



# e3p

Earthworks Validation Report  
South Heywood – Phase 1

Reference: 15-707-R2-1  
Date: September 2023



## EARTHWORKS VALIDATION REPORT

Hopwood Meadows  
South Heywood – Phase 1  
Manchester Road  
Heywood  
OL10 2QD

Prepared for:  
**Bellway Homes (Manchester) Ltd**



**Report Ref: 15-707-R2**  
**Date Issued: September 2023**

## South Heywood Phase 1

Validation Report

September 2023

## E3P

Taylor Road  
Trafford Park  
Urmston  
M41 7JQ

+ 44 (0) 161 707 9612

<https://e3p.co.uk>

Registered in England

CRN: 807255262

## QUALITY ASSURANCE

|                |                                         |  |  |
|----------------|-----------------------------------------|--|--|
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| PREPARED BY    | N Dawson                                |  |  |
| QUALIFICATIONS | BSc (Hons), FGS                         |  |  |
| CHECKED BY     | S Ellis                                 |  |  |
| QUALIFICATIONS | BSc (Hons), FGS, CEnv                   |  |  |
| AUTHORISED BY  | M. Dyer                                 |  |  |
| QUALIFICATIONS | BSc(Hons), FGS, AIEMA,<br>MIEnvSc, CEnv |  |  |



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ISO 45001 (2018)



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## 1. INTRODUCTION

### 1.1. BACKGROUND

This report details the cut/fill earthworks operations that were undertaken by Chandos under the supervision of E3P to facilitate the preparation of the low-rise residential development on a parcel of land known as South Heywood Phase 1, to the south of Hareshill Road, Rochdale, herein referenced the site.

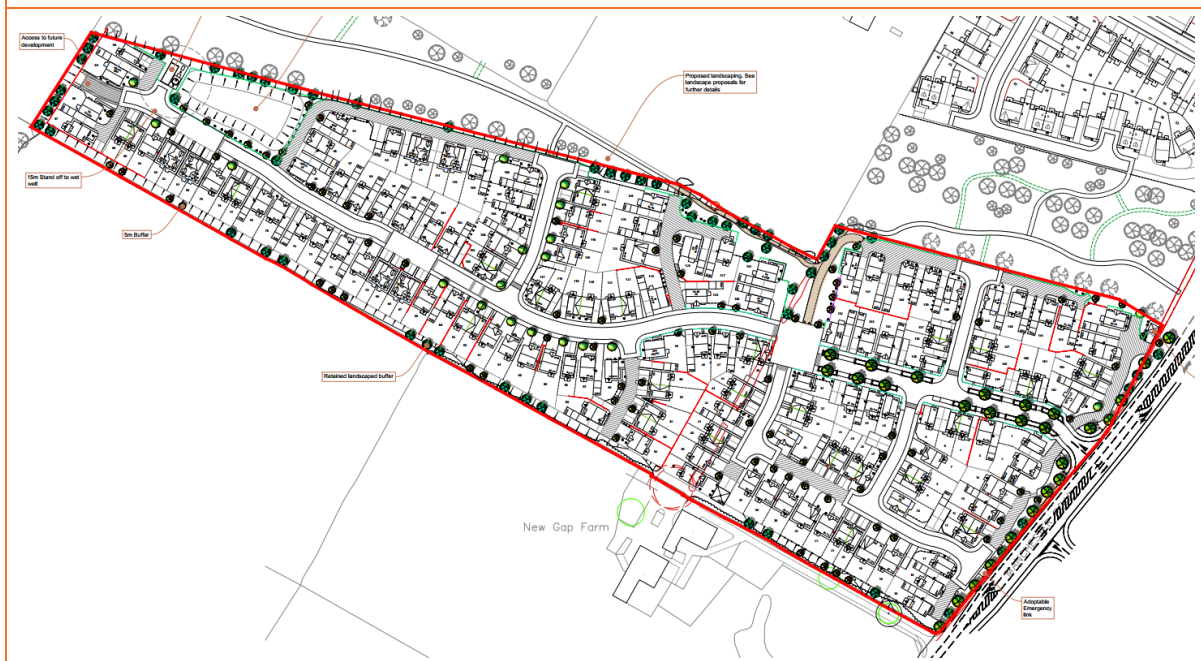
Bellway Homes (Manchester) Ltd appointed E3P as an independent Geoenvironmental / Geotechnical Consultant for the earthworks validation and the subsequent production of a suitably detailed report to ensure the satisfaction of the relevant geotechnical engineering requirements for Building Control, warranty providers and the future adoption of infrastructure by the Highways Authority and statutory service providers.

### 1.2. PROPOSED DEVELOPMENT

E3P understands that Bellway Homes (Manchester) Ltd intends to construct a low-rise residential development comprising circa. One hundred fifty-six residential dwellings with associated gardens, estate roads and infrastructure. An attenuation basin is proposed to be built in the northwest of the site.

The proposed development layout is shown in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



### 1.3. SUMMARY OF PARTIES INVOLVED

TABLE 1.1 PARTIES INVOLVED

| Function/interest                               | Name of Party           |
|-------------------------------------------------|-------------------------|
| Developer                                       | Bellway Homes           |
| Geoenvironmental Consultant                     | E3P                     |
| Main Contractor                                 | Chandos / Bellway Homes |
| Earthworks Contractor                           | Chandos                 |
| Human Health Regulator/Local Planning Authority | Rochdale MBC            |
| Waste Regulator                                 | Environment Agency      |
| Controlled Waters Regulator                     | Environment Agency      |

### 1.4. PREVIOUS WORKS

The following ground investigation report has been prepared for the site on behalf of Russell Homes, the original landowner who divested the site to Bellway Homes (Manchester):

- ✳ **E3P** – Phase II Geoenvironmental Site Assessment – South Heywood, Phase 1 Development Area (Report ref: 12-709-R1; dated October 2018).

The above document was utilised to develop the following Remediation and Enabling Works Strategy:

- ✳ **E3P** – Remediation and Enabling Works Strategy – South Heywood, Phase 1 Development Area (Report ref: 15-707-R1, dated January 2022)

The above documents should be read in conjunction with this Validation Report.



## **2. SUMMARY OF EARTHWORKS OBJECTIVES**

The proposed enabling/earthworks activities were detailed within the E3P Geotechnical Performance Specification included within the E3P Remediation and Enabling Works Strategy (15-707-R1, dated January 2022).

To avoid doubt, this report details verifying the placement and engineering of upfill in the region of Plots 66-123 west of the site.

It was proposed to reduce levels (cut) by up to 1.00 m east of the site and raise levels (fill) by up to 2.00 m west to create a more level development platform.

The enabling/earthworks objectives are summarised as follows:

- ✿ Preparation of plot footprint (+ 2 m on all elevations) to be suitable for ground improvement by Vibro Stone Column, where the depth of stiff clay/medium-dense sands exceeds 1.5 m from proposed finished floor level (FFL).
- ✿ Preparation of plots to be suitable for construction with shallow spread foundation where firm to stiff clay and medium-dense sands are present at a depth < 1.5 m from proposed FFL across the complete plot.
- ✿ Engineer all areas of the proposed adopted road and private drive to be compliant with the E3P Geotechnical Specification with CBR and elevation defined by the client.



### 3. DETAILED ENABLING/EARTHWORKS WORKS ACTIVITIES

E3P has been commissioned to provide geotechnical and geo-environmental support services as part of the site, enabling works to construct the development platform per the project engineering design requirements.

To avoid doubt, this report details the verification of the placement and engineering of upfill in the region of Plots 66-127 in the west of the site.

It was proposed to reduce levels (cut) by up to 1.00 m in the east of the site and raise levels (fill) by up to 2.00 m in the west to create a more level development platform.

The generalised preliminary earthworks volumetric assessment prepared by E3P (ref: 14-921-SMP Table, dated April 2022), details the proposed volumetric appraisal:

- ✿ Approximately 16,952 m<sup>3</sup> of topsoil will be generated by a 300 mm site scrape;
- ✿ Approximately 7,175 m<sup>3</sup> of topsoil will be required in proposed garden and POS areas (300 mm thick), producing 9,777 m<sup>3</sup> surplus topsoil to be exported off-site;
- ✿ Enabling works cut: 10,732 m<sup>3</sup>
- ✿ Enabling works fill: 35,556 m<sup>3</sup>
- ✿ Enabling works net: -24,823 m<sup>3</sup> (shortfall)

**The earthworks commenced in November 2022 and were completed by May 2023.**

#### 3.1. RECOVERY OF NATURAL TOPSOIL

The natural topsoil, circa 300 mm thick, was stripped and stockpiled for re-use within the garden and soft landscaping areas. Surplus topsoil will be removed from the site.

Topsoil was stockpiled on site subsequently tested for chemical suitability (10 no. samples) to be re-used on site within the clean cover system. Chemical analysis results indicate that the soil is suitable for use as topsoil within the proposed clean cover system. Results are included within Appendix VII (i2 Report Refs: 22-92048 and 23-10478).

Additional sampling will be conducted during the build phase of the development to ensure the frequency is in line with the remediation strategy. The additional testing results will be included within the Build Phase Completion Report.

#### 3.2. CUT-AND-FILLING OF NATURAL SOILS TO DEVELOPMENT LEVELS

Based on the cut/fill earthworks required for the proposed development, a shortfall of 24,823 m<sup>3</sup> was identified, which required importation to achieve final levels. E3P attended the site to sample the imported material for laboratory analysis to classify the material in accordance with SHW600 and determine the particle size distribution (PSD), Optimum Moisture Content (OMC) and Maximum Dry Density (MDD).

The soils were within 3% of the optimum moisture content, with an average OMC of 12% and an average MDD of 1.91%. Full results are presented in Appendix X Report Ref: PSL7311.



Chemical analysis was conducted on the imported clay soils (IMP-CLAY-101-105). Results indicate the material is suitable for re-use on site as bulk fill. Results are included within Appendix VII (i2 Report Ref: 22-96466).

### 3.3. PLACEMENT AND COMPACTION OF UPFILL MATERIAL TO FACILITATE GROUND IMPROVEMENT BY VSC

E3P attended site to carry out in-situ Non-Nuclear Density Gauge (NNDG) tests within the placed and engineered material during construction works.

Material was placed in 225 mm layers with 4 roller passes using a >5000 kg vibrating roller with in-situ testing carried out on every second layer.

The in-situ density testing confirmed that the placed and engineered material has an in-situ density in excess of 95% of that of the maximum laboratory defined dry density.

The results of the NNDG tests are summarised in Table 3.1. Test locations are shown on Drawing No. 13-923-026 in Appendix III).

TABLE 3.1 SUMMARY OF NON-NUCLEAR DENSITY GAUGE (NNDG) TESTS

| TEST LOCATION | PLOT NUMBER | TEST DATE  | % COMPACTION | RESULT | COMMENTS |
|---------------|-------------|------------|--------------|--------|----------|
| NNDG149       | 60          | 12/01/2023 | 107          | Pass   | –        |
| NNDG136       | 61          | 05/01/2023 | 126          | Pass   | –        |
| NNDG137       | 62          | 05/01/2023 | 124          | Pass   | –        |
| NNDG109       | 65          | 29/11/2022 | 105          | Pass   | –        |
| NNDG116       | 65          | 06/12/2022 | 98           | Pass   | –        |
| NNDG138       | 65          | 05/01/2023 | 127          | Pass   | –        |
| NNDG101       | 66          | 25/11/2022 | 102          | Pass   | –        |
| NNDG110       | 67          | 29/11/2022 | 104          | Pass   | –        |
| NNDG139       | 67          | 05/01/2023 | 125          | Pass   | –        |
| NNDG102       | 68          | 25/11/2022 | 124          | Pass   | –        |
| NNDG117       | 68          | 06/12/2022 | 99           | Pass   | –        |
| NNDG111       | 69          | 29/11/2022 | 97           | Pass   | –        |
| NNDG118       | 70          | 06/12/2022 | 101          | Pass   | –        |
| NNDG119       | 71          | 06/12/2022 | 96           | Pass   | –        |
| NNDG140       | 71          | 05/01/2023 | 119          | Pass   | –        |
| NNDG103       | 72          | 25/11/2022 | 132          | Pass   | –        |
| NNDG112       | 72          | 29/11/2022 | 108          | Pass   | –        |
| NNDG141       | 72          | 05/01/2023 | 116          | Pass   | –        |
| NNDG120       | 73          | 06/12/2022 | 104          | Pass   | –        |
| NNDG104       | 74          | 25/11/2022 | 132          | Pass   | –        |
| NNDG113       | 74          | 29/11/2022 | 111          | Pass   | –        |



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| TEST LOCATION | PLOT NUMBER | TEST DATE  | % COMPACTION | RESULT | COMMENTS         |
|---------------|-------------|------------|--------------|--------|------------------|
| NNDG128       | 74          | 13/12/2022 | 100          | Pass   | –                |
| NNDG142       | 74          | 05/01/2023 | 125          | Pass   | –                |
| NNDG105       | 75          | 25/11/2022 | 127          | Pass   | –                |
| NNDG114       | 75          | 29/11/2022 | 97           | Pass   | –                |
| NNDG121       | 75          | 06/12/2022 | 101          | Pass   | –                |
| NNDG143       | 75          | 05/01/2023 | 126          | Pass   | –                |
| NNDG150       | 75          | 12/01/2023 | 112          | Pass   | –                |
| NNDG106       | 76          | 25/11/2022 | 114          | Pass   | –                |
| NNDG129       | 76          | 13/12/2022 | 95           | Fail   | –                |
| NNDG144       | 76          | 05/01/2023 | 121          | Pass   | –                |
| NNDG107       | 77          | 25/11/2022 | 96           | Pass   | –                |
| NNDG115       | 77          | 29/11/2022 | 107          | Pass   | –                |
| NNDG122       | 78          | 06/12/2022 | 101          | Pass   | –                |
| NNDG151       | 78          | 12/01/2023 | 109          | Pass   | –                |
| NNDG123       | 79          | 06/12/2022 | 96           | Pass   | –                |
| NNDG145       | 79          | 05/01/2023 | 128          | Pass   | –                |
| NNDG108       | 80          | 25/11/2022 | 99           | Pass   | –                |
| NNDG152       | 80          | 12/01/2023 | 103          | Pass   | –                |
| NNDG124       | 81          | 06/12/2022 | 105          | Pass   | –                |
| NNDG130       | 81          | 13/12/2022 | 104          | Pass   | –                |
| NNDG125       | 82          | 06/12/2022 | 117          | Pass   | –                |
| NNDG153       | 82          | 12/01/2023 | 112          | Pass   | –                |
| NNDG146       | 83          | 05/01/2023 | 126          | Pass   | –                |
| NNDG131       | 84          | 13/12/2022 | 102          | Pass   | –                |
| NNDG147       | 84          | 05/01/2023 | 108          | Pass   | –                |
| NNDG132       | 85          | 13/12/2022 | 95           | Fail   | –                |
| NNDG148       | 85          | 05/01/2023 | 123          | Pass   | –                |
| NNDG126       | 86          | 08/12/2022 | 102          | Pass   | –                |
| NNDG154       | 86          | 12/01/2023 | 71           | Fail   | Re-test required |
| NNDG157       | 86          | 17/01/2023 | 121          | Pass   | Re-test          |
| NNDG161       | 86          | 19/01/2023 | 107          | Pass   | –                |
| NNDG133       | 87          | 13/12/2022 | 97           | Pass   | –                |
| NNDG155       | 87          | 12/01/2023 | 63           | Fail   | Re-test required |
| NNDG162       | 87          | 19/01/2023 | 111          | Pass   | Re-test          |
| NNDG174       | 87          | 01/02/2023 | 98           | Pass   | –                |
| NNDG127       | 88          | 08/12/2022 | 105          | Pass   | –                |



