# TEST CERTIFICATE

**DETERMINATION OF LIQUID AND PLASTIC LIMITS**
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

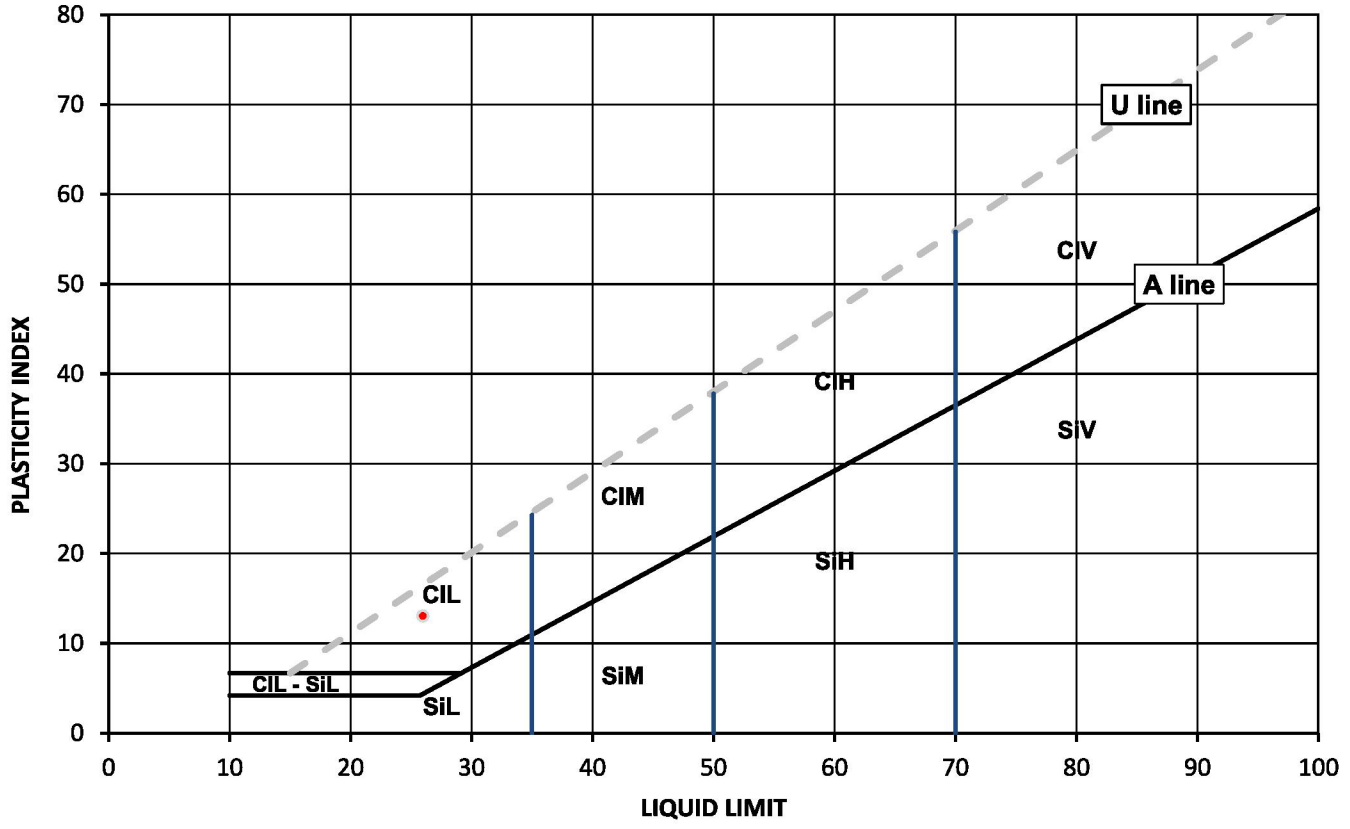
| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 27/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 22/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078886 | Depth Top [m]: | 1.00 |
| Hole No.: | BH04 | Depth Base [m]: | Not Given |
| Sample Reference: | 1 | Sample Type: | C |
| Sample Description: | Yellowish brown slightly gravelly very sandy CLAY | | |
| Sample Preparation: | Tested after >425um removed by hand | | |

| As Received Moisture Content [ W ] % | Liquid Limit [ WL ] % | Plastic Limit [ Wp ] % | Plasticity Index [ Ip ] % | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 10 | 26 | 13 | 13 | 97 |




Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

| | | Plasticity | | Liquid Limit |
|---|---|---|---|---|
| Cl | Clay | L | Low | below 35 |
| Si | Silt | M | Medium | 35 to 50 |
| | | H | High | 50 to 70 |
| | | V | Very high | exceeding 70 |
| | | O | Organic | append to classification for organic material ( eg ClHO ) |

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

Remarks:



**Signed:** [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 232.11**

# TEST CERTIFICATE

**DETERMINATION OF LIQUID AND PLASTIC LIMITS**
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 26/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 19/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

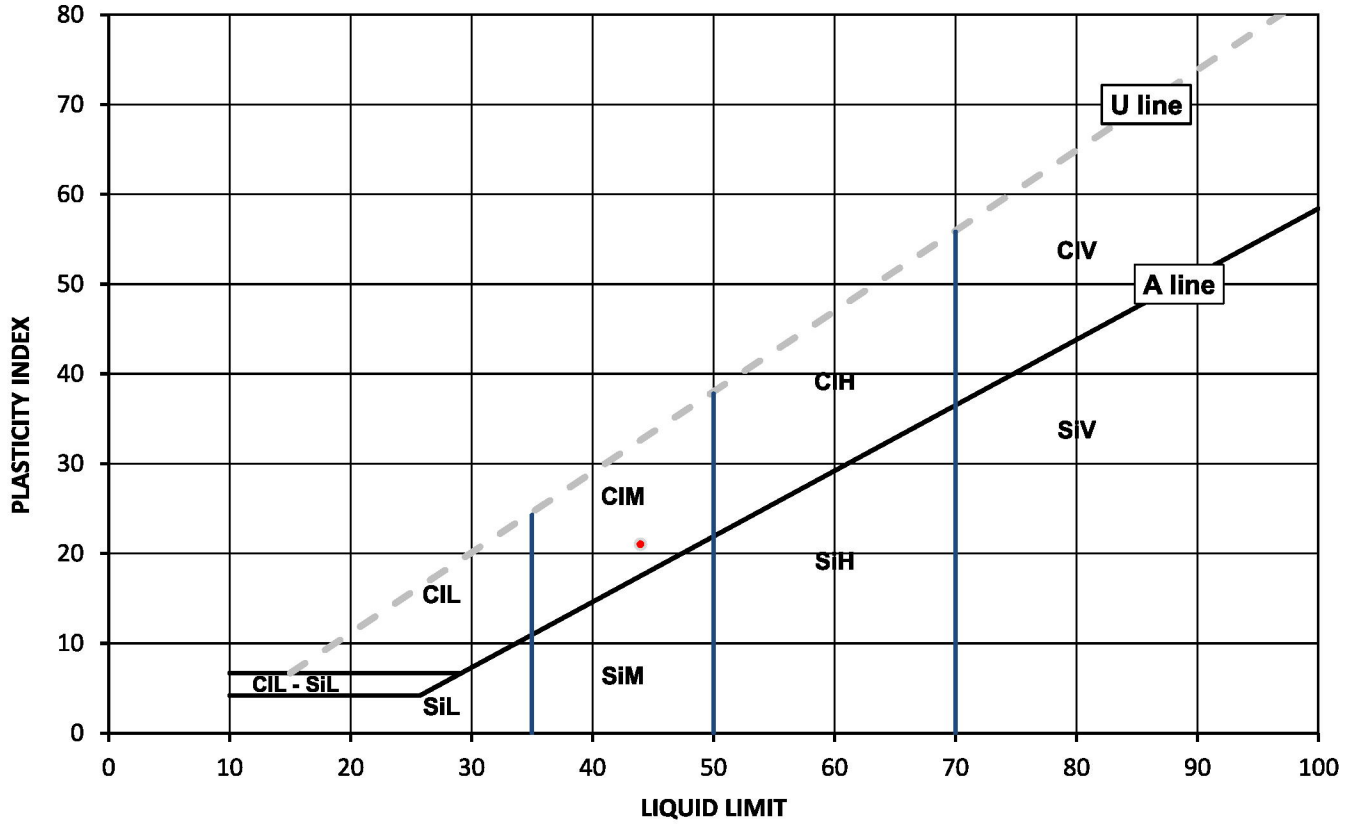
*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078910 | Depth Top [m]: | 0.55 |
| Hole No.: | BH05 | Depth Base [m]: | 0.65 |
| Sample Reference: | 2 | Sample Type: | B |
| Sample Description: | Brown slightly gravelly sandy CLAY | | |

Sample Preparation: Tested after washing to remove >425um

| As Received Moisture Content [ W ] % | Liquid Limit [ WL ] % | Plastic Limit [ Wp ] % | Plasticity Index [ Ip ] % | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 14 | 44 | 23 | 21 | 69 |




Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

| | | Plasticity | | Liquid Limit |
|---|---|---|---|---|
| Cl | Clay | L | Low | below 35 |
| Si | Silt | M | Medium | 35 to 50 |
| | | H | High | 50 to 70 |
| | | V | Very high | exceeding 70 |
| | | O | Organic | append to classification for organic material ( eg ClHO ) |

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

Remarks:



**Signed:** [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 232.11**

# SUMMARY REPORT

## SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
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Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

Client: Card Geotechnics Ltd
Client Address: 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW
Contact: Amir Abbasi
Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 25/10 - 27/10/2021
Date Received: 29/10/2021
Date Tested: 19/11 - 22/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks | Moisture Content [ W ] | Water Content [ W ] | Atterberg | | | | Density | | | Total Porosity# | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | | % Passing 425um | WL | Wp | Ip | bulk | dry | PD | | | |
| | | | m | m | | | | % | % | % | % | % | % | Mg/m3 | Mg/m3 | Mg/m3 | % | | |
| 2078879 | BH03 | 2 | 0.50 | 0.70 | B | Brown sandy very clayey GRAVEL with cobbles | Atterberg 1 Point | 12 | | 50 | 48 | 26 | 22 | | | | | | |
| 2078885 | BH04 | 2 | 0.50 | 0.60 | B | Brown sandy clayey GRAVEL with cobbles | Atterberg 1 Point | 12 | | 29 | 47 | 25 | 22 | | | | | | |
| 2078886 | BH04 | 1 | 1.00 | Not Given | C | Yellowish brown slightly gravelly very sandy CLAY | Atterberg 1 Point | 10 | | 97 | 26 | 13 | 13 | | | | | | |
| 2078910 | BH05 | 2 | 0.55 | 0.65 | B | Brown slightly gravelly sandy CLAY | Atterberg 1 Point | 14 | | 69 | 44 | 23 | 21 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

Note: # Non accredited; NP - Non plastic

Comments:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 234.13**

# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

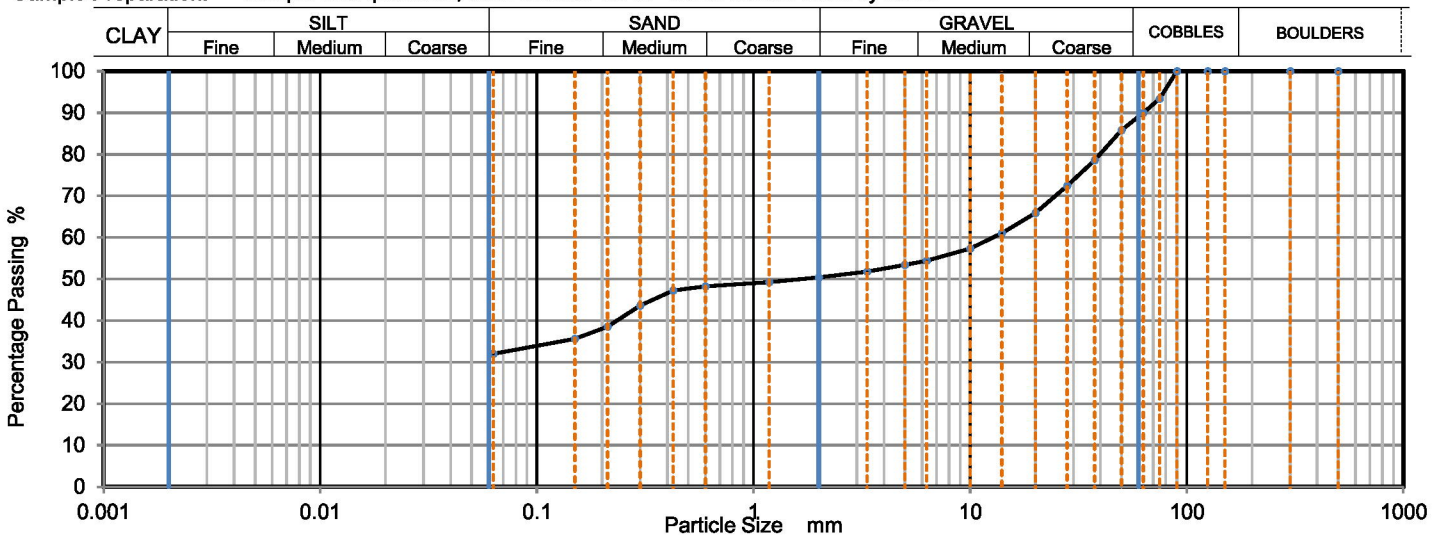
4041

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 25/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 19/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078879 | Depth Top [m]: | 0.50 |
| Hole No.: | BH03 | Depth Base [m]: | 0.70 |
| Sample Reference: | 2 | Sample Type: | B |
| Sample Description: | Brown sandy very clayey GRAVEL with cobbles | | |
| Sample Preparation: | Sample was quartered, oven dried at 107.0 °C and broken down by hand. | | |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 500 | 100 | | |
| 300 | 100 | | |
| 150 | 100 | | |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 93 | | |
| 63 | 90 | | |
| 50 | 86 | | |
| 37.5 | 79 | | |
| 28 | 72 | | |
| 20 | 66 | | |
| 14 | 61 | | |
| 10 | 57 | | |
| 6.3 | 54 | | |
| 5 | 53 | | |
| 3.35 | 52 | | |
| 2 | 50 | | |
| 1.18 | 49 | | |
| 0.6 | 48 | | |
| 0.425 | 47 | | |
| 0.3 | 44 | | |
| 0.212 | 39 | | |
| 0.15 | 36 | | |
| 0.063 | 33 | | |

| Sample Proportions | % dry mass |
|---|---|
| Very coarse | 10 |
| Gravel | 40 |
| Sand | 18 |
| | |
| Fines <0.063mm | 33 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | 90 |
| D60 | mm | 12.8 |
| D30 | mm | |
| D10 | mm | |
| Uniformity Coefficient | | > 200 |
| Curvature Coefficient | | |

