119 %            | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2 | 200-181-8  | 53-70-3  | 19 mg/kg          |              | 17.366 mg/kg   | 0.00174 %            | ✓          |                |
| 25     | benzo[ghi]perylene                 | 205-883-8    | 191-24-2   |          | 7.5 mg/kg         |              | 6.855 mg/kg    | 0.000686 %           | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4 | 205-911-9  | 205-99-2 | 2.9 mg/kg         |              | 2.651 mg/kg    | 0.000265 %           | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5 | 205-916-6  | 207-08-9 | 8.5 mg/kg         |              | 7.769 mg/kg    | 0.000777 %           | ✓          |                |
| Total: |                                    |              |            |          |                   |              |                | 0.0829 %             |            |                |

**Key**

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
|             | User supplied data                                                                                                              |
|             | Determinand values ignored for classification, see column 'Conc. Not Used' for reason                                           |
| •           | Determinand defined or amended by HazWasteOnline (see Appendix A)                                                               |
| •           | Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| <LOD        | Below limit of detection                                                                                                        |
| CLP: Note 1 | Only the metal concentration has been used for classification                                                                   |



## Classification of sample: WS04



### Non Hazardous Waste

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

## Sample details

|                         |           |                                                                                           |
|-------------------------|-----------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code: |                                                                                           |
| <b>WS04</b>             | Chapter:  | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth:           | Entry:    | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>1.10-1.70 m</b>      |           |                                                                                           |
| Moisture content:       |           |                                                                                           |
| <b>11%</b>              |           |                                                                                           |
| (wet weight correction) |           |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

| #      |   | Determinand      |           |            | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|--------|---|------------------|-----------|------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|        |   | CLP index number | EC Number | CAS Number |          |                   |              |                |                      |            |                |
| 1      | • | pH               |           |            |          | 7.6 pH            |              | 7.6 pH         | 7.6 pH               |            |                |
|        |   |                  |           | PH         |          |                   |              |                |                      |            |                |
| Total: |   |                  |           |            |          |                   |              |                | 0%                   |            |                |

### Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)



## Classification of sample: WS05

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

## Sample details

|                         |           |                                                                                           |
|-------------------------|-----------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code: |                                                                                           |
| <b>WS05</b>             | Chapter:  | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth:           | Entry:    | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>1.00-1.80 m</b>      |           |                                                                                           |
| Moisture content:       |           |                                                                                           |
| <b>8.5%</b>             |           |                                                                                           |
| (wet weight correction) |           |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 8.5% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.4 pH            |              | 8.4 pH         | 8.4 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 37 mg/kg          | 1.32         | 44.7 mg/kg     | 0.00447 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.8 mg/kg         | 1.285        | 0.941 mg/kg    | 0.0000732 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308 mg/kg   | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 20 mg/kg          | 1.462        | 26.746 mg/kg   | 0.00267 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 280 mg/kg         | 1.126        | 288.453 mg/kg  | 0.0288 %             | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 430 mg/kg         | 1.56         | 613.709 mg/kg  | 0.0393 %             | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | 1.1 mg/kg         | 1.353        | 1.362 mg/kg    | 0.000136 %           | ✓          |                |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 39 mg/kg          | 1.579        | 56.364 mg/kg   | 0.00564 %            | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554 mg/kg   | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 370 mg/kg         | 2.774        | 939.187 mg/kg  | 0.0939 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | 8.9 mg/kg         |              | 8.143 mg/kg    | 0.000814 %           | ✓          |                |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 6.7 mg/kg         |              | 6.131 mg/kg    | 0.000613 %           | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |                      |            |                |