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| TEST LOCATION | PLOT NUMBER | TEST DATE  | % COMPACTION | RESULT | COMMENTS         |
|---------------|-------------|------------|--------------|--------|------------------|
| NNDG158       | 88          | 17/01/2023 | 118          | Pass   | –                |
| NNDG163       | 88          | 19/01/2023 | 114          | Pass   | –                |
| NNDG159       | 89          | 17/01/2023 | 139          | Pass   | –                |
| NNDG164       | 89          | 19/01/2023 | 104          | Pass   | –                |
| NNDG166       | 89          | 24/01/2023 | 107          | Pass   | –                |
| NNDG175       | 89          | 01/02/2023 | 100          | Pass   | –                |
| NNDG176       | 89          | 01/02/2023 | 108          | Pass   | –                |
| NNDG182       | 89          | 16/02/2023 | 117          | Pass   | –                |
| NNDG156       | 90          | 12/01/2023 | 82           | Fail   | Re-test required |
| NNDG160       | 90          | 17/01/2023 | 131          | Pass   | Re-test          |
| NNDG165       | 90          | 19/01/2023 | 111          | Pass   | –                |
| NNDG167       | 90          | 24/01/2023 | 104          | Pass   | –                |
| NNDG177       | 90          | 01/02/2023 | 93           | Fail   | Re-test required |
| NNDG178       | 90          | 01/02/2023 | 117          | Pass   | Re-test          |
| NNDG183       | 91          | 16/02/2023 | 128          | Pass   | –                |
| NNDG203       | 91          | 02/03/2023 | 105          | Pass   | –                |
| NNDG214       | 91          | 07/03/2023 | 105          | Pass   | –                |
| NNDG224       | 91          | 09/03/2023 | 118          | Pass   | –                |
| NNDG196       | 92          | 28/02/2023 | 113          | Pass   | –                |
| NNDG215       | 92          | 07/03/2023 | 106          | Pass   | –                |
| NNDG184       | 93          | 16/02/2023 | 122          | Pass   | –                |
| NNDG197       | 93          | 28/02/2023 | 120          | Pass   | –                |
| NNDG204       | 93          | 02/03/2023 | 122          | Pass   | –                |
| NNDG185       | 94          | 16/02/2023 | 120          | Pass   | –                |
| NNDG198       | 94          | 28/02/2023 | 117          | Pass   | –                |
| NNDG205       | 94          | 02/03/2023 | 102          | Pass   | –                |
| NNDG216       | 94          | 07/03/2023 | 103          | Pass   | –                |
| NNDG225       | 94          | 09/03/2023 | 106          | Pass   | –                |
| NNDG199       | 95          | 28/02/2023 | 110          | Pass   | –                |
| NNDG206       | 95          | 02/03/2023 | 112          | Pass   | –                |
| NNDG186       | 96          | 16/02/2023 | 108          | Pass   | –                |
| NNDG217       | 96          | 07/03/2023 | 111          | Pass   | –                |
| NNDG226       | 96          | 09/03/2023 | 114          | Pass   | –                |
| NNDG187       | 97          | 16/02/2023 | 108          | Pass   | –                |
| NNDG207       | 97          | 02/03/2023 | 124          | Pass   | –                |
| NNDG218       | 97          | 07/03/2023 | 115          | Pass   | –                |



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| TEST LOCATION | PLOT NUMBER | TEST DATE  | % COMPACTION | RESULT | COMMENTS         |
|---------------|-------------|------------|--------------|--------|------------------|
| NNDG227       | 97          | 09/03/2023 | 129          | Pass   | –                |
| NNDG200       | 98          | 28/02/2023 | 116          | Pass   | –                |
| NNDG201       | 98          | 28/02/2023 | 111          | Pass   | –                |
| NNDG208       | 98          | 02/03/2023 | 105          | Pass   | –                |
| NNDG219       | 98          | 07/03/2023 | 107          | Pass   | –                |
| NNDG188       | 99          | 16/02/2023 | 119          | Pass   | –                |
| NNDG209       | 99          | 02/03/2023 | 104          | Pass   | –                |
| NNDG228       | 99          | 09/03/2023 | 118          | Pass   | –                |
| NNDG202       | 100         | 28/02/2023 | 106          | Pass   | –                |
| NNDG234       | 100         | 24/03/2023 | 120          | Pass   | –                |
| NNDG239       | 100         | 28/03/2023 | 91           | Fail   | Re-test required |
| NNDG244       | 100         | 30/03/2023 | 91           | Fail   | Re-test required |
| NNDG245       | 100         | 30/03/2023 | 91           | Fail   | Re-test required |
| NNDG250       | 100         | 06/04/2023 | 127          | Pass   | Re-test          |
| NNDG231       | 101         | 20/03/2023 | 112          | Pass   | –                |
| NNDG235       | 101         | 24/03/2023 | 117          | Pass   | –                |
| NNDG240       | 101         | 28/03/2023 | 91           | Fail   | Re-test required |
| NNDG251       | 101         | 06/04/2023 | 107          | Pass   | Re-test          |
| NNDG232       | 102         | 20/03/2023 | 110          | Pass   | –                |
| NNDG241       | 102         | 28/03/2023 | 92           | Fail   | Re-test required |
| NNDG246       | 102         | 30/03/2023 | 96           | Pass   | Re-test          |
| NNDG233       | 103         | 20/03/2023 | 130          | Pass   | –                |
| NNDG236       | 103         | 24/03/2023 | 112          | Pass   | –                |
| NNDG247       | 103         | 30/03/2023 | 93           | Fail   | Re-test required |
| NNDG254       | 103         | 11/04/2023 | 114          | Pass   | Re-test          |
| NNDG255       | 103         | 11/04/2023 | 112          | Pass   | –                |
| NNDG242       | 104         | 28/03/2023 | 91           | Fail   | Re-test required |
| NNDG252       | 104         | 06/04/2023 | 109          | Pass   | Re-test          |
| NNDG237       | 105         | 24/03/2023 | 105          | Pass   | –                |
| NNDG243       | 105         | 28/03/2023 | 92           | Fail   | Re-test required |
| NNDG248       | 105         | 30/03/2023 | 93           | Fail   | Re-test required |
| NNDG253       | 105         | 06/04/2023 | 110          | Pass   | Re-test          |
| NNDG256       | 105         | 11/04/2023 | 105          | Pass   | –                |
| NNDG220       | 106         | 07/03/2023 | 115          | Pass   | –                |
| NNDG257       | 106         | 11/04/2023 | 100          | Pass   | –                |
| NNDG258       | 106         | 13/04/2023 | 95           | Pass   | –                |



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| TEST LOCATION | PLOT NUMBER | TEST DATE  | % COMPACTION | RESULT | COMMENTS         |
|---------------|-------------|------------|--------------|--------|------------------|
| NNDG259       | 106         | 18/04/2023 | 107          | Pass   | –                |
| NNDG221       | 107         | 07/03/2023 | 117          | Pass   | –                |
| NNDG238       | 107         | 24/03/2023 | 110          | Pass   | –                |
| NNDG249       | 107         | 30/03/2023 | 96           | Pass   | –                |
| NNDG260       | 107         | 18/04/2023 | 102          | Pass   | –                |
| NNDG229       | 108         | 09/03/2023 | 110          | Pass   | –                |
| NNDG210       | 109         | 02/03/2023 | 105          | Pass   | –                |
| NNDG222       | 109         | 07/03/2023 | 118          | Pass   | –                |
| NNDG230       | 109         | 09/03/2023 | 112          | Pass   | –                |
| NNDG134       | 110         | 19/12/2022 | 65           | Fail   | Re-test required |
| NNDG211       | 110         | 02/03/2023 | 95           | Fail   | Re-test          |
| NNDG135       | 111         | 19/12/2022 | 67           | Fail   | Re-test required |
| NNDG212       | 111         | 02/03/2023 | 94           | Fail   | Re-test required |
| NNDG223       | 111         | 07/03/2023 | 102          | Pass   | Re-test          |
| NNDG168       | 112         | 24/01/2023 | 94           | Fail   | Re-test required |
| NNDG173       | 112         | 31/01/2023 | 130          | Pass   | Re-test          |
| NNDG169       | 113         | 24/01/2023 | 113          | Pass   | –                |
| NNDG170       | 114         | 24/01/2023 | 117          | Pass   | –                |
| NNDG171       | 125         | 24/01/2023 | 121          | Pass   | –                |
| NNDG179       | 125         | 01/02/2023 | 96           | Pass   | –                |
| NNDG189       | 125         | 16/02/2023 | 113          | Pass   | –                |
| NNDG172       | 126         | 24/01/2023 | 100          | Pass   | –                |
| NNDG180       | 126         | 01/02/2023 | 96           | Pass   | –                |
| NNDG190       | 126         | 16/02/2023 | 113          | Pass   | –                |
| NNDG193       | 126         | 23/02/2023 | 106          | Pass   | –                |
| NNDG191       | 127         | 16/02/2023 | 131          | Pass   | –                |
| NNDG194       | 127         | 23/02/2023 | 97           | Pass   | –                |
| NNDG213       | 127         | 02/03/2023 | 148          | Pass   | –                |
| NNDG181       | 128         | 01/02/2023 | 97           | Pass   | –                |
| NNDG192       | 128         | 16/02/2023 | 113          | Pass   | –                |
| NNDG195       | 128         | 23/02/2023 | 139          | Pass   | –                |



### **3.4. CONSTRUCTION OF TEMPORARY WORKING PLATFORM**

The temporary works platform for the vibro rig is required to achieve a minimum CBR of 5%.

CBR testing was undertaken by a third party under the instruction of the client. CBR results have not been provided at the time of writing however they can be made available on request from Bellway Homes (Manchester) Ltd. CBR locations are also available on request from Bellway Homes (Manchester) Ltd.

## **4. CONCLUSION**

The works have been completed under the supervision of the E3P Engineering Geologist, all works have been completed in accordance with the defined method for compaction and to the satisfaction of E3P.

E3P can therefore confirm that where materials have been placed within Plots 60-128 have been compacted to the required specification and as such are suitable for Ground Improvement by VSC.

**END OF REPORT**



# APPENDIX I

# LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



# **APPENDIX II**

## **GLOSSARY**

## TERMS

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



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



# **APPENDIX III**

## **DRAWINGS**



# **APPENDIX IV GEOTECHNICAL TESTING RESULTS**



# LABORATORY REPORT



4043

**Contract Number: PSL22/7311**

Report Date: 07 December 2022

Client's Reference: 15-707

Client Name: E3P  
Taylor Road  
Urmston  
Manchester  
M41 7JQ

**For the attention of: Nicola Dawson**

Contract Title: South Heywood Phase 1

Date Received: 14/11/2022

Date Commenced: 14/11/2022

Date Completed: 7/12/2022

**Notes: Opinions and Interpretations are outside the UKAS Accreditation**

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

Checked and Approved Signatories:

A Watkins  
(Director)

R Berriman  
(Quality Manager)

S Royle  
(Laboratory Manager)

L Knight  
(Assistant Laboratory Manager)

  
S Eyre  
(Senior Technician)

T Watkins  
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,  
Doncaster DN4 0AR  
tel: +44 (0)844 815 6641  
fax: +44 (0)844 815 6642  
e-mail: rberriman@prosoils.co.uk  
awatkins@prosoils.co.uk

Page 1 of

## SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

**PSL**  
**Professional Soils Laboratory**

## South Heywood Phase 1

**Contract No:**

PSL22/7311

**Client Ref:**

15-707

## SUMMARY OF SOIL CLASSIFICATION TESTS

**(BS1377 : PART 2 : 1990)**

[illegible]

**SYMBOLS : NP : Non Plastic**

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



4043



**PSL**  
Professional Soils Laboratory

## South Heywood Phase 1

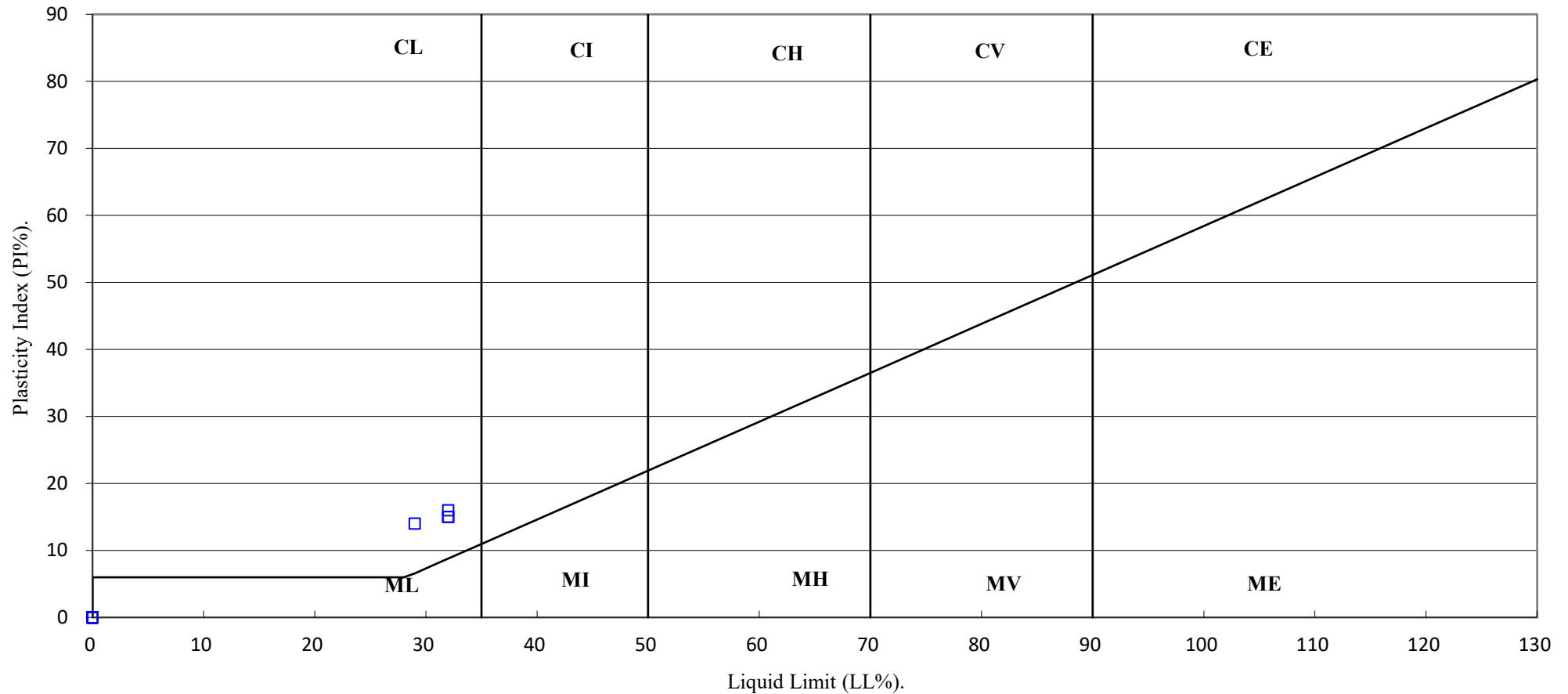
**Contract No:**

PSL22/7311

**Client Ref:**

**15-707**

# PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract No:

PSL22/7311

Client Ref:

15-707

# PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

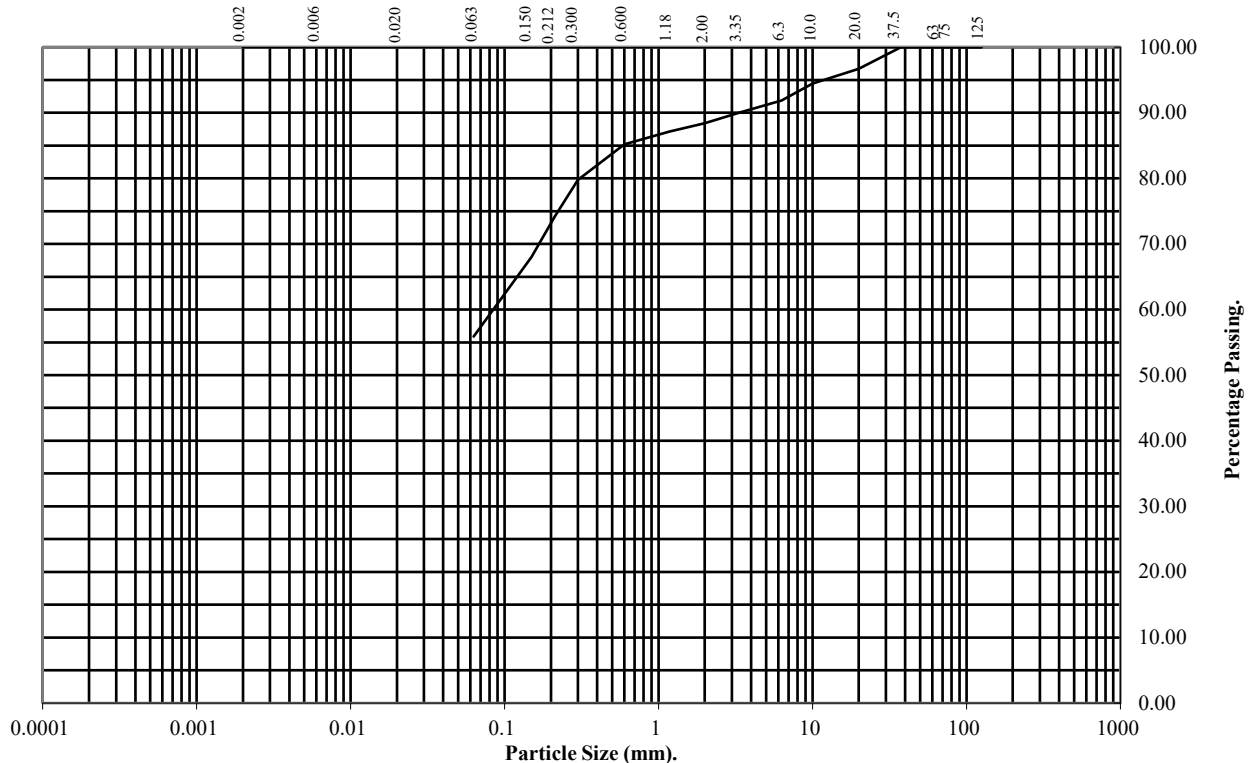
Hole Number: IMP-CLAY-101

Top Depth (m):