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 100.20**

# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

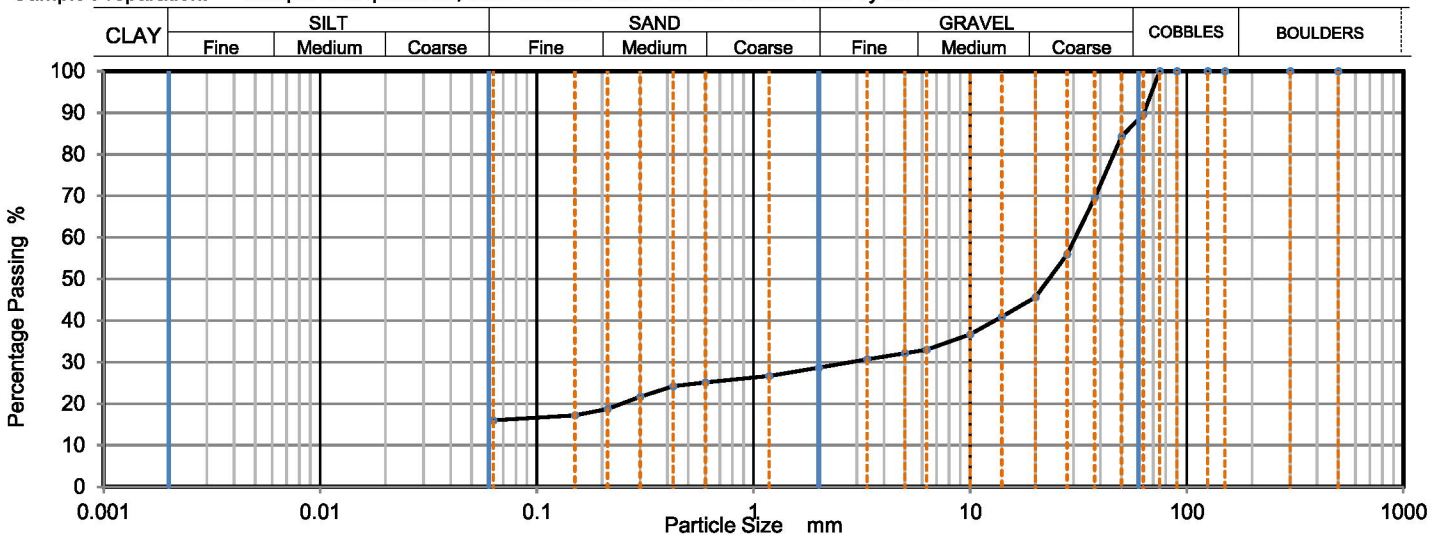
4041

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 27/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 19/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078885 | Depth Top [m]: | 0.50 |
| Hole No.: | BH04 | Depth Base [m]: | 0.60 |
| Sample Reference: | 2 | Sample Type: | B |
| Sample Description: | Brown sandy clayey GRAVEL with cobbles | | |
| Sample Preparation: | Sample was quartered, oven dried at 106.9 °C and broken down by hand. | | |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 500 | 100 | | |
| 300 | 100 | | |
| 150 | 100 | | |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 90 | | |
| 50 | 84 | | |
| 37.5 | 70 | | |
| 28 | 56 | | |
| 20 | 46 | | |
| 14 | 41 | | |
| 10 | 37 | | |
| 6.3 | 33 | | |
| 5 | 32 | | |
| 3.35 | 31 | | |
| 2 | 29 | | |
| 1.18 | 27 | | |
| 0.6 | 25 | | |
| 0.425 | 24 | | |
| 0.3 | 22 | | |
| 0.212 | 19 | | |
| 0.15 | 17 | | |
| 0.063 | 16 | | |

| Sample Proportions | % dry mass |
|---|---|
| Very coarse | 10 |
| Gravel | 61 |
| Sand | 13 |
| | |
| Fines <0.063mm | 16 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | 75 |
| D60 | mm | 30.6 |
| D30 | mm | 2.81 |
| D10 | mm | |
| Uniformity Coefficient | | > 490 |
| Curvature Coefficient | | |

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 100.20**

# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

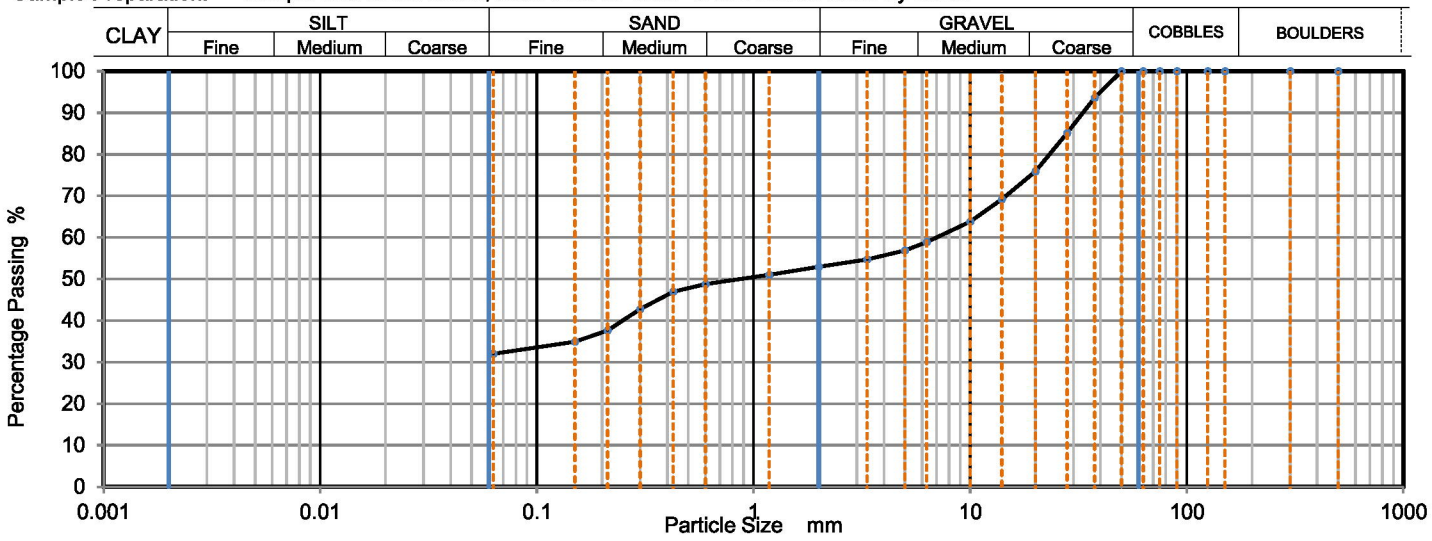
4041

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 26/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 20/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078911 | Depth Top [m]: | 0.80 |
| Hole No.: | BH05 | Depth Base [m]: | 0.90 |
| Sample Reference: | 3 | Sample Type: | B |
| Sample Description: | Brown sandy very clayey GRAVEL | | |
| Sample Preparation: | Sample was whole tested, oven dried at 109.0 °C and broken down by hand. | | |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 500 | 100 | | |
| 300 | 100 | | |
| 150 | 100 | | |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 100 | | |
| 50 | 100 | | |
| 37.5 | 94 | | |
| 28 | 85 | | |
| 20 | 76 | | |
| 14 | 69 | | |
| 10 | 64 | | |
| 6.3 | 59 | | |
| 5 | 57 | | |
| 3.35 | 55 | | |
| 2 | 53 | | |
| 1.18 | 51 | | |
| 0.6 | 49 | | |
| 0.425 | 47 | | |
| 0.3 | 43 | | |
| 0.212 | 38 | | |
| 0.15 | 35 | | |
| 0.063 | 32 | | |

| Sample Proportions | % dry mass |
|---|---|
| Very coarse | 0 |
| Gravel | 47 |
| Sand | 21 |
| | |
| Fines <0.063mm | 32 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | 50 |
| D60 | mm | 6.97 |
| D30 | mm | |
| D10 | mm | |
| Uniformity Coefficient | | > 110 |
| Curvature Coefficient | | |

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 100.20**

# TEST CERTIFICATE

## Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

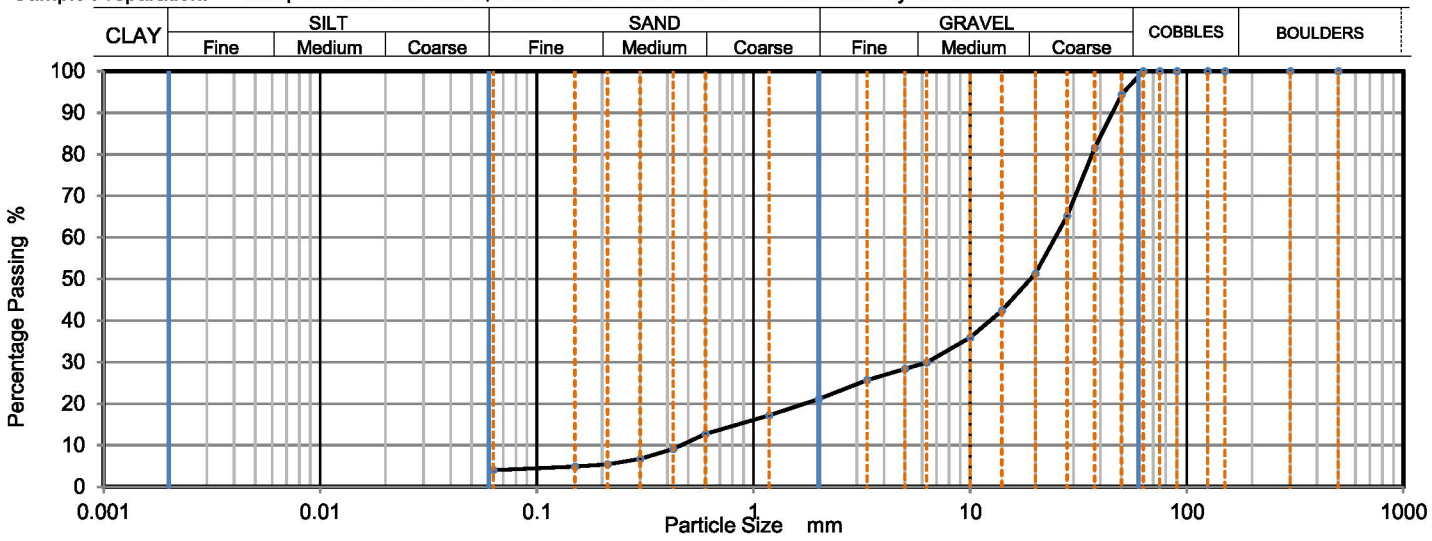
4041

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 29/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 20/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078912 | Depth Top [m]: | 0.40 |
| Hole No.: | BH07 | Depth Base [m]: | 0.60 |
| Sample Reference: | 3 | Sample Type: | B |
| Sample Description: | Brownish grey slightly clayey sandy GRAVEL | | |
| Sample Preparation: | Sample was whole tested, oven dried at 106.0 °C and broken down by hand. | | |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 500 | 100 | | |
| 300 | 100 | | |
| 150 | 100 | | |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 100 | | |
| 50 | 94 | | |
| 37.5 | 82 | | |
| 28 | 65 | | |
| 20 | 51 | | |
| 14 | 42 | | |
| 10 | 36 | | |
| 6.3 | 30 | | |
| 5 | 28 | | |
| 3.35 | 26 | | |
| 2 | 21 | | |
| 1.18 | 17 | | |
| 0.6 | 13 | | |
| 0.425 | 9 | | |
| 0.3 | 7 | | |
| 0.212 | 5 | | |
| 0.15 | 5 | | |
| 0.063 | 4 | | |

| Sample Proportions | % dry mass |
|---|---|
| Very coarse | 0 |
| Gravel | 79 |
| Sand | 17 |
| | |
| Fines <0.063mm | 4 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | 63 |
| D60 | mm | 24.7 |
| D30 | mm | 6.36 |
| D10 | mm | 0.464 |
| Uniformity Coefficient | | 53 |
| Curvature Coefficient | | 3.5 |