| #      |                                    | Determinand      |           |            | CLP Note | User entered data | Conv. Factor | Compound conc. |       | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|------------------|-----------|------------|----------|-------------------|--------------|----------------|-------|----------------------|------------|----------------|
|        |                                    | CLP index number | EC Number | CAS Number |          |                   |              |                |       |                      |            |                |
| 14     | acenaphthene                       | 201-469-6        | 83-32-9   |            | 26       | mg/kg             |              | 23.79          | mg/kg | 0.00238 %            | ✓          |                |
| 15     | fluorene                           | 201-695-5        | 86-73-7   |            | 26       | mg/kg             |              | 23.79          | mg/kg | 0.00238 %            | ✓          |                |
| 16     | phenanthrene                       | 201-581-5        | 85-01-8   |            | 150      | mg/kg             |              | 137.25         | mg/kg | 0.0137 %             | ✓          |                |
| 17     | anthracene                         | 204-371-1        | 120-12-7  |            | 46       | mg/kg             |              | 42.09          | mg/kg | 0.00421 %            | ✓          |                |
| 18     | fluoranthene                       | 205-912-4        | 206-44-0  |            | 180      | mg/kg             |              | 164.7          | mg/kg | 0.0165 %             | ✓          |                |
| 19     | pyrene                             | 204-927-3        | 129-00-0  |            | 170      | mg/kg             |              | 155.55         | mg/kg | 0.0156 %             | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9     | 200-280-6 | 56-55-3    | 100      | mg/kg             |              | 91.5           | mg/kg | 0.00915 %            | ✓          |                |
| 21     | chrysene                           | 601-048-00-0     | 205-923-4 | 218-01-9   | 93       | mg/kg             |              | 85.095         | mg/kg | 0.00851 %            | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3     | 200-028-5 | 50-32-8    | 98       | mg/kg             |              | 89.67          | mg/kg | 0.00897 %            | ✓          |                |
| 23     | indeno[123-cd]pyrene               | 205-893-2        | 193-39-5  |            | 44       | mg/kg             |              | 40.26          | mg/kg | 0.00403 %            | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2     | 200-181-8 | 53-70-3    | 85       | mg/kg             |              | 77.775         | mg/kg | 0.00778 %            | ✓          |                |
| 25     | benzo[ghi]perylene                 | 205-883-8        | 191-24-2  |            | 37       | mg/kg             |              | 33.855         | mg/kg | 0.00339 %            | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4     | 205-911-9 | 205-99-2   | 11       | mg/kg             |              | 10.065         | mg/kg | 0.00101 %            | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5     | 205-916-6 | 207-08-9   | 43       | mg/kg             |              | 39.345         | mg/kg | 0.00393 %            | ✓          |                |
| Total: |                                    |                  |           |            |          |                   |              |                |       | 0.278 %              |            |                |

**Key**

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
|             | User supplied data                                                                                                              |
|             | Determinand values ignored for classification, see column 'Conc. Not Used' for reason                                           |
| •           | Determinand defined or amended by HazWasteOnline (see Appendix A)                                                               |
| •           | Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| <LOD        | Below limit of detection                                                                                                        |
| CLP: Note 1 | Only the metal concentration has been used for classification                                                                   |



## Classification of sample: WS07

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

## Sample details

|                         |                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code:                                                                                 |
| <b>WS07</b>             | Chapter:                                                                                  |
| Sample Depth:           | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| <b>0.35-0.70 m</b>      | Entry:                                                                                    |
| Moisture content:       | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>8.8%</b>             |                                                                                           |
| (wet weight correction) |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 8.8% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. |       | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|-------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |       |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.3 pH            |              | 8.3            | pH    | 8.3 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 12 mg/kg          | 1.32         | 14.45          | mg/kg | 0.00144 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |       |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.9 mg/kg         | 1.285        | 1.055          | mg/kg | 0.0000821 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |       |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308         | mg/kg | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |       |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 23 mg/kg          | 1.462        | 30.658         | mg/kg | 0.00307 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |       |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 63 mg/kg          | 1.126        | 64.689         | mg/kg | 0.00647 %            | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |       |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 190 mg/kg         | 1.56         | 270.285        | mg/kg | 0.0173 %             | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |       |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | 0.5 mg/kg         | 1.353        | 0.617          | mg/kg | 0.0000617 %          | ✓          |                |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |       |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 20 mg/kg          | 1.579        | 28.81          | mg/kg | 0.00288 %            | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |       |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554         | mg/kg | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |       |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 290 mg/kg         | 2.774        | 733.706        | mg/kg | 0.0734 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |       |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | <0.05 mg/kg       |              | <0.05          | mg/kg | <0.000005 %          |            | <LOD           |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |       |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 0.31 mg/kg        |              | 0.283          | mg/kg | 0.0000283 %          | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |       |                      |            |                |