Sample Number:

Base Depth(m):

Sample Type: B



| BS Test Sieve (mm) | Percentage Passing |
|--------------------|--------------------|
| 125                | 100                |
| 75                 | 100                |
| 63                 | 100                |
| 37.5               | 100                |
| 20                 | 97                 |
| 10                 | 94                 |
| 6.3                | 92                 |
| 3.35               | 90                 |
| 2                  | 88                 |
| 1.18               | 87                 |
| 0.6                | 85                 |
| 0.3                | 80                 |
| 0.212              | 74                 |
| 0.15               | 68                 |
| 0.063              | 56                 |

| Soil Fraction | Total Percentage |
|---------------|------------------|
| Cobbles       | 0                |
| Gravel        | 12               |
| Sand          | 32               |
| Silt/Clay     | 56               |

## Remarks:

See Summary of Soil Descriptions



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract No:  
PSL22/7311  
Client Ref:  
15-707

# PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

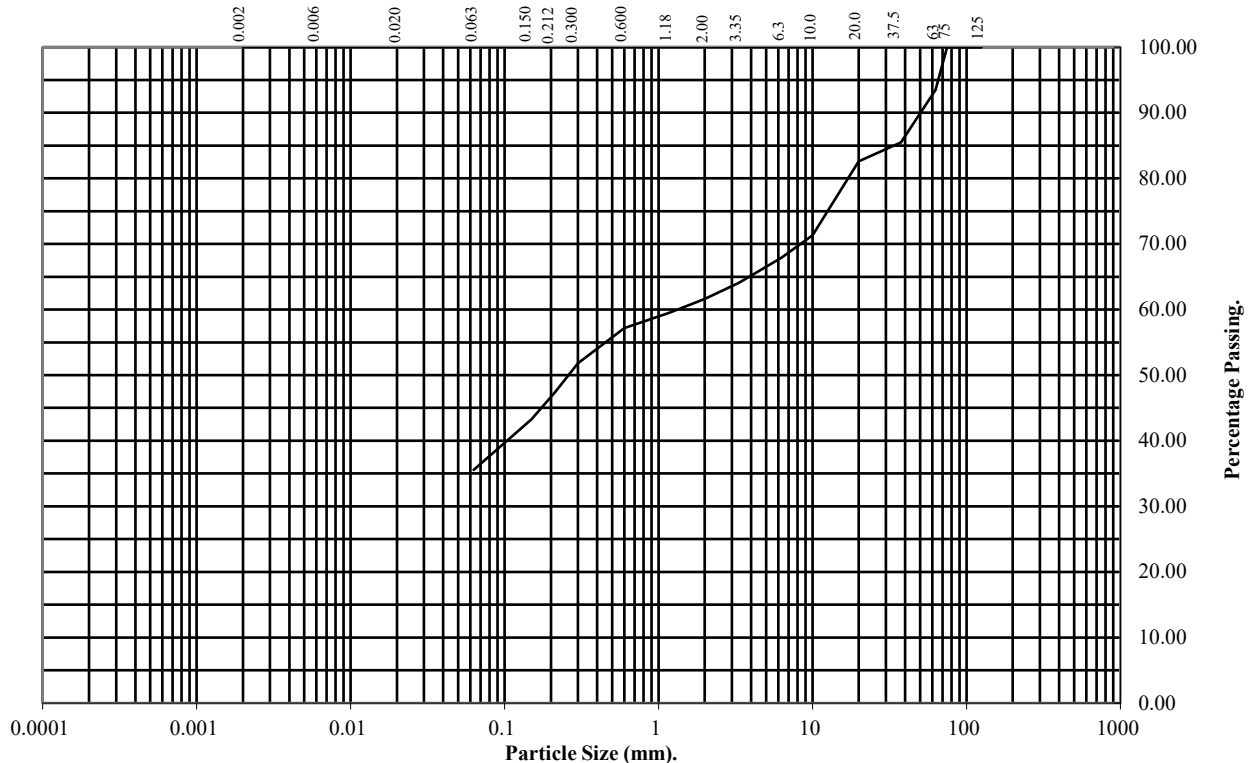
Hole Number: IMP-CLAY-102

Top Depth (m):

Sample Number:

Base Depth(m):

Sample Type: B



| BS Test Sieve (mm) | Percentage Passing |
|--------------------|--------------------|
| 125                | 100                |
| 75                 | 100                |
| 63                 | 93                 |
| 37.5               | 85                 |
| 20                 | 83                 |
| 10                 | 71                 |
| 6.3                | 68                 |
| 3.35               | 64                 |
| 2                  | 62                 |
| 1.18               | 60                 |
| 0.6                | 57                 |
| 0.3                | 52                 |
| 0.212              | 47                 |
| 0.15               | 43                 |
| 0.063              | 36                 |

| Soil Fraction | Total Percentage |
|---------------|------------------|
| Cobbles       | 7                |
| Gravel        | 31               |
| Sand          | 26               |
| Silt/Clay     | 36               |

## Remarks:

See Summary of Soil Descriptions



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract No:  
PSL22/7311  
Client Ref:  
15-707

# PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

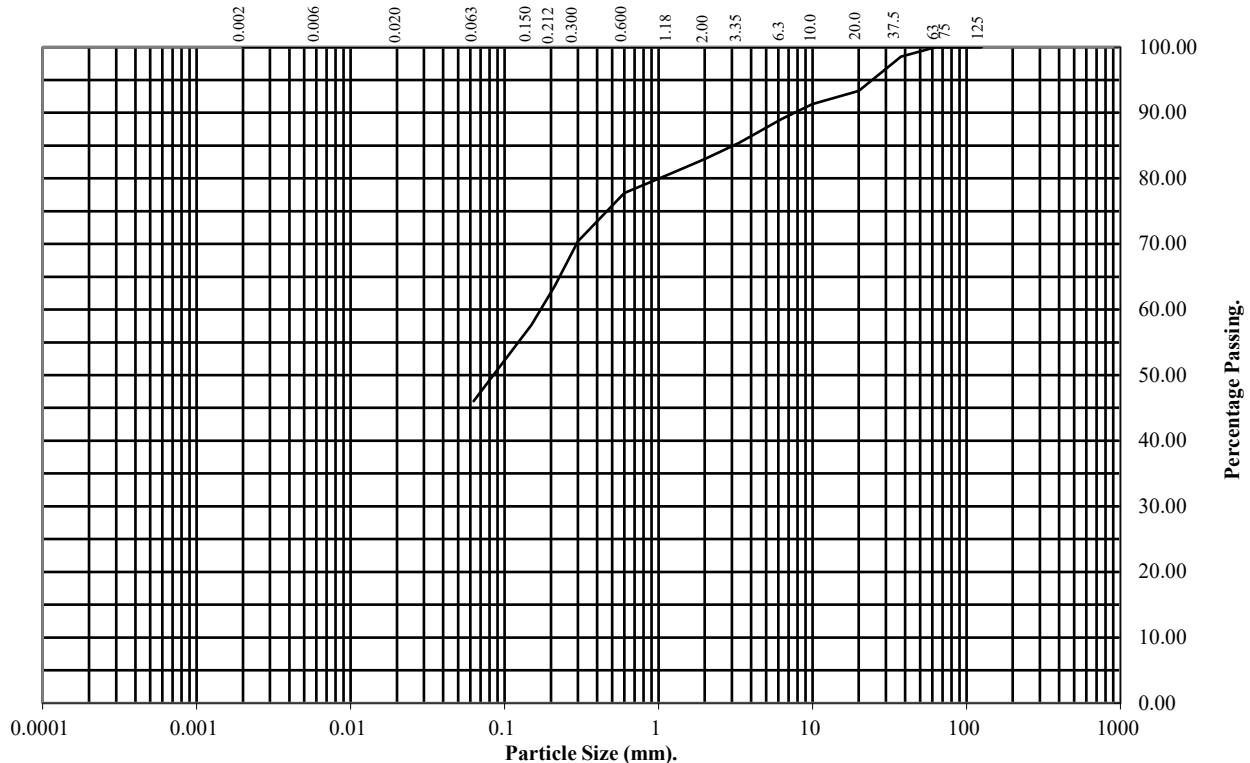
Hole Number: IMP-CLAY-103

Top Depth (m):

Sample Number:

Base Depth(m):

Sample Type: B



| BS Test Sieve (mm) | Percentage Passing |
|--------------------|--------------------|
| 125                | 100                |
| 75                 | 100                |
| 63                 | 100                |
| 37.5               | 99                 |
| 20                 | 93                 |
| 10                 | 91                 |
| 6.3                | 89                 |
| 3.35               | 85                 |
| 2                  | 83                 |
| 1.18               | 81                 |
| 0.6                | 78                 |
| 0.3                | 70                 |
| 0.212              | 64                 |
| 0.15               | 58                 |
| 0.063              | 46                 |

| Soil Fraction | Total Percentage |
|---------------|------------------|
| Cobbles       | 0                |
| Gravel        | 17               |
| Sand          | 37               |
| Silt/Clay     | 46               |

## Remarks:

See Summary of Soil Descriptions



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract No:  
PSL22/7311  
Client Ref:  
15-707

# DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.5 : 1990

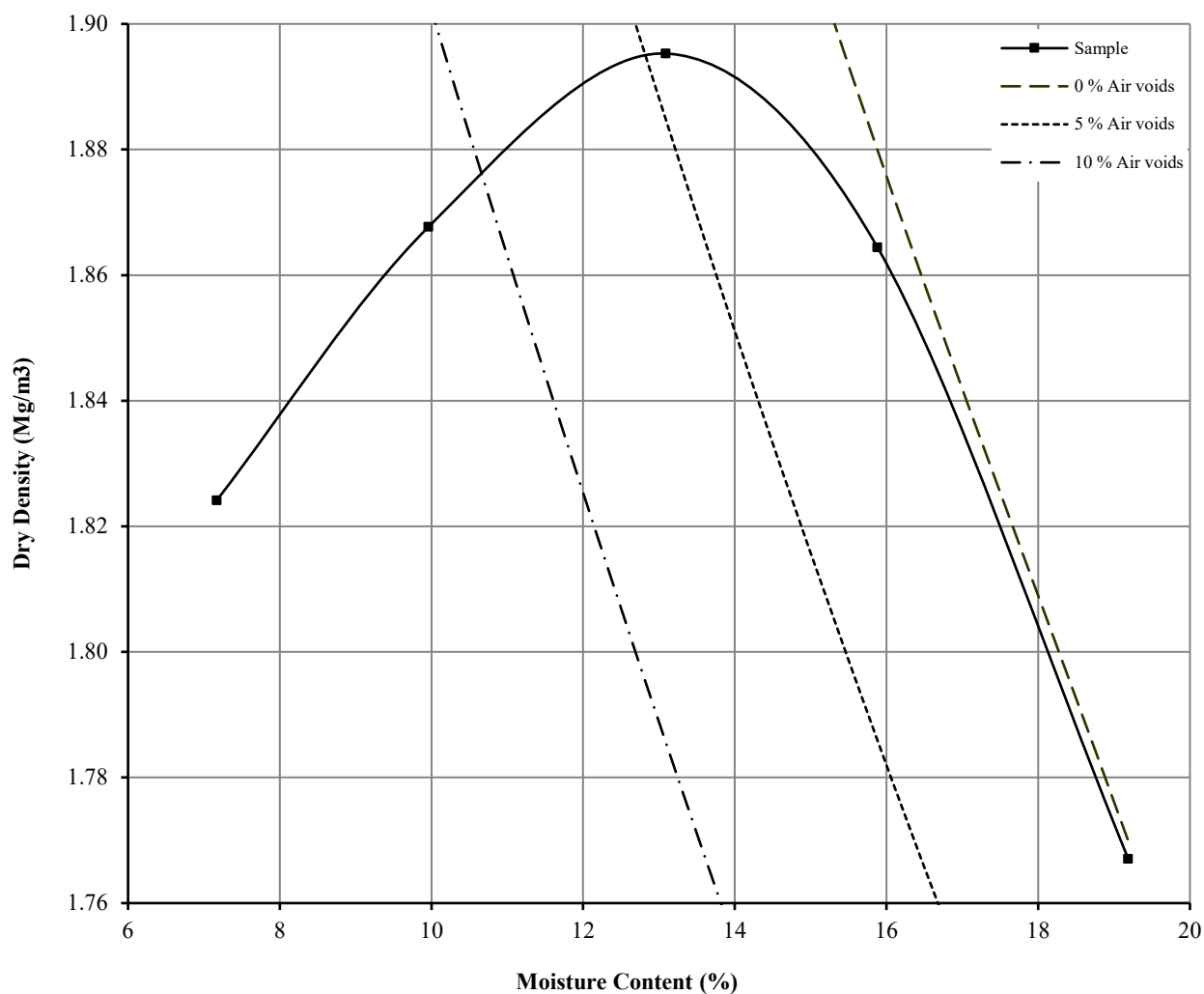
Hole Number: IMP-CLAY-101

Top Depth (m) :

Sample Number:

Base Depth (m) :

Sample Type: B



|                                          |      |                       |                                              |                  |
|------------------------------------------|------|-----------------------|----------------------------------------------|------------------|
| Initial Moisture Content:                | 16   | Method of Compaction: | 4.5kg                                        | Separate Samples |
| Particle Density (Mg/m3):                | 2.68 | Assumed               | Material Retained on 37.5 mm Test Sieve (%): | 0                |
| Maximum Dry Density (Mg/m3):             | 1.90 |                       | Material Retained on 20.0 mm Test Sieve (%): | 3                |
| Optimum Moisture Content (%):            | 13   |                       |                                              |                  |
| Remarks See summary of soil descriptions |      |                       |                                              |                  |



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract  
PSL22/7311  
Client Ref  
15-707

# DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.6 : 1990

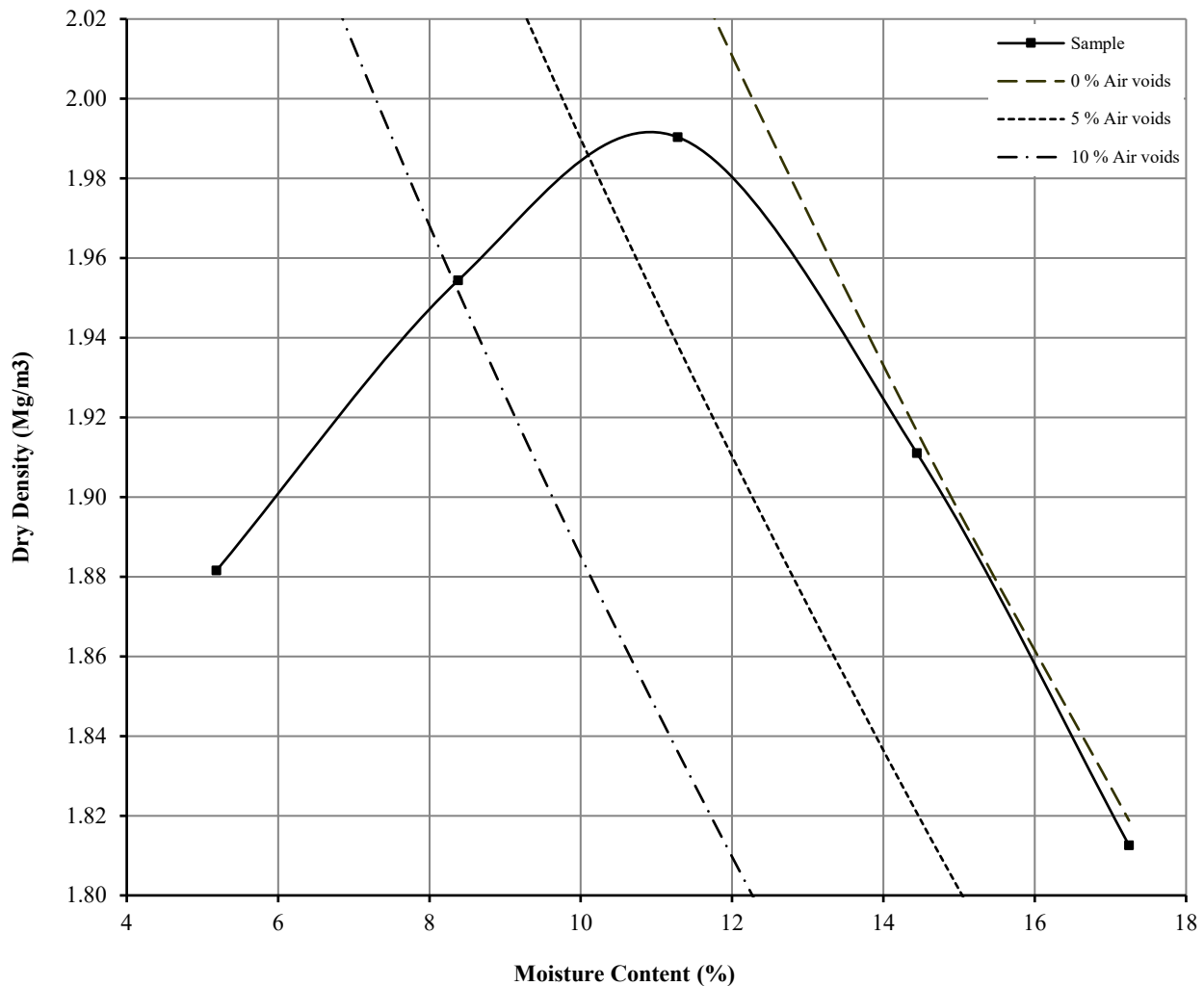
Hole Number: IMP-CLAY-102

Top Depth (m) :

Sample Number:

Base Depth (m) :

Sample Type: B



|                                           |      |                       |                                              |                  |
|-------------------------------------------|------|-----------------------|----------------------------------------------|------------------|
| Initial Moisture Content:                 | 17   | Method of Compaction: | 4.5kg                                        | Separate Samples |
| Particle Density (Mg/m <sup>3</sup> ):    | 2.65 | Assumed               | Material Retained on 37.5 mm Test Sieve (%): | 15               |
| Maximum Dry Density (Mg/m <sup>3</sup> ): | 1.99 |                       | Material Retained on 20.0 mm Test Sieve (%): | 2                |
| Optimum Moisture Content (%):             | 11   |                       |                                              |                  |
| Remarks See summary of soil descriptions  |      |                       |                                              |                  |



South Heywood Phase 1

|            |
|------------|
| Contract   |
| PSL22/7311 |
| Client Ref |
| 15-707     |

# DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.6 : 1990

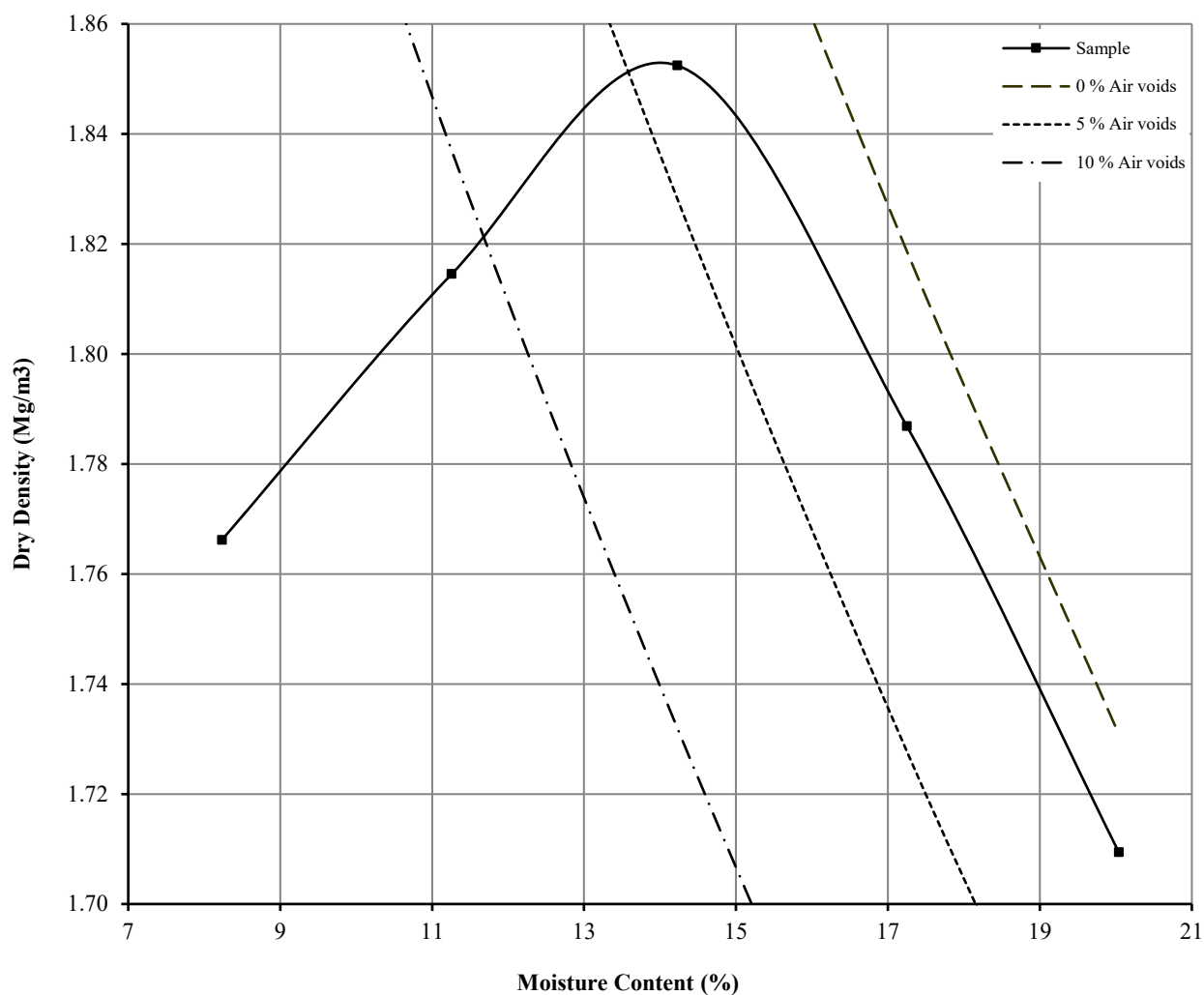
Hole Number: IMP-CLAY-103

Top Depth (m) :

Sample Number:

Base Depth (m) :

Sample Type: B



|                                          |      |                       |                                              |                  |
|------------------------------------------|------|-----------------------|----------------------------------------------|------------------|
| Initial Moisture Content:                | 17   | Method of Compaction: | 4.5kg                                        | Separate Samples |
| Particle Density (Mg/m3):                | 2.65 | Assumed               | Material Retained on 37.5 mm Test Sieve (%): | 1                |
| Maximum Dry Density (Mg/m3):             | 1.85 |                       | Material Retained on 20.0 mm Test Sieve (%): | 6                |
| Optimum Moisture Content (%):            | 14   |                       |                                              |                  |
| Remarks See summary of soil descriptions |      |                       |                                              |                  |



**PSL**  
Professional Soils Laboratory

South Heywood Phase 1

Contract  
PSL22/7311  
Client Ref  
15-707

# **APPENDIX V**

## **CBR TESTING**

### **CERTIFICATES**

## TEST REPORT

**Client** Chandos Civil Engineering Ltd

**Address** Oak Green Business Park  
Earl Road  
Cheadle Hulme  
Cheshire  
SK8 6QL

**Contract** New Gap Farm  
Manchester Road, Heywood OL10 2QA

**Job Number** MRN 4570/26

**Date of Issue** 03 March 2023

**Page** 1 of 11

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



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Email: [enquiries@murrayrix.com](mailto:enquiries@murrayrix.com) Website: [www.murrayrix.com](http://www.murrayrix.com)

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TEL 0161 475 0870



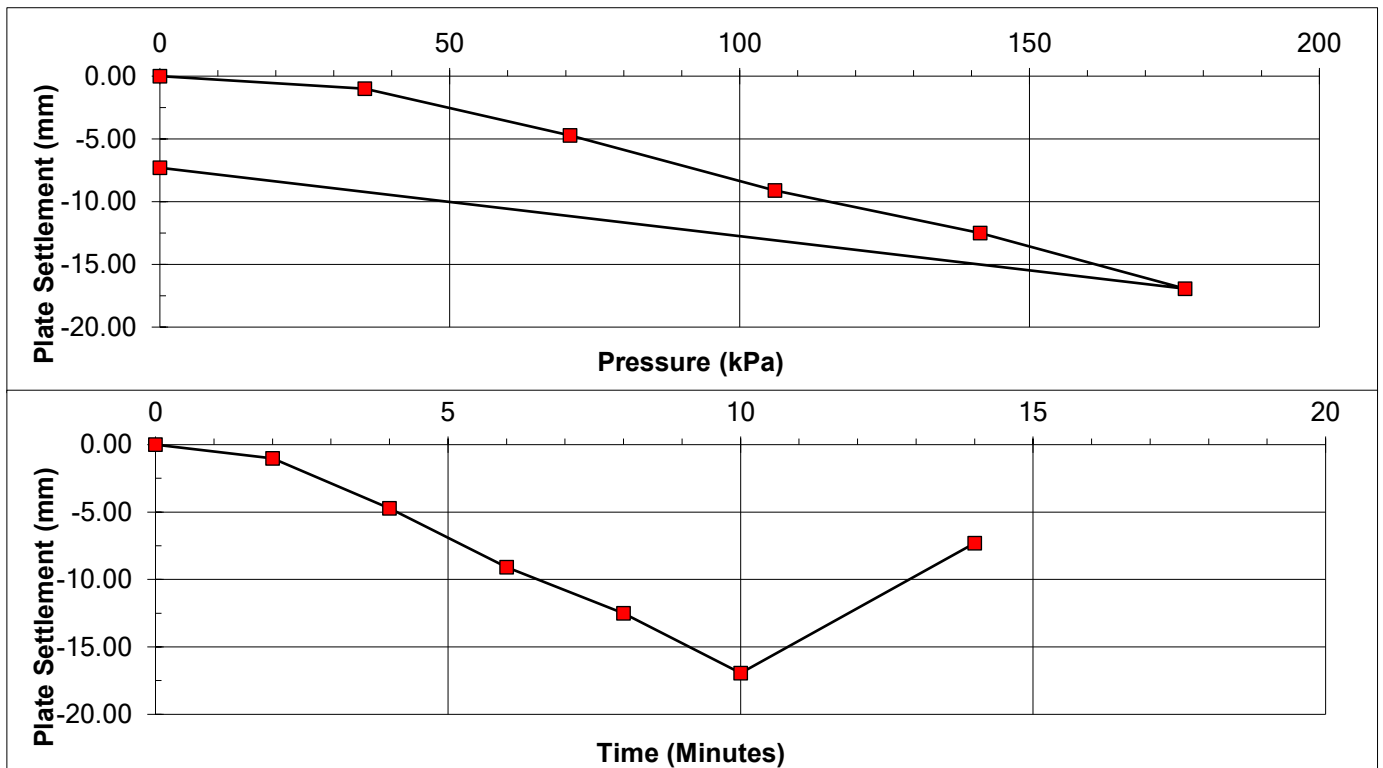
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 01 - Plot 89/90                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3314                     | 3672                     | 4938                     | 3975                   | 0.00                    | 0.00         | 0.0               |
| 3241                     | 3556                     | 4825                     | 3874                   | -1.01                   | 10.00        | 35.4              |
| 2877                     | 3165                     | 4468                     | 3503                   | -4.71                   | 20.00        | 70.7              |
| 2366                     | 2744                     | 4084                     | 3065                   | -9.10                   | 30.00        | 106.1             |
| 2103                     | 2339                     | 3732                     | 2725                   | -12.50                  | 40.00        | 141.5             |
| 1663                     | 1850                     | 3329                     | 2281                   | -16.94                  | 50.00        | 176.8             |
| 2552                     | 2955                     | 4223                     | 3243                   | -7.31                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 38 kPa   |
| Modulus of subgrade reaction (k) = | 30 MPa/m |
| Equivalent 762 mm plate reaction = | 24 MPa/m |
| Equivalent CBR =                   | 2.4 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



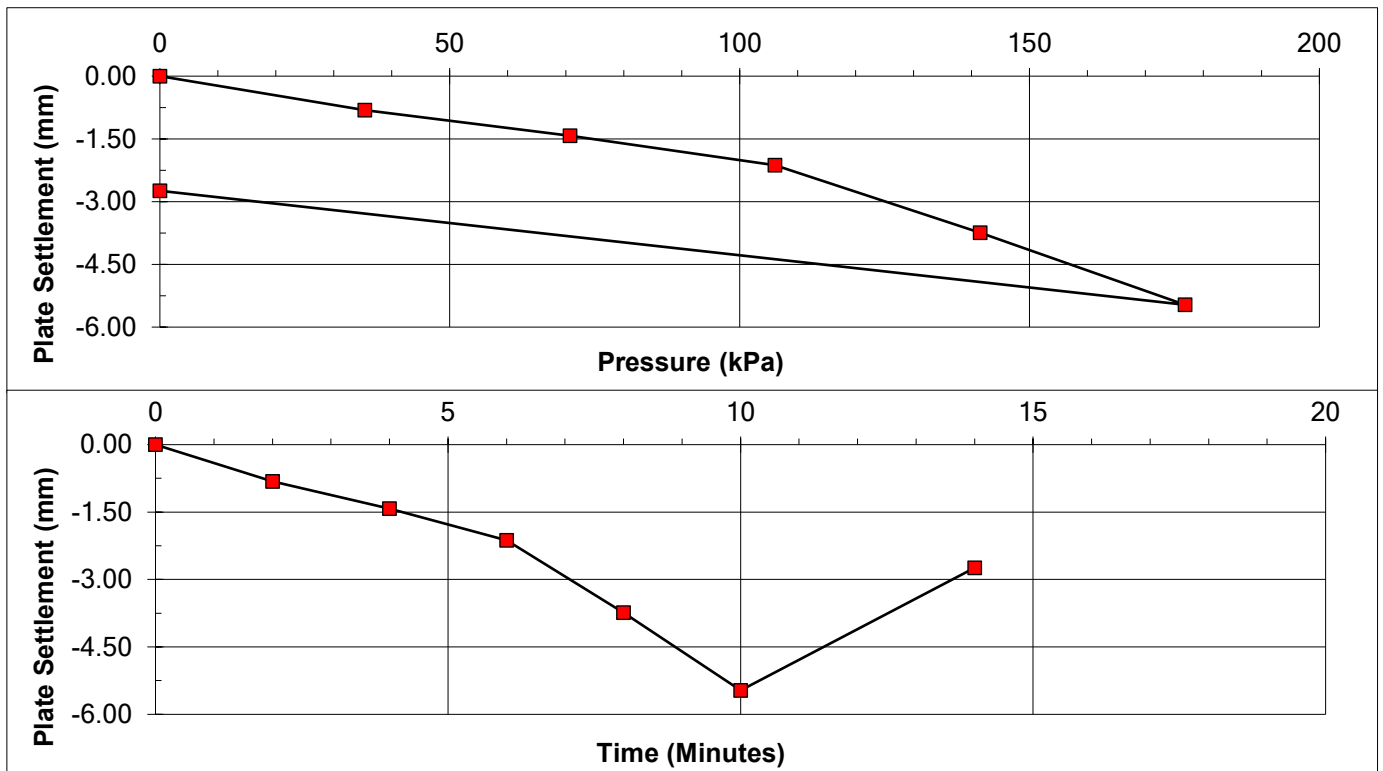
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 02 - Plot 87/88                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3347                     | 3689                     | 4636                     | 3891                   | 0.00                    | 0.00         | 0.0               |
| 3299                     | 3631                     | 4497                     | 3809                   | -0.82                   | 10.00        | 35.4              |
| 3196                     | 3530                     | 4519                     | 3748                   | -1.42                   | 20.00        | 70.7              |
| 3189                     | 3407                     | 4438                     | 3678                   | -2.13                   | 30.00        | 106.1             |
| 2951                     | 3258                     | 4341                     | 3517                   | -3.74                   | 40.00        | 141.5             |
| 2764                     | 3058                     | 4210                     | 3344                   | -5.47                   | 50.00        | 176.8             |
| 3029                     | 3396                     | 4424                     | 3616                   | -2.74                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 61 kPa   |
| Modulus of subgrade reaction (k) = | 49 MPa/m |
| Equivalent 762 mm plate reaction = | 39 MPa/m |
| Equivalent CBR =                   | 5.5 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