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 100.20**

# SUMMARY REPORT

## Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client: Card Geotechnics Ltd

Client Address: 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW

Contact: Amir Abbasi

Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 25/10 - 27/10/2021
Date Received: 29/10/2021
Date Tested: 20/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks # (including water content if measured) | Specimen Reference | Test Type see ISRM | | Failure Valid (Y/N) | Dimensions | | | | Force P | Equivalent diameter, De | Point Load Strength Index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | Type (D, A, I, B) | Direction (L, P or U) | | Lne | W | Dps | Dps' | | | Is | Is(50) |
| | | | m | m | | | | | | | | mm | mm | mm | mm | kN | mm | MPa | MPa |
| 2078880 | BH03 | 4 | 2.00 | Not Given | C | Brown to yellowish brown sandy CLAY | WC = 21.6% | 1 | D | U | YES | 51.3 | 89.5 | 89.0 | 73.0 | 0.5 | 80.8 | 0.08 | 0.09 |
| 2078880 | BH03 | 4 | 2.00 | Not Given | C | Brown to yellowish brown sandy CLAY | WC = 21.6% | 2 | A | U | YES | - | 88.1 | 72.0 | 47.0 | 0.9 | 72.6 | 0.16 | 0.19 |
| 2078881 | BH03 | 4 | 3.00 | Not Given | C | Greyish brown silty CLAY | WC = 24.8% | 1 | D | U | YES | 66.4 | 86.7 | 86.0 | 50.0 | 0.9 | 65.8 | 0.20 | 0.22 |
| 2078881 | BH03 | 4 | 3.00 | Not Given | C | Greyish brown silty CLAY | WC = 24.8% | 2 | A | U | YES | - | 86.2 | 57.0 | 18.0 | 0.8 | 44.4 | 0.40 | 0.38 |
| 2078883 | BH03 | 6 | 3.70 | Not Given | C | Light grey LIMESTONE | WC = 1.9% | 1 | D | L | YES | 61.4 | 90.1 | 90.0 | 79.0 | 21.4 | 84.4 | 3.00 | 3.80 |
| 2078883 | BH03 | 6 | 3.70 | Not Given | C | Light grey LIMESTONE | WC = 1.9% | 2 | A | P | YES | - | 89.6 | 51.0 | 47.0 | 19.4 | 73.2 | 3.61 | 4.28 |
| 2078884 | BH03 | 7 | 4.00 | Not Given | C | Light grey LIMESTONE | WC = 1.4% | 1 | D | U | YES | 62.9 | 90.1 | 90.0 | 74.0 | 25.1 | 81.7 | 3.76 | 4.69 |
| 2078884 | BH03 | 7 | 4.00 | Not Given | C | Light grey LIMESTONE | WC = 1.4% | 2 | A | U | YES | - | 89.9 | 51.0 | 46.0 | 20.1 | 72.6 | 3.82 | 4.51 |
| 2078889 | BH04 | 3 | 2.40 | Not Given | C | Light brown sandy CLAY | WC = 7.7%, Shape not suitable for Diametral - tested as Irregular. | 1 | I | U | YES | 45.3 | 56.3 | 66.0 | 62.0 | 0.2 | 66.7 | 0.05 | 0.05 |
| 2078889 | BH04 | 3 | 2.40 | Not Given | C | Light brown sandy CLAY | WC = 7.7% | 2 | A | U | YES | - | 89.2 | 49.0 | 45.0 | 0.3 | 71.5 | 0.05 | 0.06 |

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens ( platen seperation ), Dps' - at failure ( see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 23/11/2021

**GF 134.12**

# SUMMARY REPORT

## Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client: Card Geotechnics Ltd

Client Address: 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW

Contact: Amir Abbasi

Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 27/10/2021
Date Received: 29/10/2021
Date Tested: 20/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks # (including water content if measured) | Specimen Reference | Test Type see ISRM | | Failure Valid (Y/N) | Dimensions | | | | Force P | Equivalent diameter, De | Point Load Strength Index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | Type (D, A, I, B) | Direction (L, P or U) | | Lne | W | Dps | Dps' | | | Is | Is(50) |
| | | | m | m | | | | | | | | mm | mm | mm | mm | kN | mm | MPa | MPa |
| 2078890 | BH04 | 6 | 6.50 | Not Given | C | Grey LIMESTONE | WC = 6.2% | 1 | D | U | YES | 67.8 | 89.4 | 89.0 | 65.0 | 7.9 | 76.2 | 1.36 | 1.64 |
| 2078890 | BH04 | 6 | 6.50 | Not Given | C | Grey LIMESTONE | WC = 6.2% | 2 | A | U | YES | - | 89.4 | 66.0 | 56.0 | 6.6 | 79.8 | 1.04 | 1.28 |
| 2078892 | BH04 | 8 | 8.50 | Not Given | C | Greyish brown silty CLAY | WC = 23.0%, Shape not suitable for Diametral - tested as Irregular. | 1 | I | U | YES | 37.6 | 53.0 | 42.0 | 21.0 | 0.2 | 37.6 | 0.14 | 0.12 |
| 2078892 | BH04 | 8 | 8.50 | Not Given | C | Greyish brown silty CLAY | WC = 23.0% | 2 | A | U | YES | - | 98.2 | 68.0 | 36.0 | 0.4 | 67.1 | 0.08 | 0.09 |
| 2078893 | BH04 | 8 | 9.20 | Not Given | C | Grey LIMESTONE | WC = 3.4% | 1 | D | L | YES | 72.1 | 88.9 | 88.0 | 81.0 | 11.0 | 84.9 | 1.53 | 1.94 |
| 2078893 | BH04 | 8 | 9.20 | Not Given | C | Grey LIMESTONE | WC = 3.4% | 2 | A | P | YES | - | 89.4 | 63.0 | 56.0 | 5.2 | 79.8 | 0.82 | 1.01 |
| 2078894 | BH04 | 8 | 9.50 | Not Given | C | Grey LIMESTONE | WC = 2.2% | 1 | D | U | YES | 65.4 | 89.2 | 89.0 | 75.0 | 18.2 | 81.8 | 2.71 | 3.39 |
| 2078894 | BH04 | 8 | 9.50 | Not Given | C | Grey LIMESTONE | WC = 2.2% | 2 | A | U | YES | - | 89.5 | 64.0 | 58.0 | 18.9 | 81.3 | 2.86 | 3.56 |
| 2078895 | BH04 | 9 | 10.80 | Not Given | C | Light grey LIMESTONE | WC = 2.8% | 1 | D | U | YES | 58.8 | 89.6 | 89.0 | 75.0 | 9.6 | 82.0 | 1.43 | 1.78 |
| 2078895 | BH04 | 9 | 10.80 | Not Given | C | Light grey LIMESTONE | WC = 2.8% | 2 | A | U | YES | - | 89.4 | 55.0 | 48.0 | 6.9 | 73.9 | 1.25 | 1.49 |

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens ( platen seperation ), Dps' - at failure ( see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 23/11/2021

**GF 134.12**

# SUMMARY REPORT

## Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client: Card Geotechnics Ltd

Client Address: 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW

Contact: Amir Abbasi

Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 26/10 - 27/10/2021
Date Received: 29/10/2021
Date Tested: 20/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks # (including water content if measured) | Specimen Reference | Test Type see ISRM | | Failure Valid (Y/N) | Dimensions | | | | Force P | Equivalent diameter, De | Point Load Strength Index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | Type (D, A, I, B) | Direction (L, P or U) | | Lne | W | Dps | Dps' | | | Is | Is(50) |
| | | | m | m | | | | | | | | mm | mm | mm | mm | kN | mm | MPa | MPa |
| 2078896 | BH04 | 10 | 12.00 | Not Given | C | Grey LIMESTONE | WC = 3.6% | 1 | D | U | YES | 73.1 | 89.8 | 89.0 | 81.0 | 8.7 | 85.3 | 1.19 | 1.51 |
| 2078896 | BH04 | 10 | 12.00 | Not Given | C | Grey LIMESTONE | WC = 3.6% | 2 | A | U | YES | - | 89.6 | 63.0 | 57.0 | 4.5 | 80.6 | 0.68 | 0.85 |
| 2078897 | BH05 | 4 | 1.50 | Not Given | C | Cream colour to light grey LIMESTONE | WC = 0.7%, Shape not suitable for Diametral - tested as Irregular. | 1 | I | U | YES | 44.3 | 62.2 | 44.0 | 40.0 | 7.6 | 56.3 | 2.38 | 2.51 |
| 2078897 | BH05 | 4 | 1.50 | Not Given | C | Cream colour to light grey LIMESTONE | WC = 0.7% | 2 | A | U | YES | - | 89.1 | 57.0 | 54.0 | 1.0 | 78.3 | 0.16 | 0.20 |
| 2078899 | BH05 | 4 | 2.00 | Not Given | C | Grey silty CLAY | WC = 9.7% | 1 | D | U | YES | 50.2 | 89.7 | 89.0 | 85.0 | 0.2 | 87.3 | 0.03 | 0.03 |
| 2078899 | BH05 | 4 | 2.00 | Not Given | C | Grey silty CLAY | WC = 9.7% | 2 | A | U | YES | - | 89.3 | 56.0 | 48.0 | 0.4 | 73.9 | 0.06 | 0.08 |
| 2078900 | BH05 | 4 | 3.00 | Not Given | C | Greyish brown silty CLAY | WC = 16.5%, Shape not suitable for Diametral - tested as Irregular. | 1 | I | U | YES | 48.3 | 87.1 | 37.0 | 28.0 | 1.1 | 55.7 | 0.34 | 0.36 |
| 2078900 | BH05 | 4 | 3.00 | Not Given | C | Greyish brown silty CLAY | WC = 16.5% | 2 | A | U | YES | - | 88.8 | 65.0 | 44.0 | 1.5 | 70.5 | 0.29 | 0.34 |
| 2078903 | BH05 | 6 | 4.30 | Not Given | C | Grey LIMESTONE | WC = 2.5% | 1 | A | U | YES | - | 89.8 | 58.0 | 47.0 | 18.6 | 73.3 | 3.45 | 4.10 |
| 2078905 | BH05 | 8 | 5.50 | Not Given | C | Brownish grey silty CLAY | WC = 12.9% | 1 | A | U | YES | - | 88.4 | 51.0 | 44.0 | 0.9 | 70.4 | 0.17 | 0.20 |

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens ( platen seperation ), Dps' - at failure ( see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 23/11/2021

**GF 134.12**

# SUMMARY REPORT

## Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Card Geotechnics Ltd

Client Address: 4 Godalming Business Centre, Woolsack Way,
Godalming, Surrey,
GU7 1XW

Contact: Amir Abbasi

Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 26/10/2021
Date Received: 29/10/2021
Date Tested: 20/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks # (including water content if measured) | Specimen Reference | Test Type see ISRM | | Failure Valid (Y/N) | Dimensions | | | | Force P | Equivalent diameter, De | Point Load Strength Index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | Type (D, A, I, B) | Direction (L, P or U) | | Lne | W | Dps | Dps' | | | Is | Is(50) |
| | | | m | m | | | | | | | | mm | mm | mm | mm | kN | mm | MPa | MPa |
| 2078906 | BH05 | 10 | 6.00 | Not Given | C | Grey LIMESTONE | WC = 5.1% | 1 | A | U | YES | - | 89.6 | 60.0 | 43.0 | 3.2 | 70.0 | 0.65 | 0.76 |
| 2078907 | BH05 | 12 | 7.50 | Not Given | C | Grey LIMESTONE | WC = 1.5% | 1 | A | U | YES | - | 89.6 | 63.0 | 55.0 | 16.0 | 79.2 | 2.55 | 3.14 |
| 2078909 | BH05 | 15 | 12.00 | Not Given | C | Grey LIMESTONE | WC = 5.4% | 1 | A | U | YES | - | 89.7 | 57.0 | 49.0 | 7.4 | 74.8 | 1.32 | 1.59 |
| | | | | | | | | | | | | | | | | | | | |
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Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dpe - Distance between platens ( platen seperation ), Dpe' - at failure ( see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 134.12**

# SUMMARY REPORT

## Summary of Uniaxial Compression Test on Rock Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: ISRM, 2007, p153, part 1