| #      | Determinand                        |              |            | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|--------------|------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|        | CLP index number                   | EC Number    | CAS Number |          |                   |              |                |                      |            |                |
| 14     | acenaphthene                       | 201-469-6    | 83-32-9    |          | 1 mg/kg           |              | 0.912 mg/kg    | 0.0000912 %          | ✓          |                |
| 15     | fluorene                           | 201-695-5    | 86-73-7    |          | 1 mg/kg           |              | 0.912 mg/kg    | 0.0000912 %          | ✓          |                |
| 16     | phenanthrene                       | 201-581-5    | 85-01-8    |          | 7.1 mg/kg         |              | 6.475 mg/kg    | 0.000648 %           | ✓          |                |
| 17     | anthracene                         | 204-371-1    | 120-12-7   |          | 2.2 mg/kg         |              | 2.006 mg/kg    | 0.000201 %           | ✓          |                |
| 18     | fluoranthene                       | 205-912-4    | 206-44-0   |          | 11 mg/kg          |              | 10.032 mg/kg   | 0.001 %              | ✓          |                |
| 19     | pyrene                             | 204-927-3    | 129-00-0   |          | 11 mg/kg          |              | 10.032 mg/kg   | 0.001 %              | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9 | 200-280-6  |          | 5.5 mg/kg         |              | 5.016 mg/kg    | 0.000502 %           | ✓          |                |
| 21     | chrysene                           | 601-048-00-0 | 205-923-4  |          | 4 mg/kg           |              | 3.648 mg/kg    | 0.000365 %           | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3 | 200-028-5  |          | 5.1 mg/kg         |              | 4.651 mg/kg    | 0.000465 %           | ✓          |                |
| 23     | indeno[123-cd]pyrene               | 205-893-2    | 193-39-5   |          | 2.7 mg/kg         |              | 2.462 mg/kg    | 0.000246 %           | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2 | 200-181-8  |          | 4.3 mg/kg         |              | 3.922 mg/kg    | 0.000392 %           | ✓          |                |
| 25     | benzo[ghi]perylene                 | 205-883-8    | 191-24-2   |          | 2.2 mg/kg         |              | 2.006 mg/kg    | 0.000201 %           | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4 | 205-911-9  |          | 0.81 mg/kg        |              | 0.739 mg/kg    | 0.0000739 %          | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5 | 205-916-6  |          | 2.4 mg/kg         |              | 2.189 mg/kg    | 0.000219 %           | ✓          |                |
| Total: |                                    |              |            |          |                   |              |                | 0.111 %              |            |                |

**Key**

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
|             | User supplied data                                                                                                              |
|             | Determinand values ignored for classification, see column 'Conc. Not Used' for reason                                           |
|             | Determinand defined or amended by HazWasteOnline (see Appendix A)                                                               |
|             | Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| <LOD        | Below limit of detection                                                                                                        |
| CLP: Note 1 | Only the metal concentration has been used for classification                                                                   |



## Classification of sample: HP01

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

## Sample details

|                         |           |                                                                                           |
|-------------------------|-----------|-------------------------------------------------------------------------------------------|
| Sample Name:            | LoW Code: |                                                                                           |
| <b>HP01</b>             | Chapter:  | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth:           | Entry:    | 17 05 04 (Soil and stones other than those mentioned in 17 05 03)                         |
| <b>0.50 m</b>           |           |                                                                                           |
| Moisture content:       |           |                                                                                           |
| <b>11%</b>              |           |                                                                                           |
| (wet weight correction) |           |                                                                                           |