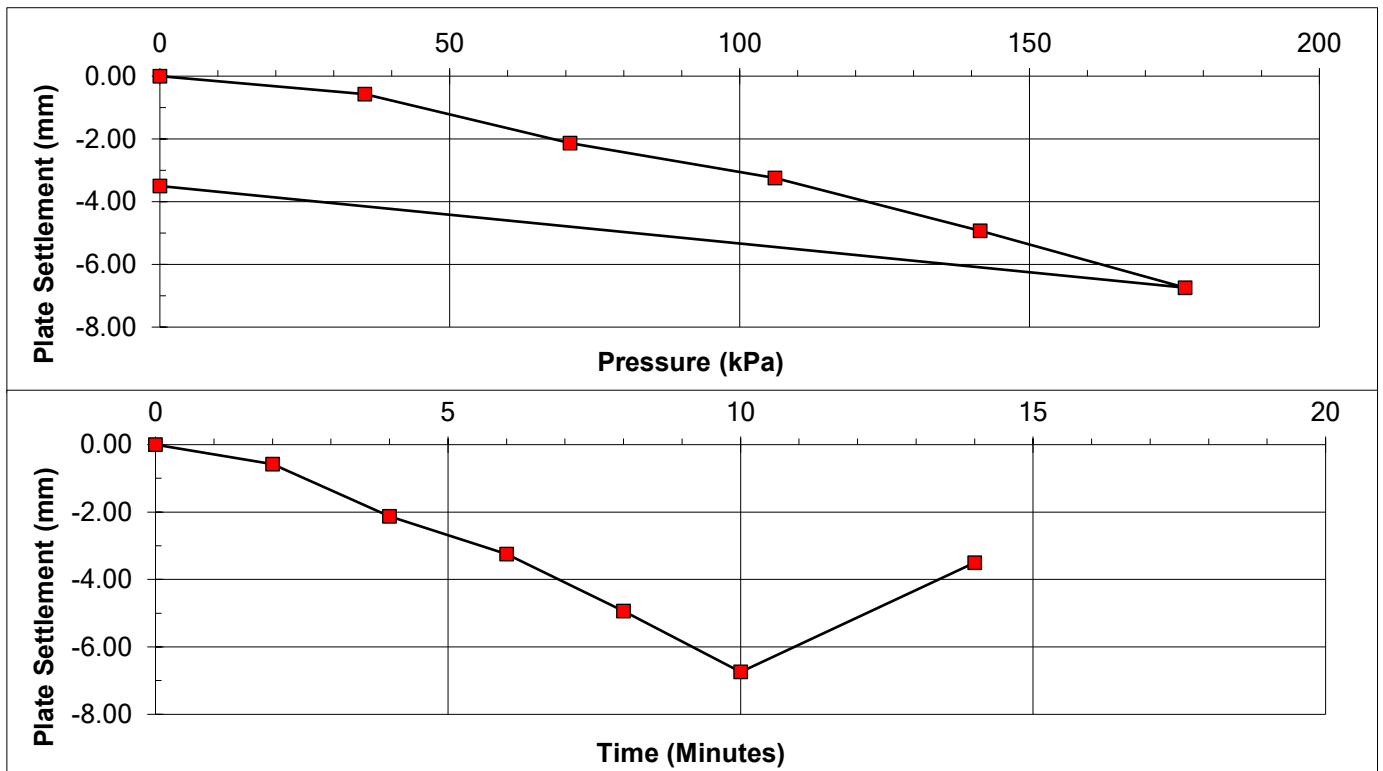
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 03 - Plot 84                               | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3371                     | 3671                     | 4705                     | 3916                   | 0.00                    | 0.00         | 0.0               |
| 3284                     | 3618                     | 4672                     | 3858                   | -0.58                   | 10.00        | 35.4              |
| 3120                     | 3491                     | 4497                     | 3703                   | -2.13                   | 20.00        | 70.7              |
| 2946                     | 3340                     | 4486                     | 3591                   | -3.25                   | 30.00        | 106.1             |
| 2758                     | 3159                     | 4350                     | 3422                   | -4.93                   | 40.00        | 141.5             |
| 2563                     | 2950                     | 4211                     | 3241                   | -6.74                   | 50.00        | 176.8             |
| 2934                     | 3310                     | 4453                     | 3566                   | -3.50                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 51 kPa   |
| Modulus of subgrade reaction (k) = | 41 MPa/m |
| Equivalent 762 mm plate reaction = | 33 MPa/m |
| Equivalent CBR =                   | 4.0 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



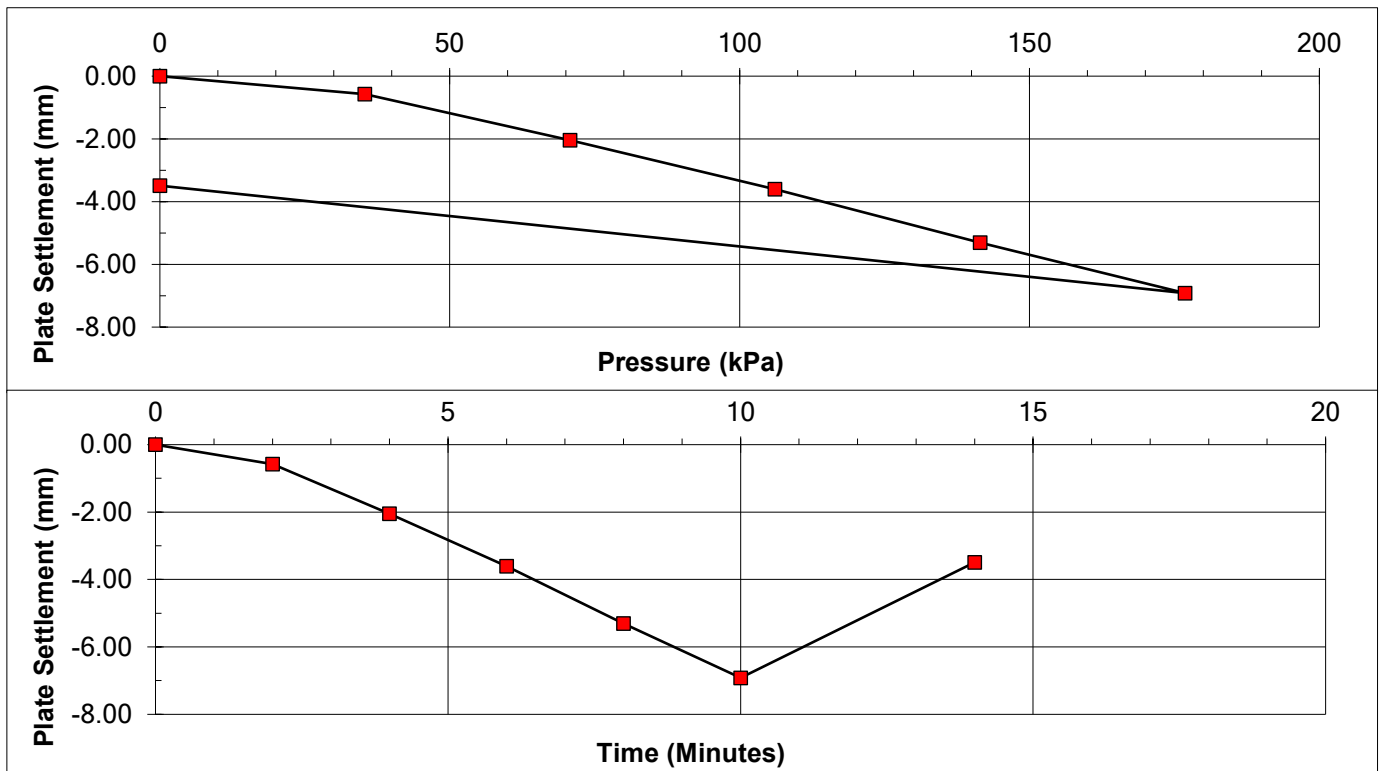
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 04 - Plot 81/82                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3294                     | 3439                     | 4496                     | 3743                   | 0.00                    | 0.00         | 0.0               |
| 3236                     | 3371                     | 4449                     | 3685                   | -0.58                   | 10.00        | 35.4              |
| 3054                     | 3224                     | 4337                     | 3538                   | -2.05                   | 20.00        | 70.7              |
| 2879                     | 3052                     | 4217                     | 3383                   | -3.60                   | 30.00        | 106.1             |
| 2688                     | 2864                     | 4084                     | 3212                   | -5.31                   | 40.00        | 141.5             |
| 2519                     | 2678                     | 3957                     | 3051                   | -6.92                   | 50.00        | 176.8             |
| 2882                     | 3016                     | 4283                     | 3394                   | -3.49                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 52 kPa   |
| Modulus of subgrade reaction (k) = | 41 MPa/m |
| Equivalent 762 mm plate reaction = | 33 MPa/m |
| Equivalent CBR =                   | 4.2 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



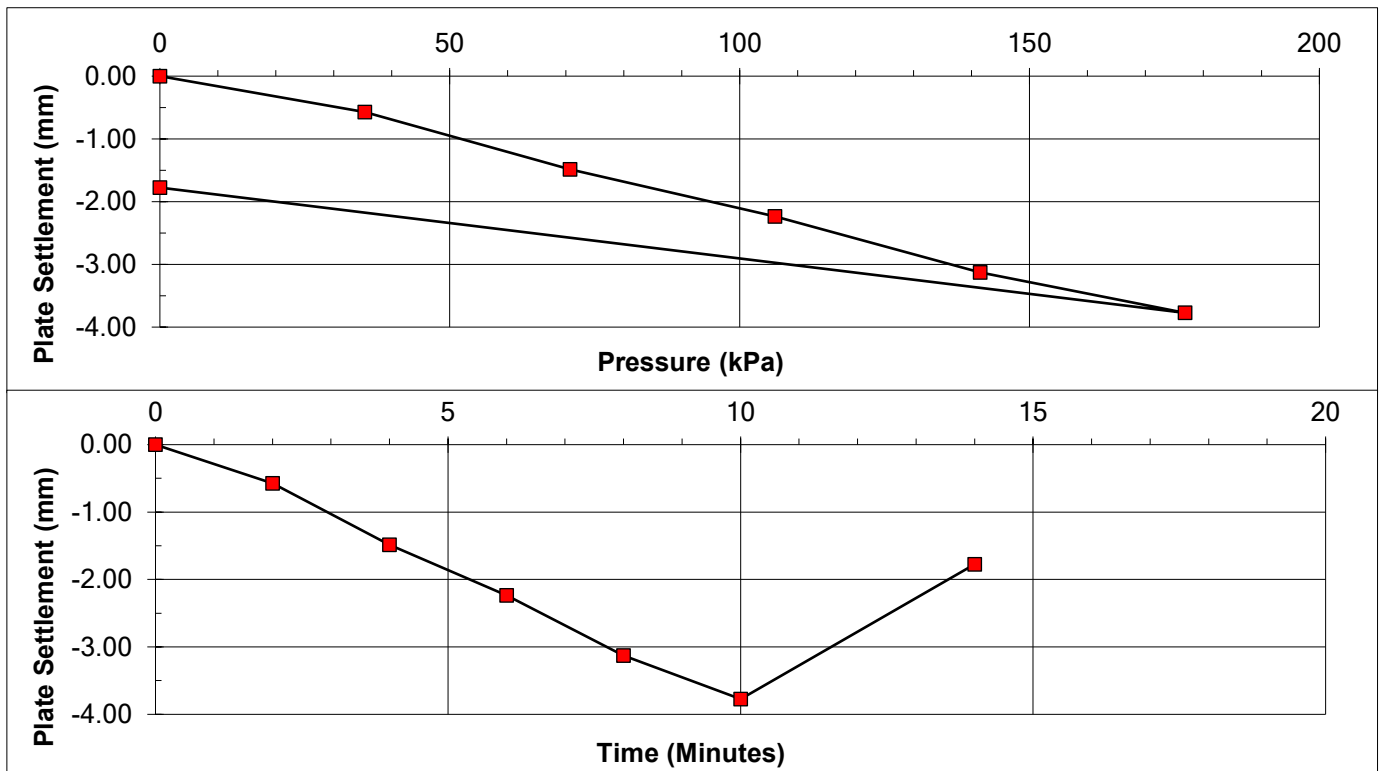
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 05 - Plot 77/78                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3487                     | 3883                     | 4569                     | 3980                   | 0.00                    | 0.00         | 0.0               |
| 3420                     | 3846                     | 4501                     | 3922                   | -0.57                   | 10.00        | 35.4              |
| 3352                     | 3729                     | 4412                     | 3831                   | -1.49                   | 20.00        | 70.7              |
| 3286                     | 3640                     | 4342                     | 3756                   | -2.24                   | 30.00        | 106.1             |
| 3201                     | 3538                     | 4262                     | 3667                   | -3.13                   | 40.00        | 141.5             |
| 3140                     | 3458                     | 4209                     | 3602                   | -3.77                   | 50.00        | 176.8             |
| 3316                     | 3722                     | 4368                     | 3802                   | -1.78                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 62 kPa   |
| Modulus of subgrade reaction (k) = | 49 MPa/m |
| Equivalent 762 mm plate reaction = | 40 MPa/m |
| Equivalent CBR =                   | 5.7 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



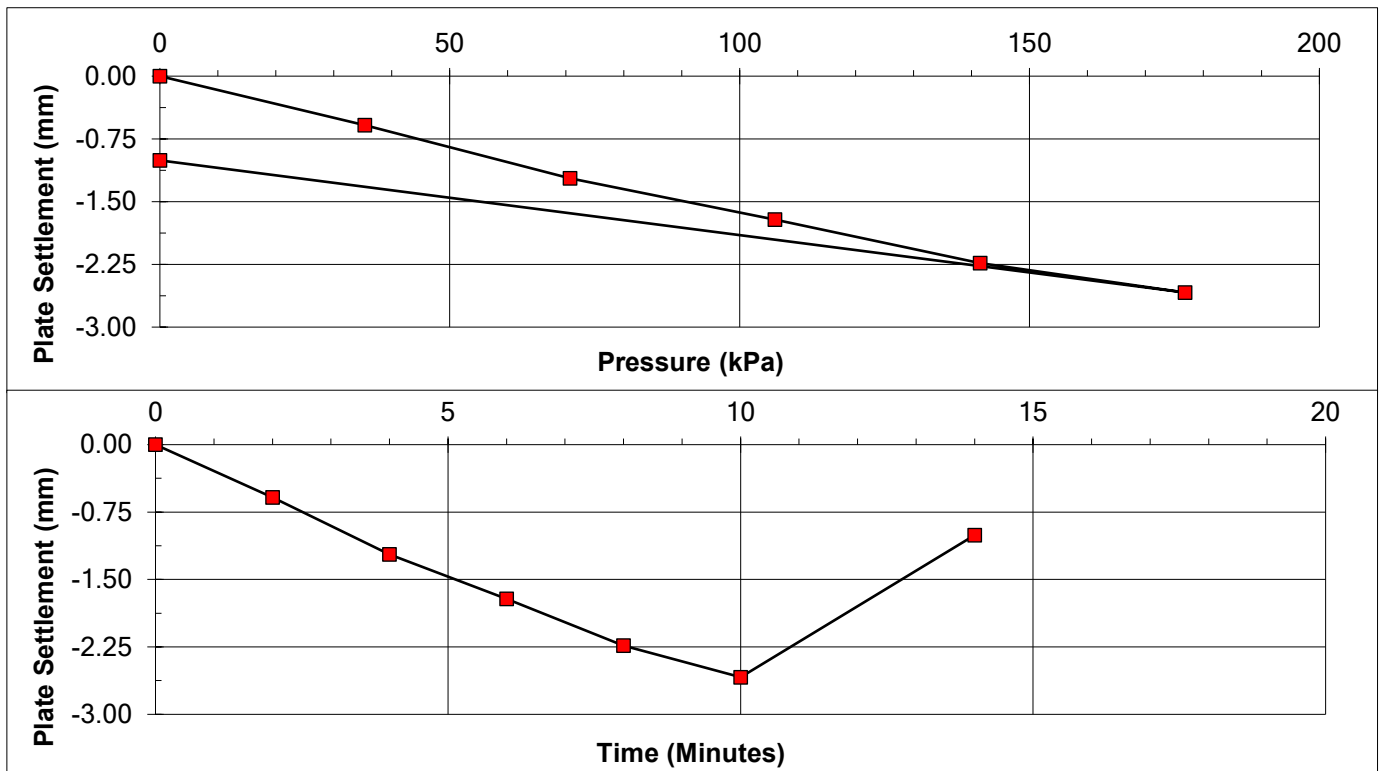
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 06 - Plot 73/74                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3386                     | 4096                     | 4969                     | 4150                   | 0.00                    | 0.00         | 0.0               |
| 3286                     | 4041                     | 4948                     | 4092                   | -0.59                   | 10.00        | 35.4              |
| 3194                     | 4000                     | 4891                     | 4028                   | -1.22                   | 20.00        | 70.7              |
| 3130                     | 3952                     | 4854                     | 3979                   | -1.72                   | 30.00        | 106.1             |
| 3080                     | 3926                     | 4774                     | 3927                   | -2.24                   | 40.00        | 141.5             |
| 3040                     | 3886                     | 4749                     | 3892                   | -2.59                   | 50.00        | 176.8             |
| 3254                     | 4023                     | 4872                     | 4050                   | -1.01                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 73 kPa   |
| Modulus of subgrade reaction (k) = | 58 MPa/m |
| Equivalent 762 mm plate reaction = | 47 MPa/m |
| Equivalent CBR =                   | 7.6 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