Client: Card Geotechnics Ltd

Client Address: 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW

Contact: Amir Abbasi

Site Address: Bicester Golf Course Bicester

Client Reference: CG39017
Job Number: 21-22172
Date Sampled: 26/10/2021
Date Received: 29/10/2021
Date Tested: 20/11/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks | Specimen Dimensions (2) | | | | Bulk density (2) | Water Content (1) | Uniaxial Compression (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top m | Depth Base m | Type | | | Diameter mm | Length mm | H/D | Orientation of sample | Mg/m3 | % | Condition | Stress Rate Mpa/s | Mode of failure | UCS Mpa |
| 2078908 | BH05 | 12 | 8.00 | Not Given | C | Light grey LIMESTONE | Sample is below recommended length to diameter ratio. | 89.5 | 194.6 | 2.2 | Vertical | 2.57 | 1.7 | as received | 0.0794 | MS + AC | 43.8 |
| | | | | | | | | | | | | | | | | | |
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Note: 1 - ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS, 2 - ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density, 3 - ISRM p153 part 1, determination of Uniaxial Compressive Strength ( UCS ) of Rock Materials, above notes apply unless annotated otherwise in the remarks. Compaction machine: VJ Tech AUTOCON - VJT 51-3011; Mode of failure legend: S - Single shear, MS - multiple shear, AC - Axial cleavage, F - Fragmented

Comments:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 223.13**

# TEST CERTIFICATE

## Unconfined Compressive Strength of soil

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 7.2

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 27/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 20/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

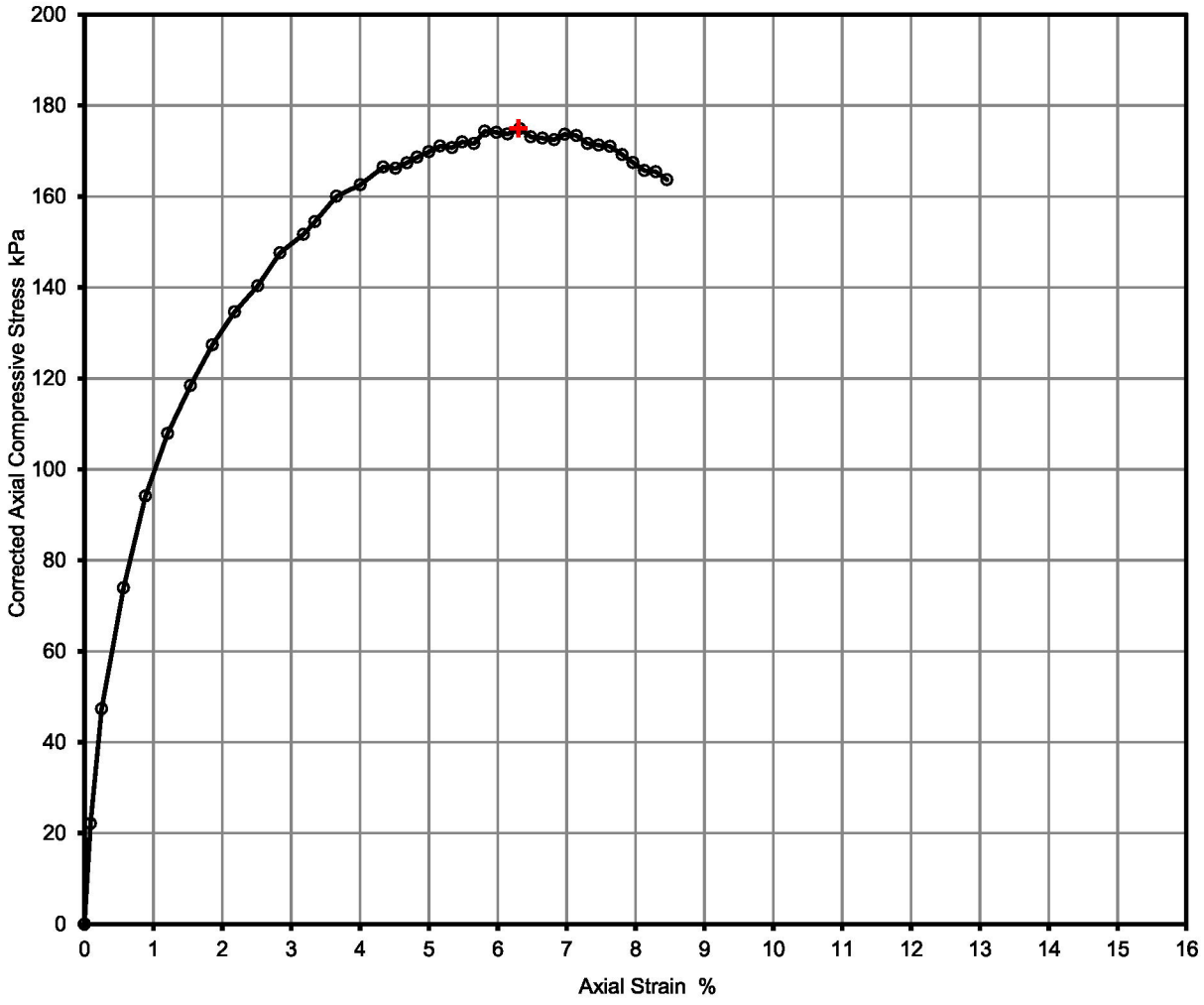
*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078891 | Depth Top [m]: | 7.50 |
| Hole No.: | BH04 | Depth Base [m]: | Not Given |
| Sample Reference: | 7 | Sample Type: | C |
| Sample Description: | Brownish grey sandy CLAY | | |

| | | | | | |
|---|---|---|---|---|---|
| Test Number | 1 | | Rate of Strain | 1.0 | %/min |
| Length | 180.3 | mm | At failure Axial Strain | 6.3 | % |
| Diameter | 89.7 | mm | Unconfined Compressive Strength | 175 | kPa |
| Bulk Density | 2.02 | Mg/m3 | Mode of Failure | Brittle | |
| Moisture Content | 20.0 | % | | | |
| Dry Density | 1.69 | Mg/m3 | | | |

**Axial Compressive Stress v Axial Strain**




Position within sample

Note: Axial compressive stress corrected for area change, and membrane effects (if used)

Remarks:



Signed:

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 243.8**

# TEST CERTIFICATE

## Unconfined Compressive Strength of soil

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 7.2

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | 4 Godalming Business Centre, Woolsack Way, Godalming, Surrey, GU7 1XW | Job Number: | 21-22172 |
| | | Date Sampled: | 26/10/2021 |
| | | Date Received: | 29/10/2021 |
| Contact: | Amir Abbasi | Date Tested: | 20/11/2021 |
| Site Address: | Bicester Golf Course Bicester | Sampled By: | Not Given |

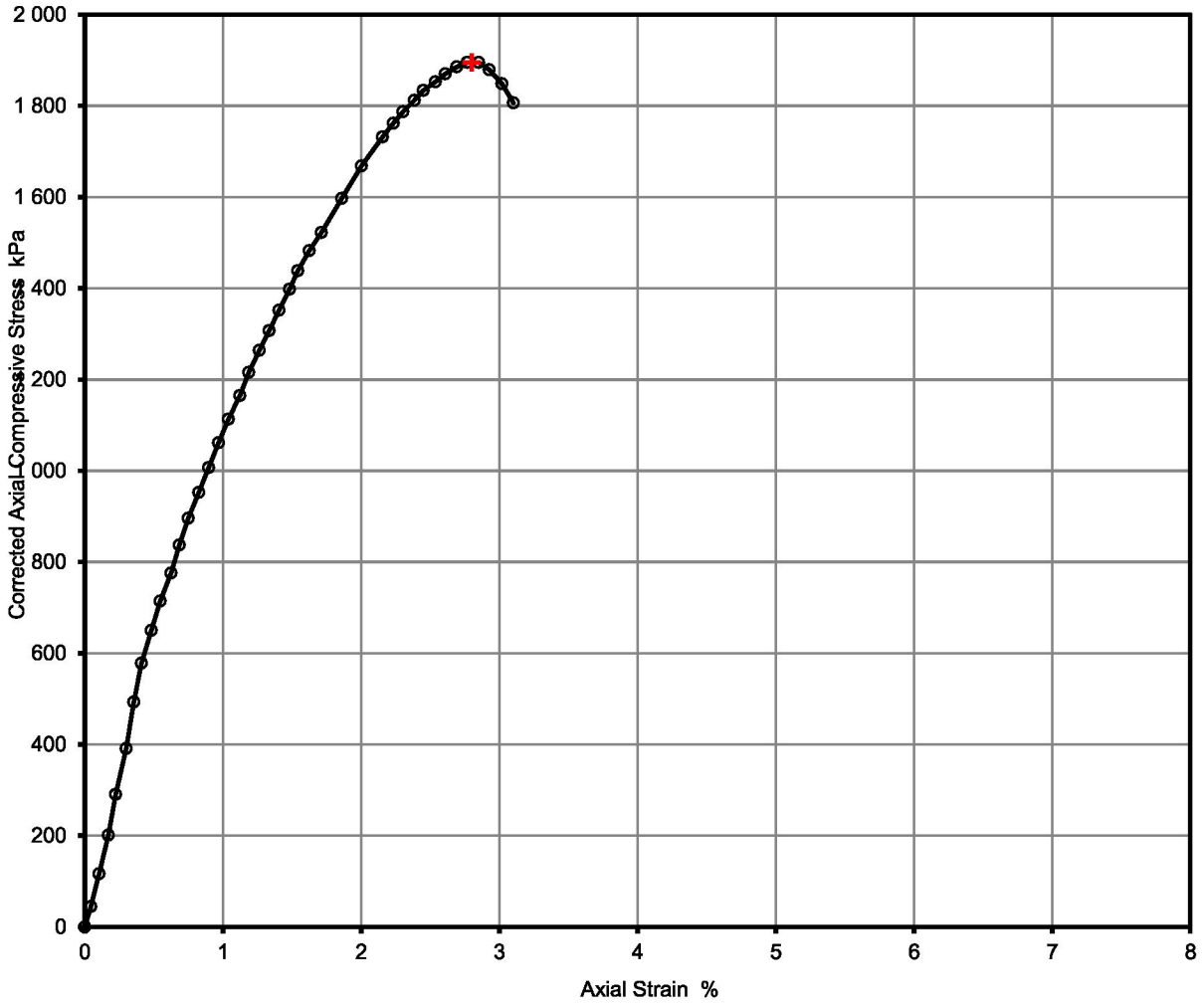
*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

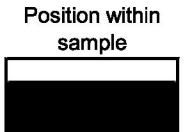
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2078904 | Depth Top [m]: | 5.00 |
| Hole No.: | BH05 | Depth Base [m]: | Not Given |
| Sample Reference: | 8 | Sample Type: | C |
| Sample Description: | Brownish grey sandy CLAY | | |

| | | | | | |
|---|---|---|---|---|---|
| Test Number | 1 | | Rate of Strain | 1.0 | %/min |
| Length | 182.8 | mm | At failure Axial Strain | 2.8 | % |
| Diameter | 89.2 | mm | Unconfined Compressive Strength | 1895 | kPa |
| Bulk Density | 2.18 | Mg/m3 | Mode of Failure | Brittle | |
| Moisture Content | 15.0 | % | | | |
| Dry Density | 1.89 | Mg/m3 | | | |

**Axial Compressive Stress v Axial Strain**




Position within sample



Note: Axial compressive stress corrected for area change, and membrane effects (if used)

Remarks:



Signed:

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 23/11/2021

**GF 243.8**

2718

GEOTECHNICAL ENGINEERING LIMITED

For the attention of CHRIS MORGAN

Version No. 1
Page No. 1 of 8
Date of Issue 10/12/2021

# TEST REPORT

| | | | |
|---|---|---|---|
| PROJECT/SITE | BICESTER GOLF COURSE, BICESTER | Samples received | 01/12/2021 |
| GEL REPORT NUMBER | 36740 | Schedule received | 16/11/2021 |
| Your ref/PO: | | Testing commenced | 01/12/2021 |
| Test report refers to | Schedule 1 | Status | Final |

## SUMMARY OF RESULTS ATTACHED

| TEST METHOD & DESCRIPTION | QUANTITY | ACCREDITED TEST |
|---|---|---|
| BS1377: Part 7: 1990:8&9, Undrained Triaxial Compression | 1 | YES |
| ISRM: Suggested Methods: 2007: Uniaxial Compressive Strength of Rock | 2 | YES |
| ISRM: 2007: Point Load Strength Test | 7 | YES |
| BRE SD1 Suite (Subcontracted) | 2 | YES/NO |

Remarks

This report may not be partially reproduced without written permission from this laboratory.