## Hazard properties

None identified

## Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

| #  | Determinand                                                                                                        |                                |                                  | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|----|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|    | CLP index number                                                                                                   | EC Number                      | CAS Number                       |          |                   |              |                |                      |            |                |
| 1  | pH                                                                                                                 |                                |                                  |          | 8.5 pH            |              | 8.5 pH         | 8.5 pH               |            |                |
| 2  | arsenic { arsenic trioxide }                                                                                       |                                |                                  |          | 13 mg/kg          | 1.32         | 15.276 mg/kg   | 0.00153 %            | ✓          |                |
|    | 033-003-00-0                                                                                                       | 215-481-4                      | 1327-53-3                        |          |                   |              |                |                      |            |                |
| 3  | cadmium { cadmium sulfide }                                                                                        |                                |                                  | 1        | 0.8 mg/kg         | 1.285        | 0.915 mg/kg    | 0.0000712 %          | ✓          |                |
|    | 048-010-00-4                                                                                                       | 215-147-8                      | 1306-23-6                        |          |                   |              |                |                      |            |                |
| 4  | chromium in chromium(VI) compounds { chromium(VI) oxide }                                                          |                                |                                  |          | <1.2 mg/kg        | 1.923        | <2.308 mg/kg   | <0.000231 %          |            | <LOD           |
|    | 024-001-00-0                                                                                                       | 215-607-8                      | 1333-82-0                        |          |                   |              |                |                      |            |                |
| 5  | chromium in chromium(III) compounds { chromium(III) oxide }                                                        |                                |                                  |          | 31 mg/kg          | 1.462        | 40.324 mg/kg   | 0.00403 %            | ✓          |                |
|    |                                                                                                                    | 215-160-9                      | 1308-38-9                        |          |                   |              |                |                      |            |                |
| 6  | copper { dicopper oxide; copper (I) oxide }                                                                        |                                |                                  |          | 68 mg/kg          | 1.126        | 68.139 mg/kg   | 0.00681 %            | ✓          |                |
|    | 029-002-00-X                                                                                                       | 215-270-7                      | 1317-39-1                        |          |                   |              |                |                      |            |                |
| 7  | lead { lead chromate }                                                                                             |                                |                                  | 1        | 210 mg/kg         | 1.56         | 291.529 mg/kg  | 0.0187 %             | ✓          |                |
|    | 082-004-00-2                                                                                                       | 231-846-0                      | 7758-97-6                        |          |                   |              |                |                      |            |                |
| 8  | mercury { mercury dichloride }                                                                                     |                                |                                  |          | 0.8 mg/kg         | 1.353        | 0.964 mg/kg    | 0.0000964 %          | ✓          |                |
|    | 080-010-00-X                                                                                                       | 231-299-8                      | 7487-94-7                        |          |                   |              |                |                      |            |                |
| 9  | nickel { nickel dihydroxide }                                                                                      |                                |                                  |          | 22 mg/kg          | 1.579        | 30.927 mg/kg   | 0.00309 %            | ✓          |                |
|    | 028-008-00-X                                                                                                       | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] |          |                   |              |                |                      |            |                |
| 10 | selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex } |                                |                                  |          | <1 mg/kg          | 2.554        | <2.554 mg/kg   | <0.000255 %          |            | <LOD           |
|    | 034-002-00-8                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 11 | zinc { zinc chromate }                                                                                             |                                |                                  |          | 250 mg/kg         | 2.774        | 617.248 mg/kg  | 0.0617 %             | ✓          |                |
|    | 024-007-00-3                                                                                                       |                                |                                  |          |                   |              |                |                      |            |                |
| 12 | naphthalene                                                                                                        |                                |                                  |          | 5.8 mg/kg         |              | 5.162 mg/kg    | 0.000516 %           | ✓          |                |
|    | 601-052-00-2                                                                                                       | 202-049-5                      | 91-20-3                          |          |                   |              |                |                      |            |                |
| 13 | acenaphthylene                                                                                                     |                                |                                  |          | 3.5 mg/kg         |              | 3.115 mg/kg    | 0.000312 %           | ✓          |                |
|    |                                                                                                                    | 205-917-1                      | 208-96-8                         |          |                   |              |                |                      |            |                |