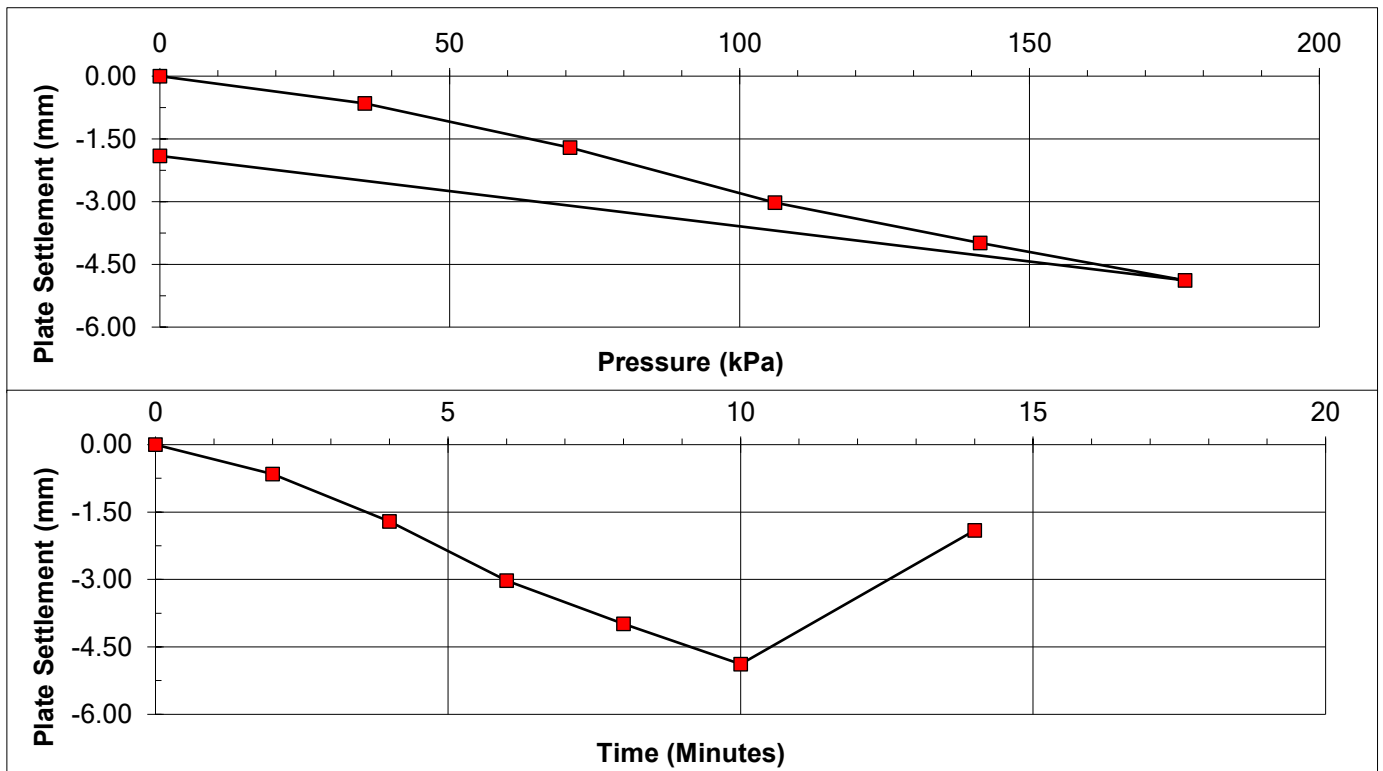
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 07 - Plot 70/71                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3371                     | 4094                     | 4752                     | 4072                   | 0.00                    | 0.00         | 0.0               |
| 3310                     | 4022                     | 4689                     | 4007                   | -0.65                   | 10.00        | 35.4              |
| 3152                     | 3912                     | 4641                     | 3902                   | -1.71                   | 20.00        | 70.7              |
| 2912                     | 3810                     | 4588                     | 3770                   | -3.02                   | 30.00        | 106.1             |
| 2881                     | 3602                     | 4538                     | 3674                   | -3.99                   | 40.00        | 141.5             |
| 2764                     | 3499                     | 4489                     | 3584                   | -4.88                   | 50.00        | 176.8             |
| 3086                     | 3907                     | 4651                     | 3881                   | -1.91                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 55 kPa   |
| Modulus of subgrade reaction (k) = | 44 MPa/m |
| Equivalent 762 mm plate reaction = | 36 MPa/m |
| Equivalent CBR =                   | 4.7 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



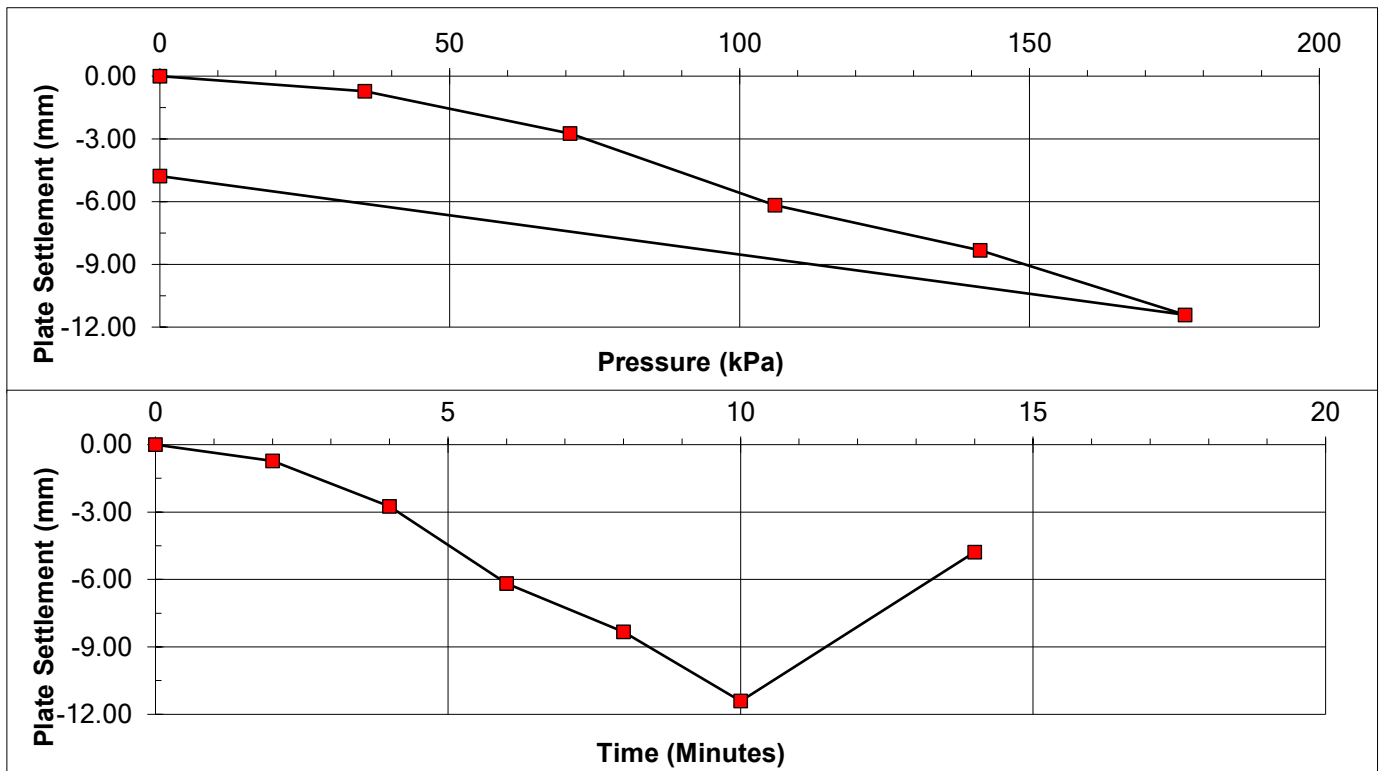
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 08 - Plot 34                               | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3286                     | 3919                     | 4236                     | 3814                   | 0.00                    | 0.00         | 0.0               |
| 3194                     | 3858                     | 4172                     | 3741                   | -0.72                   | 10.00        | 35.4              |
| 2982                     | 3618                     | 4018                     | 3539                   | -2.74                   | 20.00        | 70.7              |
| 2504                     | 3286                     | 3799                     | 3196                   | -6.17                   | 30.00        | 106.1             |
| 2254                     | 3051                     | 3635                     | 2980                   | -8.34                   | 40.00        | 141.5             |
| 1930                     | 2654                     | 3433                     | 2672                   | -11.41                  | 50.00        | 176.8             |
| 2518                     | 3477                     | 4011                     | 3335                   | -4.78                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 45 kPa   |
| Modulus of subgrade reaction (k) = | 36 MPa/m |
| Equivalent 762 mm plate reaction = | 29 MPa/m |
| Equivalent CBR =                   | 3.2 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



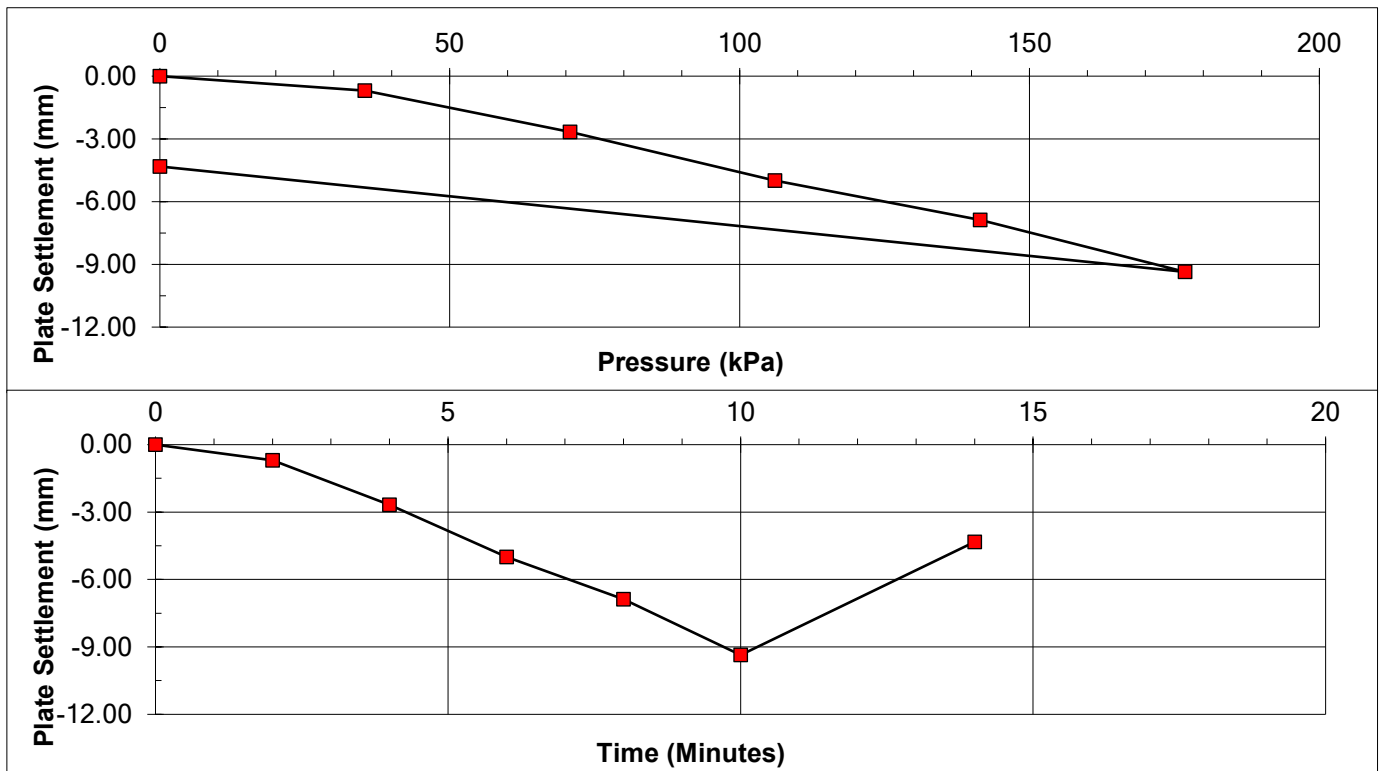
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 09 - Plot 31/32                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3272                     | 4032                     | 4629                     | 3978                   | 0.00                    | 0.00         | 0.0               |
| 3194                     | 3962                     | 4569                     | 3908                   | -0.69                   | 10.00        | 35.4              |
| 2964                     | 3704                     | 4464                     | 3711                   | -2.67                   | 20.00        | 70.7              |
| 2617                     | 3502                     | 4315                     | 3478                   | -5.00                   | 30.00        | 106.1             |
| 2431                     | 3375                     | 4063                     | 3290                   | -6.88                   | 40.00        | 141.5             |
| 2189                     | 2989                     | 3947                     | 3042                   | -9.36                   | 50.00        | 176.8             |
| 2698                     | 3631                     | 4307                     | 3545                   | -4.32                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 45 kPa   |
| Modulus of subgrade reaction (k) = | 36 MPa/m |
| Equivalent 762 mm plate reaction = | 29 MPa/m |
| Equivalent CBR =                   | 3.3 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# MURRAY RIX