The results reported relate to samples received in the laboratory

Approved Signatories:

W Jones (Laboratory Manager) **T Best (Deputy Lab Manager)**

J Hanson (Director) N Parry (Director)

[redacted]



**Geotechnical Engineering Ltd**
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**VAT Number:** 682 5857 89

**Payments:** Geotechnical Engineering Limited
**Sort code:** 16-22-11 **Bank account:** 11125135

Geotechnical Engineering Limited

# UNDRAINED TRIAXIAL COMPRESSION

**BS.1377 : PART 7 : 1990 : 8**

CLIENT CARD GEOTECHNICS LIMITED

SITE BICESTER GOLF COURSE, BICESTER

| borehole /trial pit no. | sample | | specimen depth | code | moisture content | | dimensions | | density | | cell pressure | rate of strain | deviator stress | failure strain | failure mode | shear strength* | description and remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | no./type | depth (m) | (m) | | initial (%) | final (%) | length (mm) | diameter (mm) | bulk (Mg/m3) | dry (Mg/m3) | (kPa) | (%/min) | (kPa) | (%) | | (kPa) | |
| BH04 | 13C | 16.00 | 16.80 | UU70 | 9.7 | 9.8 | 160 | 90 | 2.32 | 2.12 | 336 | 2.0 | 1174 | 6.9 | I | 587 | Light grey silty CLAY |

general remarks:

* shear strength taken as half deviator stress at failure for each stage
membrane correction applied
sample taken vertically (unless otherwise specified)
strain rate 2%/min (unless otherwise specified)

code:

UU - unconsolidated undrained
M - multi stage
S - set of three
R - remoulded

failure mode:

B - barrel (plastic failure)
S - shear (brittle failure)
I - intermediate
O - other (see remarks)

membrane type/thickness:

latex membrane used (unless otherwise specified)
38 - 0.2mm
70 - 0.4mm
100 - 0.4mm

| CONTRACT | CHECKED |
|---|---|
| **36740** | **TB** |

Geotechnical Engineering Limited

# UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

**I.S.R.M. Suggested Methods : 2007 Edition**

CLIENT CARD GEOTECHNICS LIMITED

SITE BICESTER GOLF COURSE, BICESTER

| borehole /trial pit no. | sample no./type | sample depth (m) | specimen depth (m) | diameter D (mm) | height H (mm) | H/D | moisture content (%) | bulk density (Mg/m3) | loading rate (kN/min) | time to failure (min:sec) | UCS (MPa) | description, codes and remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH04 | 4C | 3.50 | 3.70 | 91.4 | 212.0 | 2.32 | 20.1 | 2.03 | 5 | 02:37 | 0.81 | Grey MUDSTONE, P, Ax. H/D ratio falls outside ISRM specification |
| BH04 | 13C | 16.00 | 16.45 | 89.2 | 204.6 | 2.29 | 4.7 | 2.49 | 15 | 04:32 | 10.20 | Grey MUDSTONE , P, Ax. H/D ratio falls outside ISRM specification |

general remarks

sample obtained from vertically drilled core (unless specified), test machine - VJT6000

coding:

| moisture condition | sample storage | failure mode |
|---|---|---|
| N - natural moisture content | U - not wrapped | Ax - axial cleavage |
| F - fully saturated | F - wrapped in cling film/foil | Ca - cataclasis |
| S - soaked | W - waxed | Sh - shear |
| P - air/partially dried | G - contained in sealed Geoline | Ex - explosive |
| | | Ot - other |

| CONTRACT | CHECKED |
|---|---|
| **36740** | **TB** |

Geotechnical Engineering Limited

# POINT LOAD STRENGTH TEST

**I.S.R.M. Suggested Methods : 2007 Edition**

CLIENT CARD GEOTECHNICS LIMITED

SITE BICESTER GOLF COURSE, BICESTER

| borehole /trial pit no. | sample depth (m) | test type | test orien-tation | moisture condition | width W (mm) | length L (mm) | platen sep. D (mm) | failure load P (kN) | equiv. diam. De (mm) | Is (MPa) | size factor | Is(50) (MPa) | description and remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH04 | 18.00 | A | X | P | 80 | | 40 | 0.42 | 63.83 | 0.10 | 1.12 | 0.12 | Grey MUDSTONE |
| BH04 | 18.00 | D | Y | P | | 80 | 90 | 0.30 | 90.00 | 0.04 | 1.30 | 0.05 | Grey MUDSTONE |
| BH04 | 19.50 | D | Y | P | | 120 | 90 | 13.33 | 90.00 | 1.65 | 1.30 | 2.14 | Grey LIMESTONE |
| BH04 | 19.50 | A | X | P | 120 | | 80 | 14.75 | 110.56 | 1.21 | 1.43 | 1.72 | Grey LIMESTONE |
| BH04 | 4.20 | D | Y | P | | 70 | 90 | 0.72 | 90.00 | 0.09 | 1.30 | 0.12 | Grey MUDSTONE |
| BH04 | 4.20 | A | X | P | 70 | | 40 | 0.43 | 59.71 | 0.12 | 1.08 | 0.13 | Grey MUDSTONE |
| BH04 | 5.00 | D | Y | P | | 50 | 90 | 0.26 | 90.00 | 0.03 | 1.30 | 0.04 | Grey MUDSTONE |
| BH04 | 5.00 | A | X | P | 50 | | 40 | 0.14 | 50.46 | 0.05 | 1.00 | 0.06 | Grey MUDSTONE |
| BH07 | 3.00 | A | X | P | 70 | | 40 | 0.98 | 59.71 | 0.27 | 1.08 | 0.30 | Grey MUDSTONE |
| BH07 | 3.00 | D | Y | P | | 70 | 90 | 0.41 | 90.00 | 0.05 | 1.30 | 0.07 | Grey MUDSTONE |
| BH07 | 4.00 | A | X | P | 50 | | 40 | 0.35 | 50.46 | 0.14 | 1.00 | 0.14 | Grey MUDSTONE |
| BH07 | 4.00 | D | Y | P | | 50 | 90 | 0.61 | 90.00 | 0.08 | 1.30 | 0.10 | Grey MUDSTONE |
| BH07 | 4.80 | A | X | P | 80 | | 50 | 0.23 | 71.36 | 0.05 | 1.17 | 0.05 | Grey MUDSTONE |
| BH07 | 4.80 | D | Y | P | | 80 | 90 | 0.42 | 90.00 | 0.05 | 1.30 | 0.07 | Grey MUDSTONE |

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

| test type | test orientation relative to discontinuities | | moisture condition | CONTRACT | CHECKED |
|---|---|---|---|---|---|
| A - axial | X - perpendicular | U - unknown | N - natural moisture content | | |
| D - diametral | Y - parallel | | P - partially air dried | **36740** | **TB** |
| I - irregular lump | Z - oblique | | S - soaked | | |

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

# Final Report

| | |
|---|---|
| **Report No.:** | 21-42709-1 |
| **Initial Date of Issue:** | 09-Dec-2021 |
| **Client** | Geotechnical Engineering Ltd |
| **Client Address:** | Centurion House<br>Olympus Park<br>Quedgeley<br>Gloucester<br>Gloucestershire<br>GL2 4NF |
| **Contact(s):** | GEL<br>Tom Best |
| **Project** | 36740 Bicester Golf Course, Bicester |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 03-Dec-2021 |
| **Order No.:** | 5492 | **Date Instructed:** | 03-Dec-2021 |
| **No. of Samples:** | 2 | | |
| **Turnaround (Wkdays):** | 5 | **Results Due:** | 09-Dec-2021 |
| **Date Approved:** | 09-Dec-2021 | | |

**Approved By:**

[redacted]

**Details:** Glynn Harvey, Technical Manager

# Results - Soil

**Project: 36740 Bicester Golf Course, Bicester**

| **Client: Geotechnical Engineering Ltd** | | | **Chemtest Job No.:** | | 21-42709 | 21-42709 |
|---|---|---|---|---|---|---|
| Quotation No.: | | | **Chemtest Sample ID.:** | | 1333030 | 1333031 |
| Order No.: 5492 | | | Client Sample Ref.: | | 15 | 4 |
| | | | Sample Location: | | BH04 | BH07 |
| | | | Sample Type: | | SOIL | SOIL |
| | | | Top Depth (m): | | 4.00 | 1.60 |
| | | | Bottom Depth (m): | | 5.50 | 2.60 |
| | | | Date Sampled: | | 01-Dec-2021 | 01-Dec-2021 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| Moisture | N | 2030 | % | 0.020 | 38 | 23 |
| pH (2.5:1) | N | 2010 | | 4.0 | 8.2 | 8.2 |
| Magnesium (Water Soluble) | N | 2120 | g/l | 0.010 | < 0.010 | < 0.010 |
| Sulphate (2:1 Water Soluble) as SO4 | U | 2120 | g/l | 0.010 | 0.31 | 0.017 |
| Total Sulphur | U | 2175 | % | 0.010 | 0.68 | 0.052 |
| Chloride (Water Soluble) | U | 2220 | g/l | 0.010 | < 0.010 | < 0.010 |
| Nitrate (Water Soluble) | N | 2220 | g/l | 0.010 | < 0.010 | < 0.010 |
| Sulphate (Acid Soluble) | U | 2430 | % | 0.010 | 0.099 | 0.029 |

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 2010 | pH Value of Soils | pH | pH Meter |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium | Boron; Sulphate; Magnesium; Chromium | Aqueous extraction / ICP-OES |
| 2175 | Total Sulphur in Soils | Total Sulphur | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser. |
| 2220 | Water soluble Chloride in Soils | Chloride | Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate. |
| 2430 | Total Sulphate in soils | Total Sulphate | Acid digestion followed by determination of sulphate in extract by ICP-OES. |

## Report Information

**Key**

| | |
|---|---|
| U | UKAS accredited |
| M | MCERTS and UKAS accredited |
| N | Unaccredited |
| S | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis |
| SN | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T | This analysis has been subcontracted to an unaccredited laboratory |
| I/S | Insufficient Sample |
| U/S | Unsuitable Sample |
| N/E | not evaluated |
| < | "less than" |
| > | "greater than" |
| SOP | Standard operating procedure |
| LOD | Limit of detection |

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

**Sample Retention and Disposal**

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

# TEST CERTIFICATE

**DETERMINATION OF LIQUID AND PLASTIC LIMITS**
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

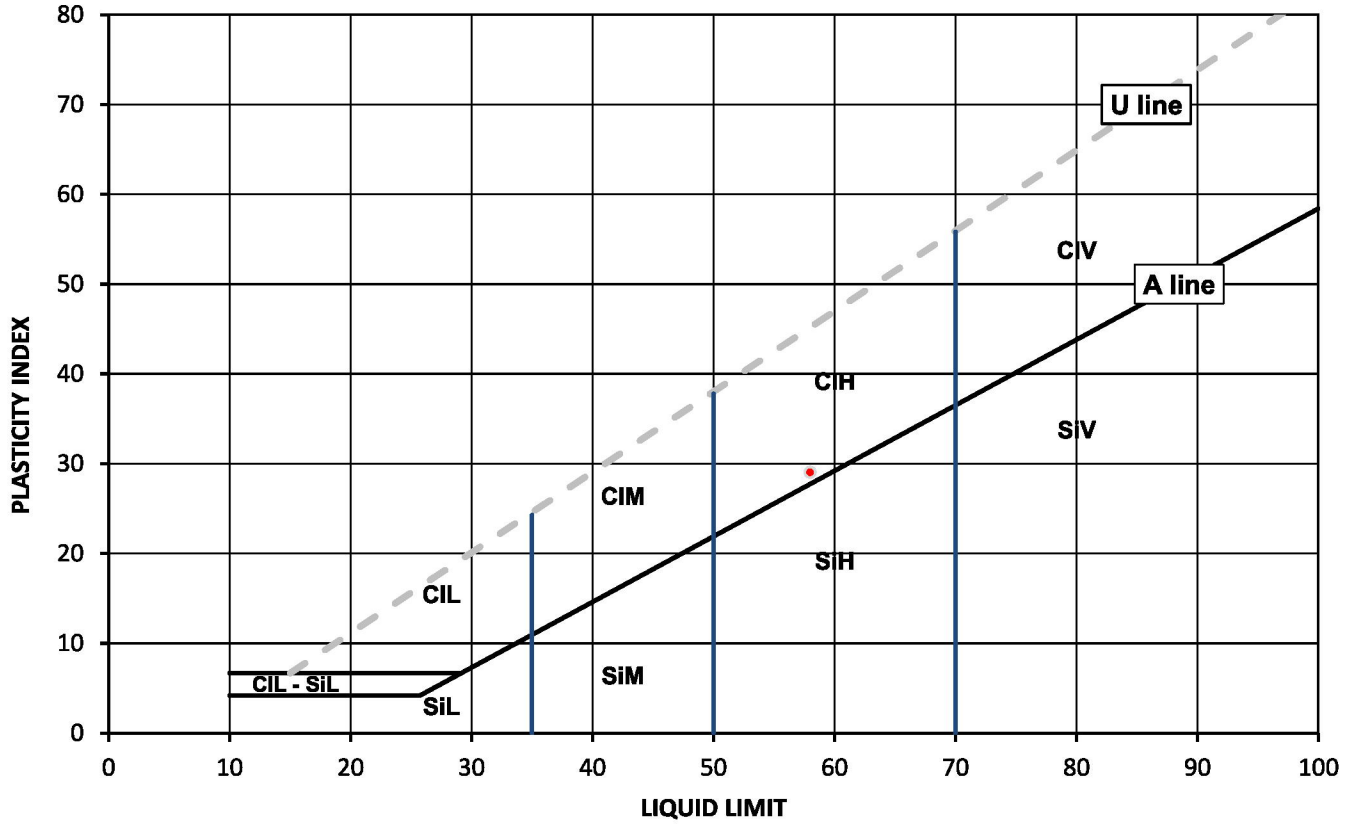
| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | Palatine House, Unit 2,<br>Sigford Road, Exeter,<br>EX2 8NL | Job Number: | 21-26639 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 02/11/2021 |
| Contact: | Amir Abbasi | Date Tested: | 06/12/2021 |
| Site Address: | Bicester Golf Course, Bicester | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2103485 | Depth Top [m]: | 8.50 |
| Hole No.: | BH04 | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | C |
| Sample Description: | Grey slightly gravelly slightly sandy CLAY | | |
| Sample Preparation: | Tested after washing to remove >425um | | |

| As Received Moisture Content [ W ] % | Liquid Limit [ WL ] % | Plastic Limit [ Wp ] % | Plasticity Index [ Ip ] % | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 30 | 58 | 29 | 29 | 84 |




Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

| | | Plasticity | | Liquid Limit |
|---|---|---|---|---|
| Cl | Clay | L | Low | below 35 |
| Si | Silt | M | Medium | 35 to 50 |
| | | H | High | 50 to 70 |
| | | V | Very high | exceeding 70 |
| | | O | Organic | append to classification for organic material ( eg ClHO ) |

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

Remarks:



**Signed:** [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 14/12/2021

**GF 232.11**

# TEST CERTIFICATE

**DETERMINATION OF LIQUID AND PLASTIC LIMITS**
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | Card Geotechnics Ltd | Client Reference: | CG39017 |
| Client Address: | Palatine House, Unit 2,<br>Sigford Road, Exeter,<br>EX2 8NL | Job Number: | 21-26639 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 02/11/2021 |
| Contact: | Amir Abbasi | Date Tested: | 10/12/2021 |
| Site Address: | Bicester Golf Course, Bicester | Sampled By: | Not Given |

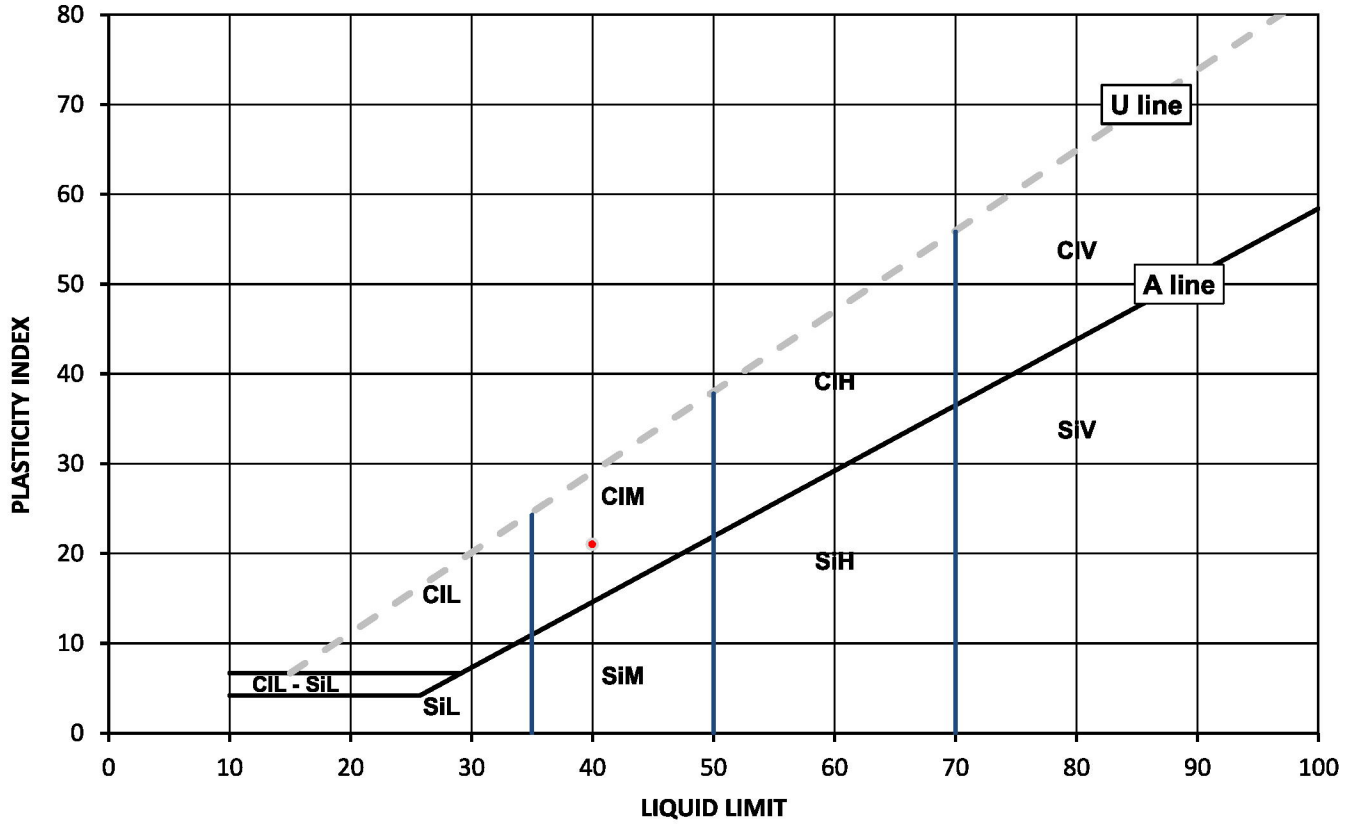
*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2103486 | Depth Top [m]: | 5.50 |
| Hole No.: | BH05 | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | Grey sandy CLAY | | |

Sample Preparation: Tested in natural condition

| As Received Moisture Content [ W ] % | Liquid Limit [ WL ] % | Plastic Limit [ Wp ] % | Plasticity Index [ Ip ] % | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 15 | 40 | 19 | 21 | 100 |




Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

| | | Plasticity | | Liquid Limit |
|---|---|---|---|---|
| Cl | Clay | L | Low | below 35 |
| Si | Silt | M | Medium | 35 to 50 |
| | | H | High | 50 to 70 |
| | | V | Very high | exceeding 70 |
| | | O | Organic | append to classification for organic material ( eg ClHO ) |

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

Remarks:



**Signed:** [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 14/12/2021

**GF 232.11**

# SUMMARY REPORT

## SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Card Geotechnics Ltd

Client Address: Palatine House, Unit 2, Sigford Road, Exeter, EX2 8NL

Contact: Amir Abbasi

Site Address: Bicester Golf Course, Bicester

Client Reference: CG39017
Job Number: 21-26639
Date Sampled: Not Given
Date Received: 02/11/2021
Date Tested: 06/12 - 10/12/2021
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

### Test results

| Laboratory Reference | Hole No. | Sample | | | | Description | Remarks | Moisture Content [ W ] | Water Content [ W ] | Atterberg | | | | Density | | | Total Porosity# | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Reference | Depth Top | Depth Base | Type | | | | | % Passing 425um | WL | Wp | Ip | bulk | dry | PD | | | |
| | | | m | m | | | | % | % | % | % | % | % | Mg/m3 | Mg/m3 | Mg/m3 | % | | |
| 2103485 | BH04 | Not Given | 8.50 | Not Given | C | Grey slightly gravelly slightly sandy CLAY | Atterberg 1 Point | 30 | | 84 | 58 | 29 | 29 | | | | | | |
| 2103486 | BH05 | Not Given | 5.50 | Not Given | D | Grey sandy CLAY | Atterberg 1 Point | 15 | | 100 | 40 | 19 | 21 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | |

Note: # Non accredited; NP - Non plastic

Comments:



Signed: [redacted]

Anna Dudzinska
Deputy Head of Geo Office Section
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 14/12/2021

# APPENDIX J

*CGL Contamination Assessment Tables*

## ASSESSMENT CRITERIA

Table J1 below sets out CGL's rationale for generic assessment criteria (GAC) adoption in order to evaluate risks posed to potential receptors at the site from identified chemical contamination. Potential receptors have been identified with reference to the Part IIA regime and associated DEFRA guidance. As with the Part IIA regime, under the planning regime all receptors (humans, controlled waters, ecology and buildings) have been considered if there is the potential for them to be adversely affected by exposure to contamination. The results of the assessment for the site are then presented in Tables J2 to J6 of this appendix.

***Table J1. Rationale for Assessment Criteria Adoption***

| Source / Media | CGL's Approach & Rationale |
|---|---|
| *Risks to Human Health (long-term chronic risks)* | |
| Soil contaminants | • Laboratory test results have been compared against Generic Assessment Criteria (GACs) derived in-house by CGL using the Contaminated Land Exposure Assessment (CLEA) model and version 1.071 of the CLEA software. Where Soil Guideline Values (SGVs) have been published previously by the Environment Agency, the CGL GACs have updated these based on current exposure parameters (e.g. updated inhalation rates).<br>• The GACs have been generated assuming a sandy loam soil type and a Soil Organic Material 1%<br>• In the event impacts are identified on a site above the GAC level for arsenic, cadmium, chromium VI, benzene or benzo(a)pyrene, the results have been compared to the applicable Category 4 Screening Level (C4SL) published by DEFRA to further assess risks.<br>• The exception to the above relates to lead. The SGV for lead has been withdrawn and the C4SL for lead is used by CGL directly as a first tier of assessment.<br>• The CGL GACs represent conservative screening criteria (set at acceptable or minimal risk) and have generally been calculated using the default parameters for the standard land use scenarios set out in the CLEA technical report and toxicological inputs in line with the requirements of Science Report SC050021/SR2 and, in the case of petroleum hydrocarbons, Science Report P5-080/TR3.<br>• Where a CGL GAC has not been derived alternative assessment criteria will be sourced from current commercially-available sources (including international standards where no suitable UK assessment criteria exists).<br>• Concentrations of cyanide above the laboratory reporting limit are assessed against a Soil Screening Value (SSV) developed by Atkins. Atkins have based this assessment criteria on acute exposure to a 0 to 6 year old child.<br>• Where the dataset is of appropriate size, assessment against the applicable GAC or C4SL is carried out at the 95$^{th}$ percentile of the sample mean (designated $US_{95}$), which is considered to represent a reasonable worst-case scenario. An assessment of the normality of the data has been undertaken. Where datasets are normally distributed the one sample t-test has been applied to calculate the $US_{95}$. In the case of non-parametric datasets, the Chebychev Theorem has been applied. The Grubbs Test has also been used to identify potential outliers within datasets.<br>• It is noted that the British Geological Survey has published background levels for a number of organic and inorganic constituents. In the event that the C4SL or a GAC is found to be exceeded, the risk may still be considered to be low, unlikely to meet the definition of contaminated land under Part IIA and potentially suitable for use from a development perspective, if the contaminant concentrations are below local background levels, assuming no other contributing factors.<br>• At this time an authoritative GAC is not available for asbestos fibres in soil. A positive identification of asbestos fibres in a soil sample by the laboratory is considered sufficient to warrant additional assessment of risks. Laboratory identification and quantification by microscopy may be required subject to source of material. |
| Dissolved contaminants | • Concentrations of organic constituents detected above the laboratory reporting limit in shallow groundwater or perched water have been assessed against groundwater vapour generic assessment criteria ($GAC_{gwvap}$) developed by the Society of Brownfield Remediation Risk Assessment (SoBRA). These assess chronic risks to human health via the indoor and outdoor air inhalation pathway only. The values assume a sand soil type, a soil organic matter of 1% and a depth below ground level of 650mm. |
| Ground gas | • Concentrations and flow rates of carbon dioxide and methane in ground gas are converted to Gas Screening Values (GSVs) in accordance with CIRIA (2007). Potential risks associated with gas chemistry are evaluated in accordance with guidance presented in CIRIA (2007), NHBC (2007), BSI (2007). |

| Source / Media | CGL's Approach & Rationale |
|---|---|
| Radon | • Risks from the radon content of soil gas are evaluated in accordance with BRE (2011). |
| *Risks to Controlled Waters* | |
| Soil contaminants | • Results from any eluted liquids have been directly compared to Environmental Quality Standards (EQS)) as an initial screen of water quality. These are considered to be conservative screening criteria. |
| | |
| *Risks to Buildings & Structures* | |
| Water supply pipes | • The evaluation of water supply pipe requirements at the site has been undertaken in general accordance with guidance and criteria produced by the UK Water Industry (2011). |
| Sulfate & pH conditions | • The evaluation of risks to buried concrete has followed the guidance and criteria produced by BRE (2005). |
| | |
| *Risks to Vegetation & Plants* | |
| Soil contaminants | • Risks to plant growth (i.e. phytotoxicity) have been assessed for specific contaminants where the limits for phytotoxic effect proposed (e.g. by BS 3882) are significantly lower than the health GAC. |