| #      | Determinand                        |              |            | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|--------|------------------------------------|--------------|------------|----------|-------------------|--------------|----------------|----------------------|------------|----------------|
|        | CLP index number                   | EC Number    | CAS Number |          |                   |              |                |                      |            |                |
| 14     | acenaphthene                       | 201-469-6    | 83-32-9    |          | 3.2 mg/kg         |              | 2.848 mg/kg    | 0.000285 %           | ✓          |                |
| 15     | fluorene                           | 201-695-5    | 86-73-7    |          | 6 mg/kg           |              | 5.34 mg/kg     | 0.000534 %           | ✓          |                |
| 16     | phenanthrene                       | 201-581-5    | 85-01-8    |          | 38 mg/kg          |              | 33.82 mg/kg    | 0.00338 %            | ✓          |                |
| 17     | anthracene                         | 204-371-1    | 120-12-7   |          | 9.9 mg/kg         |              | 8.811 mg/kg    | 0.000881 %           | ✓          |                |
| 18     | fluoranthene                       | 205-912-4    | 206-44-0   |          | 38 mg/kg          |              | 33.82 mg/kg    | 0.00338 %            | ✓          |                |
| 19     | pyrene                             | 204-927-3    | 129-00-0   |          | 40 mg/kg          |              | 35.6 mg/kg     | 0.00356 %            | ✓          |                |
| 20     | benzo[a]anthracene                 | 601-033-00-9 | 200-280-6  | 56-55-3  | 18 mg/kg          |              | 16.02 mg/kg    | 0.0016 %             | ✓          |                |
| 21     | chrysene                           | 601-048-00-0 | 205-923-4  | 218-01-9 | 14 mg/kg          |              | 12.46 mg/kg    | 0.00125 %            | ✓          |                |
| 22     | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3 | 200-028-5  | 50-32-8  | 17 mg/kg          |              | 15.13 mg/kg    | 0.00151 %            | ✓          |                |
| 23     | indeno[123-cd]pyrene               | 205-893-2    | 193-39-5   |          | 5.6 mg/kg         |              | 4.984 mg/kg    | 0.000498 %           | ✓          |                |
| 24     | dibenz[a,h]anthracene              | 601-041-00-2 | 200-181-8  | 53-70-3  | 14 mg/kg          |              | 12.46 mg/kg    | 0.00125 %            | ✓          |                |
| 25     | benzo[ghi]perylene                 | 205-883-8    | 191-24-2   |          | 6.2 mg/kg         |              | 5.518 mg/kg    | 0.000552 %           | ✓          |                |
| 26     | benzo[b]fluoranthene               | 601-034-00-4 | 205-911-9  | 205-99-2 | 2 mg/kg           |              | 1.78 mg/kg     | 0.000178 %           | ✓          |                |
| 27     | benzo[k]fluoranthene               | 601-036-00-5 | 205-916-6  | 207-08-9 | 6.8 mg/kg         |              | 6.052 mg/kg    | 0.000605 %           | ✓          |                |
| Total: |                                    |              |            |          |                   |              |                | 0.117 %              |            |                |

**Key**

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
|             | User supplied data                                                                                                              |
|             | Determinand values ignored for classification, see column 'Conc. Not Used' for reason                                           |
| •           | Determinand defined or amended by HazWasteOnline (see Appendix A)                                                               |
| •           | Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| <LOD        | Below limit of detection                                                                                                        |
| CLP: Note 1 | Only the metal concentration has been used for classification                                                                   |

## Appendix A: Classifier defined and non CLP determinands

### • pH (CAS Number: PH)

Description/Comments: Appendix C4  
Data source: WM3 1st Edition 2015  
Data source date: 25 May 2015  
Hazard Statements: None.