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



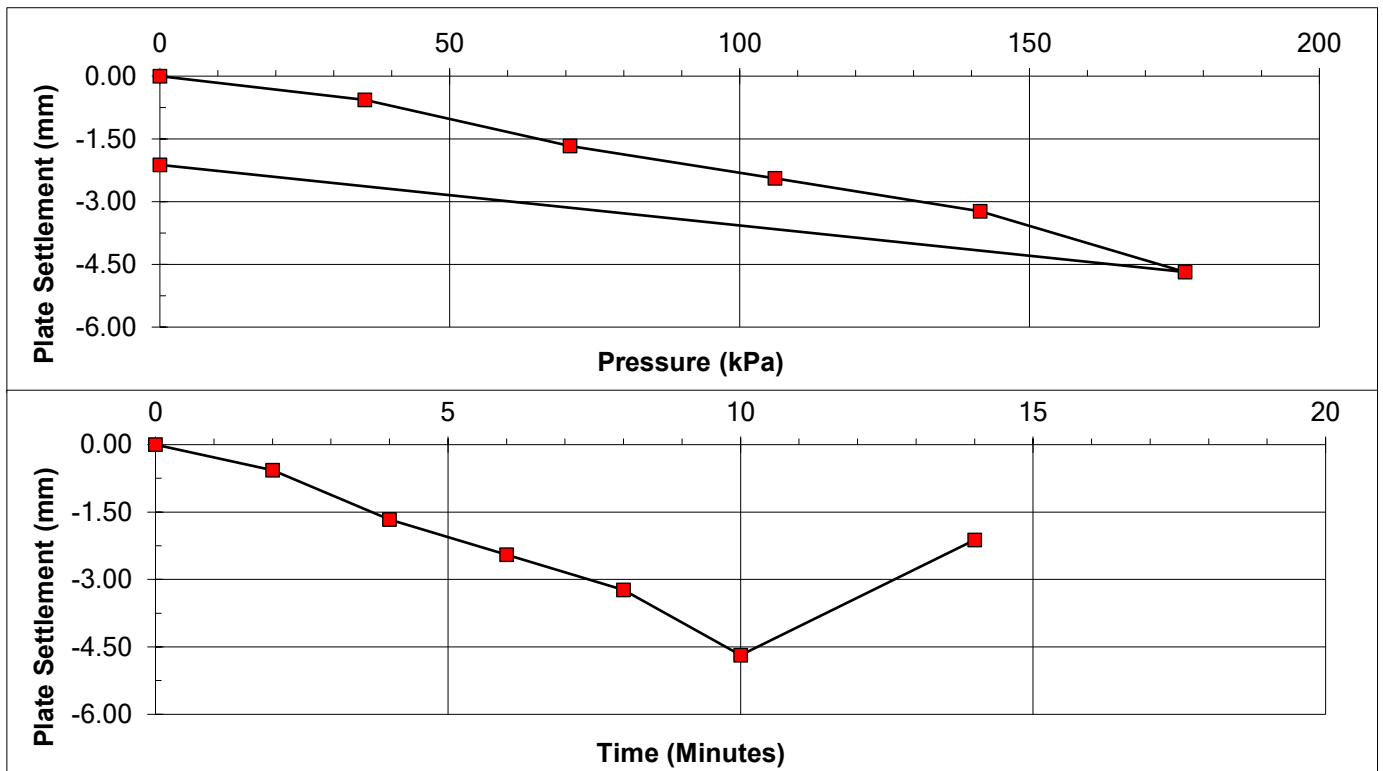
## TEST CERTIFICATE

### PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

|                     |                                                 |                    |                       |
|---------------------|-------------------------------------------------|--------------------|-----------------------|
| CLIENT              | Chandos Civil Engineering Ltd                   |                    |                       |
| SITE                | New Gap Farm, Manchester Road, Heywood OL10 2QA |                    |                       |
| JOB NUMBER          | MRN 4570/26                                     |                    |                       |
| TEST LOCATION       | Test 10 - Plot 24/25                            | LOADING DEVICE     | 10 Tonne Enerpac Jack |
| TEST DATE           | 02-Mar-23                                       | PLATE SIZE (mm)    | 600 diameter          |
| TEST DEPTH          | Surface                                         | REACTION LOAD USED | Site Plant            |
| MATERIAL UNDER TEST | Crush                                           | MOISTURE CONTENT   | Not Required          |

| Dial Gauge 1<br>(mmx100) | Dial Gauge 2<br>(mmx100) | Dial Gauge 3<br>(mmx100) | Mean Gauge<br>(mmx100) | Mean Deflection<br>(mm) | Load<br>(kN) | Pressure<br>(kPa) |
|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------|-------------------|
| 3496                     | 4142                     | 4864                     | 4167                   | 0.00                    | 0.00         | 0.0               |
| 3447                     | 4085                     | 4799                     | 4110                   | -0.57                   | 10.00        | 35.4              |
| 3314                     | 3976                     | 4712                     | 4001                   | -1.67                   | 20.00        | 70.7              |
| 3230                     | 3889                     | 4649                     | 3923                   | -2.45                   | 30.00        | 106.1             |
| 3094                     | 3878                     | 4560                     | 3844                   | -3.23                   | 40.00        | 141.5             |
| 2916                     | 3731                     | 4450                     | 3699                   | -4.68                   | 50.00        | 176.8             |
| 3226                     | 3986                     | 4653                     | 3955                   | -2.12                   | 0.00         | 0.0               |



|                                    |          |
|------------------------------------|----------|
| Pressure at 1.25 mm deflexion =    | 57 kPa   |
| Modulus of subgrade reaction (k) = | 46 MPa/m |
| Equivalent 762 mm plate reaction = | 37 MPa/m |
| Equivalent CBR =                   | 5.0 %    |

#### REMARKS

SIGNED

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

DATE 03-Mar-23

# **APPENDIX VI**

## **SRD TESTING RESULTS**

## TEST REPORT

**Client** e3p

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

**Contract** Manchester Road, Heywood

**Job Number** MRN 4588/12  
**Date of Issue** 13 February 2023  
**Page** 1 of 2

Approved Signatories

S J Hutchings, O P Davies

### Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870  
Email: [enquiries@murrayrix.com](mailto:enquiries@murrayrix.com) Website: [www.murrayrix.com](http://www.murrayrix.com)

Also at: London: 020 8523 1999

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

# MURRAY RIX

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



## TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD

BS 1377 : Part 9 : Clause 2.2

MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

|            |                          |
|------------|--------------------------|
| CLIENT     | e3p                      |
| SITE       | Manchester Road, Heywood |
| JOB NUMBER | MRN 4588/12              |

|              |                        |                 |            |
|--------------|------------------------|-----------------|------------|
| TEST METHOD  | Large Pouring Cylinder | DATE RECEIVED   | 10-Feb-23  |
| DATE OF TEST | 10-Feb-23              | SAMPLED BY      | Murray Rix |
| DATE TESTED  | 11-Feb-23              | MATERIAL SOURCE | Site Won   |

| Laboratory Sample Number                 | Test Location | Material  | Bulk Density (Mg/m <sup>3</sup> ) | Dry Density (Mg/m <sup>3</sup> ) | Moisture Content (%) | Compaction (%) | Air Voids (%) |
|------------------------------------------|---------------|-----------|-----------------------------------|----------------------------------|----------------------|----------------|---------------|
| 121309                                   | Plot 89/90    | Clay/Fill | 2.14                              | 1.83                             | 17                   | N/A            | N/A           |
| 121310                                   | Plot 124/125  | Clay/Fill | 2.11                              | 1.80                             | 17                   | N/A            | N/A           |
| 121311                                   | Plot 126      | Clay/Fill | 2.21                              | 1.89                             | 17                   | N/A            | N/A           |
| 121312                                   | Plot 128      | Clay/Fill | 2.07                              | 1.82                             | 14                   | N/A            | N/A           |
|                                          |               |           |                                   |                                  |                      |                |               |
|                                          |               |           |                                   |                                  |                      |                |               |
|                                          |               |           |                                   |                                  |                      |                |               |
|                                          |               |           |                                   |                                  |                      |                |               |
|                                          |               |           |                                   |                                  |                      |                |               |
| Maximum Dry Density (Mg/m <sup>3</sup> ) |               |           |                                   | N/A                              |                      | (Not Advised)  |               |
| Particle Density (Mg/m <sup>3</sup> )    |               |           |                                   | N/A                              |                      | (Not Advised)  |               |

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons)  
(Laboratory Manager)

SIGNED

DATE 13-Feb-23

# **APPENDIX VII CHEMICAL TESTING RESULTS**

**Jonny Beer**  
e3p  
Taylor Road  
Urmston  
Manchester  
M41 7JQ

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

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

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

## **Analytical Report Number : 22-96466**

|                             |                |                                                        |            |
|-----------------------------|----------------|--------------------------------------------------------|------------|
| <b>Project / Site name:</b> | South Heywood  | <b>Samples received on:</b>                            | 01/11/2022 |
| <b>Your job number:</b>     | 15-707         | <b>Samples instructed on/<br/>Analysis started on:</b> | 14/11/2022 |
| <b>Your order number:</b>   |                | <b>Analysis completed by:</b>                          | 22/11/2022 |
| <b>Report Issue Number:</b> | 1              | <b>Report issued on:</b>                               | 22/11/2022 |
| <b>Samples Analysed:</b>    | 5 soil samples |                                                        |            |

**Signed:**

*Izabela Wójcik*  
Izabela Wójcik  
Reporting 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.

Analytical Report Number: 22-96466  
Project / Site name: South Heywood

| Lab Sample Number                       |       |                    |                         | 2498393       | 2498394       | 2498395       | 2498396       | 2498397       |
|-----------------------------------------|-------|--------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Sample Reference                        |       |                    |                         | IMP-CLAY-101  | IMP-CLAY-102  | IMP-CLAY-103  | IMP-CLAY-104  | IMP-CLAY-105  |
| Sample Number                           |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Date Sampled                            |       |                    |                         | 01/11/2022    | 01/11/2022    | 01/11/2022    | 01/11/2022    | 01/11/2022    |
| Time Taken                              |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>Status |               |               |               |               |               |
| Stone Content                           | %     | 0.1                | NONE                    | < 0.1         | < 0.1         | < 0.1         | < 0.1         | < 0.1         |
| Moisture Content                        | %     | 0.01               | NONE                    | 13            | 13            | 13            | 13            | 15            |
| Total mass of sample received           | kg    | 0.001              | NONE                    | 0.3           | 0.3           | 0.3           | 0.3           | 0.3           |

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

#### General Inorganics

|                                                                  |          |         |        |       |       |       |       |       |
|------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|-------|-------|
| pH - Automated                                                   | pH Units | N/A     | MCERTS | 6.7   | 7.7   | 8.4   | 7.8   | 8.9   |
| Total Cyanide                                                    | mg/kg    | 1       | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphate as SO <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 460   | 270   | 1400  | 760   | 910   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.18  | 0.073 | 0.42  | 0.24  | 0.16  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 360   | 150   | 840   | 480   | 320   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/l     | 1.25    | MCERTS | 179   | 73.1  | 420   | 241   | 162   |
| Sulphide                                                         | mg/kg    | 1       | NONE   | 5.8   | 2.4   | 13    | 8     | 9.7   |
| Total Sulphur                                                    | mg/kg    | 50      | MCERTS | 390   | 260   | 760   | 450   | 530   |
| Total Organic Carbon (TOC) - Automated                           | %        | 0.1     | MCERTS | 0.8   | 0.7   | 0.9   | 0.7   | 0.9   |

#### Total Phenols

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

#### Speciated PAHs

|                        |       |      |      |        |        |        |        |        |
|------------------------|-------|------|------|--------|--------|--------|--------|--------|
| Naphthalene            | mg/kg | 0.05 | NONE | 0.27   | 0.3    | 0.18   | 0.23   | 0.14   |
| Acenaphthylene         | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene           | mg/kg | 0.05 | NONE | < 0.05 | 0.08   | 0.08   | 0.13   | 0.14   |
| Fluorene               | mg/kg | 0.05 | NONE | < 0.05 | 0.1    | 0.07   | 0.11   | 0.14   |
| Phenanthrene           | mg/kg | 0.05 | NONE | 0.31   | 0.43   | 0.63   | 0.77   | 0.81   |
| Anthracene             | mg/kg | 0.05 | NONE | 0.05   | 0.09   | 0.2    | 0.18   | 0.25   |
| Fluoranthene           | mg/kg | 0.05 | NONE | 0.37   | 0.49   | 1.1    | 1.1    | 1.4    |
| Pyrene                 | mg/kg | 0.05 | NONE | 0.35   | 0.43   | 1.2    | 1.1    | 1.2    |
| Benzo(a)anthracene     | mg/kg | 0.05 | NONE | 0.17   | 0.27   | 0.67   | 0.6    | 0.71   |
| Chrysene               | mg/kg | 0.05 | NONE | 0.18   | 0.22   | 0.6    | 0.54   | 0.64   |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | NONE | 0.19   | 0.25   | 0.66   | 0.56   | 0.63   |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | NONE | 0.06   | 0.09   | 0.35   | 0.32   | 0.33   |
| Benzo(a)pyrene         | mg/kg | 0.05 | NONE | 0.13   | 0.17   | 0.72   | 0.49   | 0.64   |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | 0.57   | 0.29   | 0.35   |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | < 0.05 | < 0.05 | 0.06   |
| Benzo(ghi)perylene     | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | 0.77   | 0.34   | 0.46   |

#### Total PAH

|                             |       |     |      |      |      |      |      |      |
|-----------------------------|-------|-----|------|------|------|------|------|------|
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | NONE | 2.08 | 2.92 | 7.77 | 6.77 | 7.88 |
|-----------------------------|-------|-----|------|------|------|------|------|------|

Analytical Report Number: 22-96466  
Project / Site name: South Heywood

| Lab Sample Number                       |  |  |  | 2498393       | 2498394            | 2498395              | 2498396       | 2498397       |
|-----------------------------------------|--|--|--|---------------|--------------------|----------------------|---------------|---------------|
| Sample Reference                        |  |  |  | IMP-CLAY-101  | IMP-CLAY-102       | IMP-CLAY-103         | IMP-CLAY-104  | IMP-CLAY-105  |
| Sample Number                           |  |  |  | None Supplied | None Supplied      | None Supplied        | None Supplied | None Supplied |
| Depth (m)                               |  |  |  | None Supplied | None Supplied      | None Supplied        | None Supplied | None Supplied |
| Date Sampled                            |  |  |  | 01/11/2022    | 01/11/2022         | 01/11/2022           | 01/11/2022    | 01/11/2022    |
| Time Taken                              |  |  |  | None Supplied | None Supplied      | None Supplied        | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) |  |  |  | Units         | Limit of detection | Accreditation Status |               |               |

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |       |       |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 7.7   | 7.2   | 7.3   | 5.2   | 7.7   |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | 0.3   | 0.3   | < 0.2 |
| Chromium (hexavalent)             | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 19    | 19    | 17    | 19    | 18    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 25    | 24    | 25    | 27    | 26    |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 21    | 22    | 40    | 31    | 39    |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 20    | 20    | 19    | 22    | 21    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 51    | 51    | 65    | 62    | 59    |

#### Petroleum Hydrocarbons

|                                      |       |     |      |       |       |       |       |       |
|--------------------------------------|-------|-----|------|-------|-------|-------|-------|-------|
| TPH (C5 - C6) HS_ID_TOTAL            | mg/kg | 1   | NONE | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH (C6 - C8) HS_ID_TOTAL            | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10) HS_ID_TOTAL           | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12) EH_CU_ID_TOTAL       | mg/kg | 2   | NONE | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16) EH_CU_ID_TOTAL       | mg/kg | 4   | NONE | < 4.0 | < 4.0 | < 4.0 | < 4.0 | < 4.0 |
| TPH (C16 - C21) EH_CU_ID_TOTAL       | mg/kg | 1   | NONE | < 1.0 | < 1.0 | 16    | < 1.0 | 11    |
| TPH (C21 - C35) EH_CU_ID_TOTAL       | mg/kg | 1   | NONE | < 1.0 | < 1.0 | 160   | < 1.0 | 51    |
| TPH (C35 - C40) EH_CU_ID_TOTAL       | mg/kg | 10  | NONE | < 10  | < 10  | 68    | < 10  | 19    |
| TPH Total C5 - C40 EH_CU+HS_ID_TOTAL | mg/kg | 10  | NONE | < 10  | < 10  | 250   | < 10  | 80    |

U/S = Unsuitable Sample I/S = Insufficient Sample

**Analytical Report Number : 22-96466**

**Project / Site name: South Heywood**

\* 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 2498393           | IMP-CLAY-101     | None Supplied | None Supplied | Brown loam and clay with gravel and vegetation. |
| 2498394           | IMP-CLAY-102     | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498395           | IMP-CLAY-103     | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498396           | IMP-CLAY-104     | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498397           | IMP-CLAY-105     | None Supplied | None Supplied | Brown loam and clay with gravel.                |

**Analytical Report Number : 22-96466**

**Project / Site name: South Heywood**

**Water matrix abbreviations:**

**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name                               | Analytical Method Description                                                                                                                                          | Analytical Method Reference                                                                                     | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| 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               |
| Asbestos identification in soil                    | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.                                                 | In house method based on HSG 248                                                                                | A001-PL       | D                  | ISO 17025            |
| Moisture Content                                   | Moisture content, determined gravimetrically. (30 oC)                                                                                                                  | In house method.                                                                                                | L019-UK/PL    | W                  | NONE                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| 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                  | NONE                 |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | NONE                 |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| 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                 |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total 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.                                                                                                | L009-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | NONE                 |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.                                      | In-house method                                                                                                 | L080-PL       | W                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (1hr extraction)  | Sulphate, water soluble, in soil (1hr extraction)                                                                                                                      | In-house method                                                                                                 | L038-PL       | D                  | MCERTS               |

Analytical Report Number : 22-96466  
Project / Site name: South Heywood

**Water matrix abbreviations:**

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' 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