**Job Number: CG/39017**
**Job Reference: Bicester Golf Club, Bicester**

| Table J2. Data assessment summary - potential soil risks to human health | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Land Use Category:** | | **Commercial** | | | | | **SOM:** | 1.00% |
| **Stratum:** | | **[TOPSOIL]** | | | | | **No. Samples** | 4 |
| **Determinand** | **GAC** mg/kg | **SSL** mg/kg (See Note A) | **Min recorded (mg/kg)** | **Max recorded (mg/kg)** | **No. Samples exceeding GAC** | **No. Samples exceeding SSL** | **$US_{95}$ (mg/kg)** | **$US_{95}$ > GAC** |
| Arsenic | 323 | - | 16 | 26 | 0 | 0 | NA | OK |
| Beryllium | 11.6 | - | 0.82 | 1.1 | 0 | 0 | NA | OK |
| Boron | 236000 | - | 0.2 | 2.4 | 0 | 0 | NA | OK |
| Cadmium | 188 | - | < 0.2 | < 0.2 | 0 | 0 | NA | OK |
| Chromium (III) | 8350 | - | 21 | 28 | 0 | 0 | NA | OK |
| Chromium (VI) | 32.2 | - | < 1.2 | < 1.2 | 0 | 0 | NA | OK |
| Copper | 68300 | - | 11 | 21 | 0 | 0 | NA | OK |
| Lead (note E) | 2300 | - | 19 | 25 | 0 | 0 | NA | OK |
| Mercury | 1190 | - | < 0.3 | < 0.3 | 0 | 0 | NA | OK |
| Nickel | 983 | - | 18 | 24 | 0 | 0 | NA | OK |
| Selenium | 13000 | - | < 1 | < 1 | 0 | 0 | NA | OK |
| Vanadium | 6360 | - | 40 | 54 | 0 | 0 | NA | OK |
| Zinc | 728000 | - | 54 | 90 | 0 | 0 | NA | OK |
| Benzene | 36.7 | - | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Toluene | 73700 | 869 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Ethyl benzene | 21000 | 518 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| m-Xylene | 8220 | 625 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| o-Xylene | 8820 | 478 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| p-Xylene | 7920 | 576 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Total Phenols (note C) | 33800 | - | < 1 | < 1 | 0 | 0 | NA | OK |
| Total Cyanide (note D) | 34 | - | < 1 | < 1 | 0 | 0 | NA | OK |
| Aliphatic EC5-6 | 3560 | 372 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Aliphatic EC6-8 | 7620 | 171 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Aliphatic EC8-10 | 1670 | 84.7 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Aliphatic EC10-12 | 8170 | 50.2 | < 1 | < 1 | 0 | 0 | NA | OK |
| Aliphatic EC12-16 | 49300 | 22.2 | < 2 | < 2 | 0 | 0 | NA | OK |
| Aliphatic EC16-35 | 1910000 | - | < 16 | < 16 | 0 | 0 | NA | OK |
| Aromatic EC5-7 | 36.5 | - | 0 | 0 | 0 | 0 | NA | OK |
| Aromatic EC7-8 | 73700 | 869 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Aromatic EC8-10 | 2650 | 620 | < 0.001 | < 0.001 | 0 | 0 | NA | OK |
| Aromatic EC10-12 | 12700 | 372 | < 1 | < 1 | 0 | 0 | NA | OK |
| Aromatic EC12-16 | 31900 | 170 | < 2 | < 2 | 0 | 0 | NA | OK |
| Aromatic EC16-21 | 28600 | - | < 10 | < 10 | 0 | 0 | NA | OK |
| Aromatic EC21-35 | 28600 | - | < 10 | < 10 | 0 | 0 | NA | OK |
| Naphthalene | 247 | 76.4 | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Acenaphthylene | 75800 | 86.1 | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Acenaphthene | 76000 | 57 | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Fluorene | 59700 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Phenanthrene | 22200 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Anthracene | 514000 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Fluoranthene | 22400 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Pyrene | 53800 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Benzo(a)Anthracene | 171 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Chrysene | 347 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Benzo(b)fluoranthene | 44.3 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Benzo(k)fluoranthene | 1170 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Benzo(a)Pyrene | 35.2 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Indeno(1,2,3,cd)pyrene | 502 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Dibenzo(a,h)anthracene | 3.84 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Benzo(g,h,i)perylene | 3930 | - | < 0.05 | < 0.05 | 0 | 0 | NA | OK |
| Asbestos in Soils | (Number of samples in which Asbestos detected) | | | | 0 | 0 | NA | OK |

| Table J2. Data assessment summary - potential soil risks to human health | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Land Use Category:** | | **Commercial** | | | | | **SOM:** | 1.00% |
| **Stratum:** | | **[TOPSOIL]** | | | | | **No. Samples** | 4 |
| **Determinand** | **GAC** mg/kg | **SSL** mg/kg (See Note A) | **Min recorded (mg/kg)** | **Max recorded (mg/kg)** | **No. Samples exceeding GAC** | **No. Samples exceeding SSL** | **$US_{95}$ (mg/kg)** | **$US_{95}$ > GAC** |

A. SSL (Soil Saturation Limit) presented for contaminants where GAC exceeds the calculated saturation limit using CLEA. Where the SSL is exceeded, there is the potential for free product.

B. Concentrations for total xylenes should be compared against m-xylene for fresh spills and o-xylene for all other cases.

C. GAC relates to phenol ($C_6H_5OH$) only.

D. Cyanide GAC based on acute exposure of 0-6 year old child (Atkins value).

E. Published C4SL.

E. Published C4SL.

E. Published C4SL.

| Table J3. Data assessment summary - potential soil risks to human health | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Land Use Category:** | | **Commercial** | | | | | **SOM:** | 1.00% |
| **Stratum:** | | **[WEATHERED CORNBRASH FORMATION]** | | | | | **No. Samples** | 11 |
| **Determinand** | **GAC** mg/kg | **SSL** mg/kg (See Note A) | **Min recorded (mg/kg)** | **Max recorded (mg/kg)** | **No. Samples exceeding GAC** | **No. Samples exceeding SSL** | **$US_{95}$ (mg/kg)** | **$US_{95}$ > GAC** |
| Arsenic | 323 | - | 6.7 | 28 | 0 | 0 | 20.81 | OK |
| Beryllium | 11.6 | - | 0.48 | 1 | 0 | 0 | 1.06 | OK |
| Boron | 236000 | - | < 0.2 | 2.1 | 0 | 0 | 1.46 | OK |
| Cadmium | 188 | - | < 0.2 | < 0.2 | 0 | 0 | 0.10 | OK |
| Chromium (III) | 8350 | - | 11 | 31 | 0 | 0 | 30.40 | OK |
| Chromium (VI) | 32.2 | - | < 1.2 | < 1.2 | 0 | 0 | 0.60 | OK |
| Copper | 68300 | - | 3.3 | 40 | 0 | 0 | 25.37 | OK |
| Lead (note E) | 2300 | - | 6.9 | 67 | 0 | 0 | 40.93 | OK |
| Mercury | 1190 | - | < 0.3 | < 0.3 | 0 | 0 | 0.15 | OK |
| Nickel | 983 | - | 8.6 | 26 | 0 | 0 | 21.78 | OK |
| Selenium | 13000 | - | < 1 | < 1 | 0 | 0 | 0.50 | OK |
| Vanadium | 6360 | - | 20 | 130 | 0 | 0 | 70.99 | OK |
| Zinc | 728000 | - | 30 | 100 | 0 | 0 | 62.80 | OK |
| Benzene | 36.7 | - | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Toluene | 73700 | 869 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Ethyl benzene | 21000 | 518 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| m-Xylene | 8220 | 625 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| o-Xylene | 8820 | 478 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| p-Xylene | 7920 | 576 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Total Phenols (note C) | 33800 | - | < 1 | < 1 | 0 | 0 | 0.50 | OK |
| Total Cyanide (note D) | 34 | - | < 1 | < 1 | 0 | 0 | 0.50 | OK |
| Aliphatic EC5-6 | 3560 | 372 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Aliphatic EC6-8 | 7620 | 171 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Aliphatic EC8-10 | 1670 | 84.7 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Aliphatic EC10-12 | 8170 | 50.2 | < 1 | < 1 | 0 | 0 | 0.50 | OK |
| Aliphatic EC12-16 | 49300 | 22.2 | < 2 | < 2 | 0 | 0 | 1.00 | OK |
| Aliphatic EC16-35 | 1910000 | - | < 16 | < 16 | 0 | 0 | 8.00 | OK |
| Aromatic EC5-7 | 36.5 | - | 0 | 0 | 0 | 0 | 0.00 | OK |
| Aromatic EC7-8 | 73700 | 869 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Aromatic EC8-10 | 2650 | 620 | < 0.001 | < 0.001 | 0 | 0 | 0.00 | OK |
| Aromatic EC10-12 | 12700 | 372 | < 1 | < 1 | 0 | 0 | 0.50 | OK |
| Aromatic EC12-16 | 31900 | 170 | < 2 | < 2 | 0 | 0 | 1.00 | OK |
| Aromatic EC16-21 | 28600 | - | < 10 | < 10 | 0 | 0 | 5.00 | OK |
| Aromatic EC21-35 | 28600 | - | < 10 | < 10 | 0 | 0 | 5.00 | OK |
| Naphthalene | 247 | 76.4 | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Acenaphthylene | 75800 | 86.1 | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Acenaphthene | 76000 | 57 | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Fluorene | 59700 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Phenanthrene | 22200 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Anthracene | 514000 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Fluoranthene | 22400 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Pyrene | 53800 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Benzo(a)Anthracene | 171 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Chrysene | 347 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Benzo(b)fluoranthene | 44.3 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Benzo(k)fluoranthene | 1170 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Benzo(a)Pyrene | 35.2 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Indeno(1,2,3,cd)pyrene | 502 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Dibenzo(a,h)anthracene | 3.84 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Benzo(g,h,i)perylene | 3930 | - | < 0.05 | < 0.05 | 0 | 0 | 0.03 | OK |
| Asbestos in Soils | (Number of samples in which Asbestos detected) | | | | 0 | 0 | 0.00 | 0 |

| Table J3. Data assessment summary - potential soil risks to human health | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Land Use Category:** | | **Commercial** | | | | | **SOM:** | 1.00% |
| **Stratum:** | | **[WEATHERED CORNBRASH FORMATION]** | | | | | **No. Samples** | 11 |
| **Determinand** | **GAC** mg/kg | **SSL** mg/kg (See Note A) | **Min recorded (mg/kg)** | **Max recorded (mg/kg)** | **No. Samples exceeding GAC** | **No. Samples exceeding SSL** | **$US_{95}$ (mg/kg)** | **$US_{95}$ > GAC** |

A. SSL (Soil Saturation Limit) presented for contaminants where GAC exceeds the calculated saturation limit using CLEA. Where the SSL is exceeded, there is the potential for free product.

B. Concentrations for total xylenes should be compared against m-xylene for fresh spills and o-xylene for all other cases.

C. GAC relates to phenol ($C_6H_5OH$) only.

D. Cyanide GAC based on acute exposure of 0-6 year old child (Atkins value).

E. Published C4SL.

E. Published C4SL.

E. Published C4SL.

| Table J4. Data assessment summary - potential risks to groundwater | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Water Body** | | **Freshwater** | | | | | |
| **Determinand** | **Freshwater EQS[1] (µg/l)** | **EC Drinking Water Value (µg/l)** | **Min recorded (µg/l)** | **Max recorded (µg/l)** | **Bioavailable concentration (µg/l)** | **No. Samples Exceeding EQS** | **No. Samples Exceeding DWV** |
| Arsenic | 50 | 10 | <1.0 | 11 | - | 0 of 5 | 0 of 5 |
| Cadmium | 0.08 | 5 | <0.08 | <0.08 | - | 0 of 5 | 0 of 5 |
| Chromium (VI) | 3.4 | 50 | <5.0 | <5.0 | - | 0 of 5 | 0 of 5 |
| Chromium (III) | 4.7 | 50 | <1.0 | 1.6 | - | 0 of 5 | 0 of 5 |
| Lead | 7.2 | 10 | <1.0 | 3.6 | - | 0 of 5 | 0 of 5 |
| Mercury | 0.07 | 1 | <0.5 | <0.5 | - | 0 of 5 | 0 of 5 |
| Selenium | * | 10 | <4.0 | <4.0 | - | 0 of 5 | 0 of 5 |
| Boron | * | 1000 | 11 | 160 | - | 0 of 5 | 0 of 5 |
| Copper | 1 | 2000 | 2.5 | 11 | 0.1 to 0.29 | 0 of 5 | 0 of 5 |
| Nickel | 4 | 20 | 3.8 | 5 | 0.73 to 2.14 | 0 of 5 | 0 of 5 |
| Zinc | 10.9 | 5000 | 9.1 | 13 | 1.44 to 4.62 | 0 of 5 | 0 of 5 |
| Barium | * | 1000 | 5.6 | 10 | - | 0 of 5 | 0 of 5 |
| Beryllium | 15 | * | 0.3 | 1.1 | - | 0 of 5 | 0 of 5 |
| Total Phenols (monohydric) | 7.7 | 0.5 | <1.0 | <1.0 | - | 0 of 5 | 0 of 5 |
| Total Cyanide | 1 | 50 | <1.0 | <1.0 | - | 0 of 5 | 0 of 5 |
| Total Sulphate as SO4 (mg/l) | * | 250 | 0.67 | 3.38 | - | 0 of 5 | 0 of 5 |
| TPH | * | 10 | <10 | <10 | - | 0 of 5 | 0 of 5 |
| PAH | * | 0.1 | <0.2 | <0.2 | - | 0 of 5 | 0 of 5 |
| Anthracene | 0.1 | * | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| Benzo(a)pyrene | 0.02 | 0.01 | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| Fluoranthene | 0.1 | * | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| Naphthalene | 2 | * | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| Benzene | 10 | 1 | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| Toluene | 74 | * | <0.01 | <0.01 | - | 0 of 5 | 0 of 5 |
| pH | 6.0 - 9.0 | 6.5 to 10 | 7.5 | 8 | - | 0 of 5 | 0 of 5 |

Notes:

1 Annual Averages prescribed within The River Basin Districts Typology, Standards and Groundwater threshold values. (Water Framework Directive) (England and Wales)

2 This value relates to total chromium.

3 * = No values defined or given.