### • chromium(III) oxide (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462  
Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 17 Jul 2015  
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

### • acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 17 Jul 2015  
Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

### • acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 17 Jul 2015  
Hazard Statements: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

### • fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 06 Aug 2015  
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

### • phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 06 Aug 2015  
Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

### • anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 17 Jul 2015  
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

### • fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 21 Aug 2015  
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

### • pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014  
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>  
Data source date: 21 Aug 2015  
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315



■ **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2 H351

■ **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

■ **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

■ **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Description/Comments:

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazards Statement(s)/Risk Phrase(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

## Appendix B: Rationale for selection of metal species

### arsenic {arsenic trioxide}

Worst case species based on hazard statements

### cadmium {cadmium sulfide}

Worst case species based on hazard statements

### chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

### chromium in chromium(III) compounds {chromium(III) oxide}

Worst case species based on hazard statements

### copper {dicopper oxide; copper (I) oxide}

Most likely common species

### lead {lead chromate}

Worst case species based on hazard statements

### mercury {mercury dichloride}

Worst case species based on hazard statements

### nickel {nickel dihydroxide}

Worst case species based on hazard statements

### selenium {selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex}

Worst case species based on hazard statements

### zinc {zinc chromate}

Worst case species based on hazard statements

## Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**

HazWasteOnline Classification Engine Version: 2019.182.3894.7916 (01 Jul 2019)

HazWasteOnline Database: 2019.182.3894.7916 (01 Jul 2019)



This classification utilises the following guidance and legislation:

**WM3 v1.1 - Waste Classification** - 1st Edition v1.1 - May 2018  
**CLP Regulation** - Regulation 1272/2008/EC of 16 December 2008  
**1st ATP** - Regulation 790/2009/EC of 10 August 2009  
**2nd ATP** - Regulation 286/2011/EC of 10 March 2011  
**3rd ATP** - Regulation 618/2012/EU of 10 July 2012  
**4th ATP** - Regulation 487/2013/EU of 8 May 2013  
**Correction to 1st ATP** - Regulation 758/2013/EU of 7 August 2013  
**5th ATP** - Regulation 944/2013/EU of 2 October 2013  
**6th ATP** - Regulation 605/2014/EU of 5 June 2014  
**WFD Annex III replacement** - Regulation 1357/2014/EU of 18 December 2014  
**Revised List of Wastes 2014** - Decision 2014/955/EU of 18 December 2014  
**7th ATP** - Regulation 2015/1221/EU of 24 July 2015  
**8th ATP** - Regulation (EU) 2016/918 of 19 May 2016  
**9th ATP** - Regulation (EU) 2016/1179 of 19 July 2016  
**10th ATP** - Regulation (EU) 2017/776 of 4 May 2017  
**HP14 amendment** - Regulation (EU) 2017/997 of 8 June 2017  
**13th ATP** - Regulation (EU) 2018/1480 of 4 October 2018  
**POPs Regulation 2004** - Regulation 850/2004/EC of 29 April 2004  
**1st ATP to POPs Regulation** - Regulation 756/2010/EU of 24 August 2010  
**2nd ATP to POPs Regulation** - Regulation 757/2010/EU of 24 August 2010

## **North West**

**William Smith House  
173 – 183 Witton Street  
Northwich  
Cheshire  
CW9 5LP**

**Tel: 01606 334 844**

## **Midlands**

**Unit 5, Alfred Court  
Saxon Business Park  
Stoke Prior  
Bromsgrove  
Worcestershire  
B60 4AD**

**Tel: 01215 729014**

**[www.brownfield-solutions.com](http://www.brownfield-solutions.com)**