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

## Information in Support of Analytical Results

### List of HWOL Acronyms and Operators

| Acronym | Descriptions                                                           |
|---------|------------------------------------------------------------------------|
| HS      | Headspace Analysis                                                     |
| MS      | Mass spectrometry                                                      |
| FID     | Flame Ionisation Detector                                              |
| GC      | Gas Chromatography                                                     |
| EH      | Extractable Hydrocarbons (i.e. everything extracted by the solvent(s)) |
| CU      | Clean-up - e.g. by Florisil®, silica gel                               |
| 1D      | GC - Single coil/column gas chromatography                             |
| 2D      | GC-GC - Double coil/column gas chromatography                          |
| Total   | Aliphatics & Aromatics                                                 |
| AL      | Aliphatics                                                             |
| AR      | Aromatics                                                              |
| #1      | EH_2D_Total but with humics mathematically subtracted                  |
| #2      | EH_2D_Total but with fatty acids mathematically subtracted             |
| -       | Operator - understore to separate acronyms (exception for +)           |
| +       | Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total     |

## Sample Deviation Report



**Analytical Report Number : 22-96466**

**Project / Site name: South Heywood**

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

| Sample ID    | Other ID      | Sample Type | Lab Sample Number | Sample Deviation | Test Name             | Test Ref | Test Deviation |
|--------------|---------------|-------------|-------------------|------------------|-----------------------|----------|----------------|
| IMP-CLAY-101 | None Supplied | S           | 2498393           | c                | Sulphide in soil      | L010-PL  | c              |
| IMP-CLAY-101 | None Supplied | S           | 2498393           | c                | Total cyanide in soil | L080-PL  | c              |
| IMP-CLAY-102 | None Supplied | S           | 2498394           | c                | Sulphide in soil      | L010-PL  | c              |
| IMP-CLAY-102 | None Supplied | S           | 2498394           | c                | Total cyanide in soil | L080-PL  | c              |
| IMP-CLAY-103 | None Supplied | S           | 2498395           | c                | Sulphide in soil      | L010-PL  | c              |
| IMP-CLAY-103 | None Supplied | S           | 2498395           | c                | Total cyanide in soil | L080-PL  | c              |
| IMP-CLAY-104 | None Supplied | S           | 2498396           | c                | Sulphide in soil      | L010-PL  | c              |
| IMP-CLAY-104 | None Supplied | S           | 2498396           | c                | Total cyanide in soil | L080-PL  | c              |
| IMP-CLAY-105 | None Supplied | S           | 2498397           | c                | Sulphide in soil      | L010-PL  | c              |
| IMP-CLAY-105 | None Supplied | S           | 2498397           | c                | Total cyanide in soil | L080-PL  | c              |

**Jonny Beer**  
e3p  
Taylor Road  
Urmston  
Manchester  
M41 7JQ

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

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

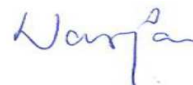
**e:** jbeer@e3p.co.uk

## **Analytical Report Number : 22-96466-2**

Replaces Analytical Report Number: 22-96466-1, issue no. 2  
Client references/information amended.

|                             |                        |                                                        |            |
|-----------------------------|------------------------|--------------------------------------------------------|------------|
| <b>Project / Site name:</b> | Fairways, Westhoughton | <b>Samples received on:</b>                            | 01/11/2022 |
| <b>Your job number:</b>     | 15-707                 | <b>Samples instructed on/<br/>Analysis started on:</b> | 14/11/2022 |
| <b>Your order number:</b>   | 003478                 | <b>Analysis completed by:</b>                          | 22/11/2022 |
| <b>Report Issue Number:</b> | 2                      | <b>Report issued on:</b>                               | 23/11/2022 |
| <b>Samples Analysed:</b>    | 5 soil samples         |                                                        |            |

**Signed:**



Dominika Warjan  
Junior Reporting 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 |

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

Analytical Report Number: 22-96466  
 Project / Site name: Fairways, Westthoughton  
 Your Order No: 003478

| Lab Sample Number                       | 2498393       | 2498394            | 2498395                 | 2498396       | 2498397       |
|-----------------------------------------|---------------|--------------------|-------------------------|---------------|---------------|
| Sample Reference                        | CLAY101       | CLAY102            | CLAY103                 | CLAY104       | CLAY105       |
| Sample Number                           | None Supplied | None Supplied      | None Supplied           | None Supplied | None Supplied |
| Depth (m)                               | None Supplied | None Supplied      | None Supplied           | None Supplied | None Supplied |
| Date Sampled                            | 01/11/2022    | 01/11/2022         | 01/11/2022              | 01/11/2022    | 01/11/2022    |
| Time Taken                              | None Supplied | None Supplied      | None Supplied           | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) | Units         | Limit of detection | Accreditation<br>Status |               |               |
| Stone Content                           | %             | 0.1                | NONE                    | < 0.1         | < 0.1         |
| Moisture Content                        | %             | 0.01               | NONE                    | 13            | 15            |
| Total mass of sample received           | kg            | 0.001              | NONE                    | 0.3           | 0.3           |

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

#### General Inorganics

| pH - Automated                                                   | pH Units | N/A     | MCERTS | 6.7   | 7.7   | 8.4   | 7.8   | 8.9   |
|------------------------------------------------------------------|----------|---------|--------|-------|-------|-------|-------|-------|
| Total Cyanide                                                    | mg/kg    | 1       | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Total Sulphate as SO <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 460   | 270   | 1400  | 760   | 910   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.18  | 0.073 | 0.42  | 0.24  | 0.16  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 360   | 150   | 840   | 480   | 320   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/l     | 1.25    | MCERTS | 179   | 73.1  | 420   | 241   | 162   |
| Sulphide                                                         | mg/kg    | 1       | NONE   | 5.8   | 2.4   | 13    | 8     | 9.7   |
| Total Sulphur                                                    | mg/kg    | 50      | MCERTS | 390   | 260   | 760   | 450   | 530   |
| Total Organic Carbon (TOC) - Automated                           | %        | 0.1     | MCERTS | 0.8   | 0.7   | 0.9   | 0.7   | 0.9   |

#### Total Phenols

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

#### Speciated PAHs

| Naphthalene            | mg/kg | 0.05 | NONE | 0.27   | 0.3    | 0.18   | 0.23   | 0.14   |
|------------------------|-------|------|------|--------|--------|--------|--------|--------|
| Acenaphthylene         | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthene           | mg/kg | 0.05 | NONE | < 0.05 | 0.08   | 0.08   | 0.13   | 0.14   |
| Fluorene               | mg/kg | 0.05 | NONE | < 0.05 | 0.1    | 0.07   | 0.11   | 0.14   |
| Phenanthrene           | mg/kg | 0.05 | NONE | 0.31   | 0.43   | 0.63   | 0.77   | 0.81   |
| Anthracene             | mg/kg | 0.05 | NONE | 0.05   | 0.09   | 0.2    | 0.18   | 0.25   |
| Fluoranthene           | mg/kg | 0.05 | NONE | 0.37   | 0.49   | 1.1    | 1.1    | 1.4    |
| Pyrene                 | mg/kg | 0.05 | NONE | 0.35   | 0.43   | 1.2    | 1.1    | 1.2    |
| Benzo(a)anthracene     | mg/kg | 0.05 | NONE | 0.17   | 0.27   | 0.67   | 0.6    | 0.71   |
| Chrysene               | mg/kg | 0.05 | NONE | 0.18   | 0.22   | 0.6    | 0.54   | 0.64   |
| Benzo(b)fluoranthene   | mg/kg | 0.05 | NONE | 0.19   | 0.25   | 0.66   | 0.56   | 0.63   |
| Benzo(k)fluoranthene   | mg/kg | 0.05 | NONE | 0.06   | 0.09   | 0.35   | 0.32   | 0.33   |
| Benzo(a)pyrene         | mg/kg | 0.05 | NONE | 0.13   | 0.17   | 0.72   | 0.49   | 0.64   |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | 0.57   | 0.29   | 0.35   |
| Dibenz(a,h)anthracene  | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | < 0.05 | < 0.05 | 0.06   |
| Benzo(ghi)perylene     | mg/kg | 0.05 | NONE | < 0.05 | < 0.05 | 0.77   | 0.34   | 0.46   |

#### Total PAH

| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | NONE | 2.08 | 2.92 | 7.77 | 6.77 | 7.88 |
|-----------------------------|-------|-----|------|------|------|------|------|------|
|-----------------------------|-------|-----|------|------|------|------|------|------|

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Project / Site name: Fairways, Westthoughton  
Your Order No: 003478

|                                         |       |                    |                         |               |               |               |               |               |
|-----------------------------------------|-------|--------------------|-------------------------|---------------|---------------|---------------|---------------|---------------|
| Lab Sample Number                       |       |                    |                         | 2498393       | 2498394       | 2498395       | 2498396       | 2498397       |
| Sample Reference                        |       |                    |                         | CLAY101       | CLAY102       | CLAY103       | CLAY104       | CLAY105       |
| Sample Number                           |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Depth (m)                               |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Date Sampled                            |       |                    |                         | 01/11/2022    | 01/11/2022    | 01/11/2022    | 01/11/2022    | 01/11/2022    |
| Time Taken                              |       |                    |                         | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Analytical Parameter<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>Status |               |               |               |               |               |

#### Heavy Metals / Metalloids

|                                   |       |     |        |       |       |       |       |       |
|-----------------------------------|-------|-----|--------|-------|-------|-------|-------|-------|
| Arsenic (aqua regia extractable)  | mg/kg | 1   | MCERTS | 7.7   | 7.2   | 7.3   | 5.2   | 7.7   |
| Cadmium (aqua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 0.2 | 0.3   | 0.3   | < 0.2 |
| Chromium (hexavalent)             | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1   | MCERTS | 19    | 19    | 17    | 19    | 18    |
| Copper (aqua regia extractable)   | mg/kg | 1   | MCERTS | 25    | 24    | 25    | 27    | 26    |
| Lead (aqua regia extractable)     | mg/kg | 1   | MCERTS | 21    | 22    | 40    | 31    | 39    |
| Mercury (aqua regia extractable)  | mg/kg | 0.3 | MCERTS | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nickel (aqua regia extractable)   | mg/kg | 1   | MCERTS | 20    | 20    | 19    | 22    | 21    |
| Selenium (aqua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Zinc (aqua regia extractable)     | mg/kg | 1   | MCERTS | 51    | 51    | 65    | 62    | 59    |

#### Petroleum Hydrocarbons

|                                      |       |     |      |       |       |       |       |       |
|--------------------------------------|-------|-----|------|-------|-------|-------|-------|-------|
| TPH (C5 - C6) HS_ID_TOTAL            | mg/kg | 1   | NONE | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH (C6 - C8) HS_ID_TOTAL            | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10) HS_ID_TOTAL           | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12) EH_CU_ID_TOTAL       | mg/kg | 2   | NONE | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16) EH_CU_ID_TOTAL       | mg/kg | 4   | NONE | < 4.0 | < 4.0 | < 4.0 | < 4.0 | < 4.0 |
| TPH (C16 - C21) EH_CU_ID_TOTAL       | mg/kg | 1   | NONE | < 1.0 | < 1.0 | 16    | < 1.0 | 11    |
| TPH (C21 - C35) EH_CU_ID_TOTAL       | mg/kg | 1   | NONE | < 1.0 | < 1.0 | 160   | < 1.0 | 51    |
| TPH (C35 - C40) EH_CU_ID_TOTAL       | mg/kg | 10  | NONE | < 10  | < 10  | 68    | < 10  | 19    |
| TPH Total C5 - C40 EH_CU+HS_ID_TOTAL | mg/kg | 10  | NONE | < 10  | < 10  | 250   | < 10  | 80    |

U/S = Unsuitable Sample I/S = Insufficient Sample

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\* 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 *                            |
|-------------------|------------------|---------------|---------------|-------------------------------------------------|
| 2498393           | CLAY101          | None Supplied | None Supplied | Brown loam and clay with gravel and vegetation. |
| 2498394           | CLAY102          | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498395           | CLAY103          | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498396           | CLAY104          | None Supplied | None Supplied | Brown loam and clay with gravel.                |
| 2498397           | CLAY105          | None Supplied | None Supplied | Brown loam and clay with gravel.                |

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Project / Site name: Fairways, Westhoughton

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

| Analytical Test Name                               | Analytical Method Description                                                                                                                                          | Analytical Method Reference                                                                                     | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Sulphate, water soluble, in soil (16hr extraction) | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).              | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| 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               |
| Asbestos identification in soil                    | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.                                                 | In house method based on HSG 248                                                                                | A001-PL       | D                  | ISO 17025            |
| Moisture Content                                   | Moisture content, determined gravimetrically. (30 oC)                                                                                                                  | In house method.                                                                                                | L019-UK/PL    | W                  | NONE                 |
| Monohydric phenols in soil                         | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                 | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | MCERTS               |
| 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                  | NONE                 |
| pH in soil (automated)                             | Determination of pH in soil by addition of water followed by automated electrometric measurement.                                                                      | In house method.                                                                                                | L099-PL       | D                  | MCERTS               |
| Sulphide in soil                                   | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode. | In-house method                                                                                                 | L010-PL       | D                  | NONE                 |
| Total sulphate (as SO4 in soil)                    | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| 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                 |
| Total Sulphur in soil                              | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                   | In house method.                                                                                                | L038-PL       | D                  | MCERTS               |
| Total cyanide in soil                              | Determination of total cyanide by distillation followed by colorimetry.                                                                                                | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | MCERTS               |
| Total 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.                                                                                                | L009-PL       | D                  | MCERTS               |
| TPH in (Soil)                                      | Determination of TPH bands by HS-GC-MS/GC-FID                                                                                                                          | In-house method, TPH with carbon banding and silica gel split/cleanup.                                          | L076-PL       | D                  | NONE                 |
| Hexavalent chromium in soil                        | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.                                      | In-house method                                                                                                 | L080-PL       | W                  | MCERTS               |
| 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                 |
| Sulphate, water soluble, in soil (1hr extraction)  | Sulphate, water soluble, in soil (1hr extraction)                                                                                                                      | In-house method                                                                                                 | L038-PL       | D                  | MCERTS               |

Analytical Report Number : 22-96466

Project / Site name: Fairways, Westhoughton

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' 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

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

## Information in Support of Analytical Results

### List of HWOL Acronyms and Operators

| Acronym | Descriptions                                                           |
|---------|------------------------------------------------------------------------|
| HS      | Headspace Analysis                                                     |
| MS      | Mass spectrometry                                                      |
| FID     | Flame Ionisation Detector                                              |
| GC      | Gas Chromatography                                                     |
| EH      | Extractable Hydrocarbons (i.e. everything extracted by the solvent(s)) |
| CU      | Clean-up - e.g. by Florisil®, silica gel                               |
| 1D      | GC - Single coil/column gas chromatography                             |
| 2D      | GC-GC - Double coil/column gas chromatography                          |
| Total   | Aliphatics & Aromatics                                                 |
| AL      | Aliphatics                                                             |
| AR      | Aromatics                                                              |
| #1      | EH_2D_Total but with humics mathematically subtracted                  |
| #2      | EH_2D_Total but with fatty acids mathematically subtracted             |
| -       | Operator - understore to separate acronyms (exception for +)           |
| +       | Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total     |

**Analytical Report Number : 22-96466**

**Project / Site name: Fairways, Westthoughton**

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

| Sample ID | Other ID      | Sample Type | Lab Sample Number | Sample Deviation | Test Name             | Test Ref | Test Deviation |
|-----------|---------------|-------------|-------------------|------------------|-----------------------|----------|----------------|
| CLAY101   | None Supplied | S           | 2498393           | c                | Sulphide in soil      | L010-PL  | c              |
| CLAY101   | None Supplied | S           | 2498393           | c                | Total cyanide in soil | L080-PL  | c              |
| CLAY102   | None Supplied | S           | 2498394           | c                | Sulphide in soil      | L010-PL  | c              |
| CLAY102   | None Supplied | S           | 2498394           | c                | Total cyanide in soil | L080-PL  | c              |
| CLAY103   | None Supplied | S           | 2498395           | c                | Sulphide in soil      | L010-PL  | c              |
| CLAY103   | None Supplied | S           | 2498395           | c                | Total cyanide in soil | L080-PL  | c              |
| CLAY104   | None Supplied | S           | 2498396           | c                | Sulphide in soil      | L010-PL  | c              |
| CLAY104   | None Supplied | S           | 2498396           | c                | Total cyanide in soil | L080-PL  | c              |
| CLAY105   | None Supplied | S           | 2498397           | c                | Sulphide in soil      | L010-PL  | c              |
| CLAY105   | None Supplied | S           | 2498397           | c                | Total cyanide in soil | L080-PL  | c              |