4 3.76 µg/l dissolved where DOC < 1mg. 3.76 + (2.677 x ((DOC/2) – 0.5)) µg/l dissolved, where DOC > 1mg/l.

5 6.8 µg/l dissolved zinc plus ambient background concentration (µg/l) of 1.1 µg/l recommended for saltwater.

6 Concentration formerly prescribed within the Water Supply (Water Quality) Regulations 1989.

7 Dutch Indication Level of Serious Contamination

8 Drinking water standard based on total cyanide.

9 Sum concentration of 4 PAH comprising benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene.

10 The previous published value for benzo(a)pyrene and fluoranthene is given in the table, and the current published value is given in square brackets. The square brackets value

***Table J5a Data assessment summary – potential soil risk to vegetation and plants – Topsoil***

| Determinant | Assessment Criteria (mg/kg) | Measured range (mg/kg) | Measured range > Assessment Criteria? (Y/N) |
|---|---|---|---|
| Copper[1] | 135 | 11 to 21 | N |
| Zinc[1] | 200 | 54 to 90 | N |
| Nickel[1] | 75 | 18 to 24 | N |
| Boron (water soluble)[2] | 5 | 0.2 to 2.4 | N |

***Table J5b. Data assessment summary – potential soil risk to vegetation and plants – Natural strata***

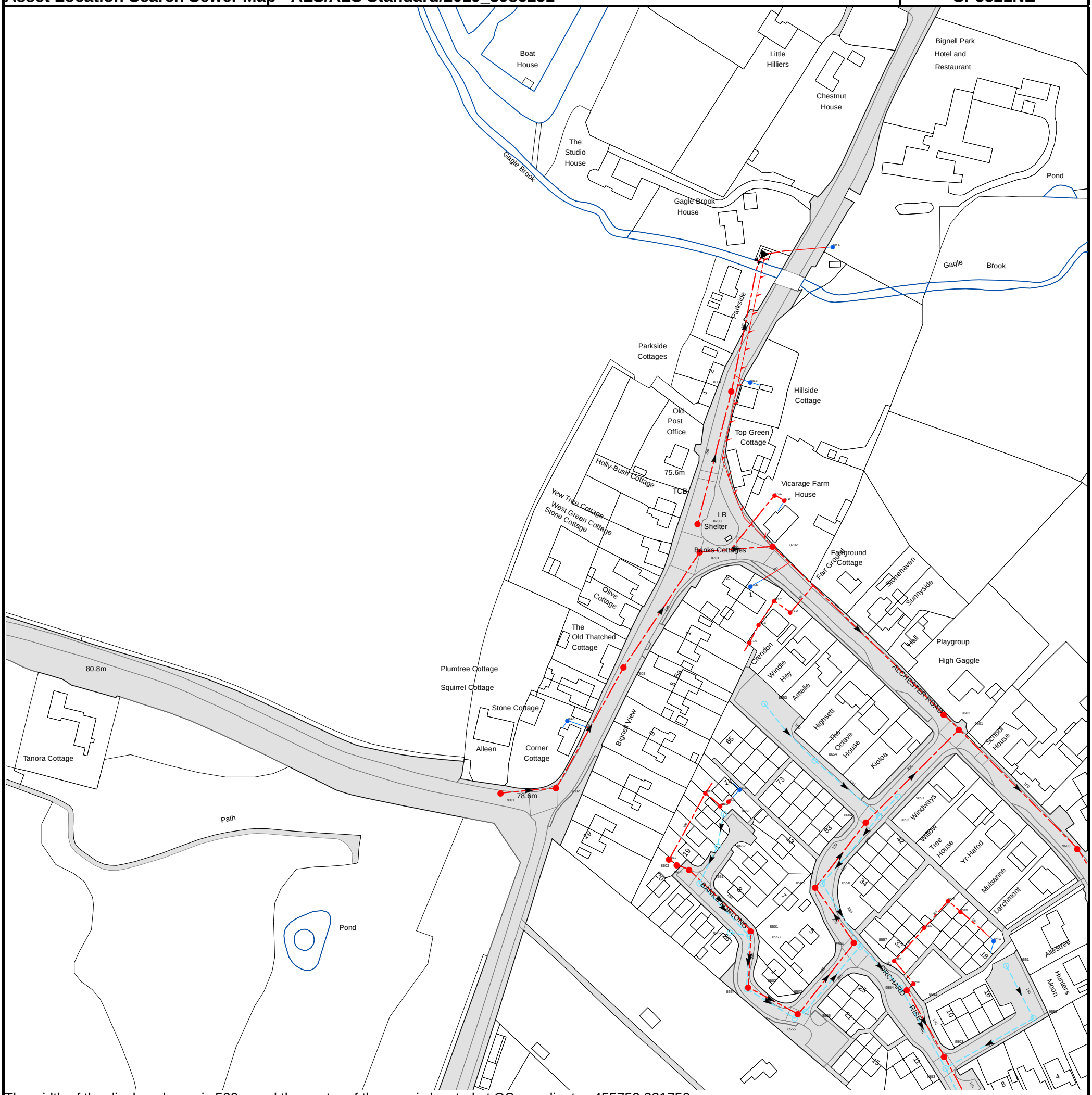
| Determinant | Assessment Criteria (mg/kg) | Measured range (mg/kg) | Measured range > Assessment Criteria? (Y/N) |
|---|---|---|---|
| Copper[3] | 135 | 3.3 to 40 | N |
| Zinc[1] | 200 | 30 to 100 | N |
| Nickel[1] | 75 | 8.6 to 26 | N |
| Boron (water soluble)[4] | 5 | <0.2 to 2.1 | N |

[1] BSI, (2015). *Specification for topsoil and requirements for use. BS 3882:2015*. Values taken for pH 6-7
[2] Limit for phytotoxic effect. Nable, Banuelos and Paul, (1997). *Boron Toxicity*. Plant and Soil, Volume 193, pp 181-198
[3] BSI, (2015). *Specification for topsoil and requirements for use. BS 3882:2015*. Values taken for pH 6-7
[4] Limit for phytotoxic effect. Nable, Banuelos and Paul, (1997). *Boron Toxicity*. Plant and Soil, Volume 193, pp 181-198

C Thames Water Records

# Asset Location Search Sewer Map - ALS/ALS Standard/2019_3986151

**SP5521NE**




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,221750

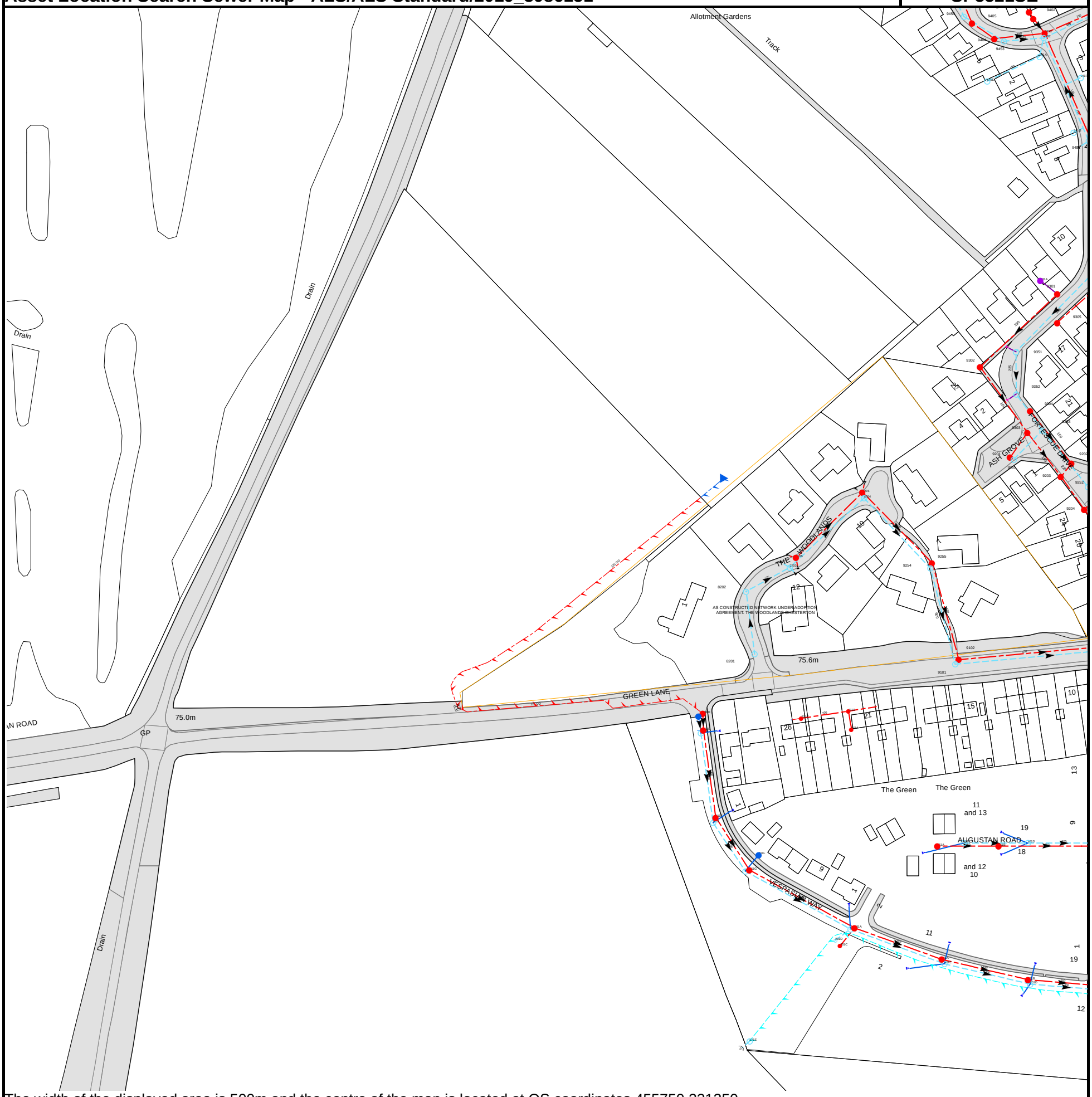
**The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.**

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 9652 | 77.34 | 75.7 |
| 8651 | 77.99 | 76.64 |
| 861M | n/a | n/a |
| 861L | n/a | n/a |
| 9651 | 77.25 | 75.8 |
| 861N | n/a | n/a |
| 7601 | 78.74 | 77.54 |
| 861K | n/a | n/a |
| 7602 | 78.11 | 75.86 |
| 8654 | 77.49 | 76.06 |
| 9601 | 76.41 | 74.46 |
| 9602 | 76.44 | 74.56 |
| 8653 | 77.58 | 76.29 |
| 7603 | 77.63 | 75.56 |
| 871A | n/a | n/a |
| 871B | n/a | n/a |
| 871D | n/a | n/a |
| 871C | n/a | n/a |
| 871E | n/a | n/a |
| 8701 | 76.71 | 75.26 |
| 8702 | 76.46 | 74.91 |
| 8703 | 76.56 | 75.09 |
| 871F | n/a | n/a |
| 871G | n/a | n/a |
| 8801 | 76.69 | 75.32 |
| 881B | n/a | n/a |
| 881A | n/a | n/a |
| 9552 | 76.3 | 75.23 |
| 9551 | 76.43 | 75.44 |
| 951A | n/a | n/a |
| 9603 | 75.96 | 74.14 |
| 9553 | 76.54 | 75.13 |
| 9503 | 76.52 | 74.79 |
| 8555 | 77.65 | 75.69 |
| 8503 | 77.64 | 75.79 |
| 8556 | 77.63 | 75.64 |
| 9502 | 76.9 | 74.96 |
| 8554 | 77.86 | 75.92 |
| 8502 | 77.88 | 75.95 |
| 9554 | 76.93 | 75.26 |
| 9501 | 77.08 | 75.18 |
| 951E | n/a | n/a |
| 8557 | 77.27 | 75.35 |
| 8504 | 77.24 | 75.44 |
| 8553 | 77.75 | 76.1 |
| 8552 | 77.97 | 76.35 |
| 8501 | 77.74 | 76.14 |
| 951C | n/a | n/a |
| 951D | n/a | n/a |
| 951B | n/a | n/a |
| 8505 | 77.53 | 75.18 |
| 8558 | 77.49 | 75.57 |
| 8551 | 77.96 | 76.14 |
| 8603 | 77.93 | 76.49 |
| 8602 | 78.04 | 76.61 |
| 8601 | 78.06 | 76.65 |
| 8652 | 77.94 | 76.45 |
| 8604 | 77.29 | 74.92 |

# Asset Location Search Sewer Map - ALS/ALS Standard/2019_3986151

**SP5521SE**



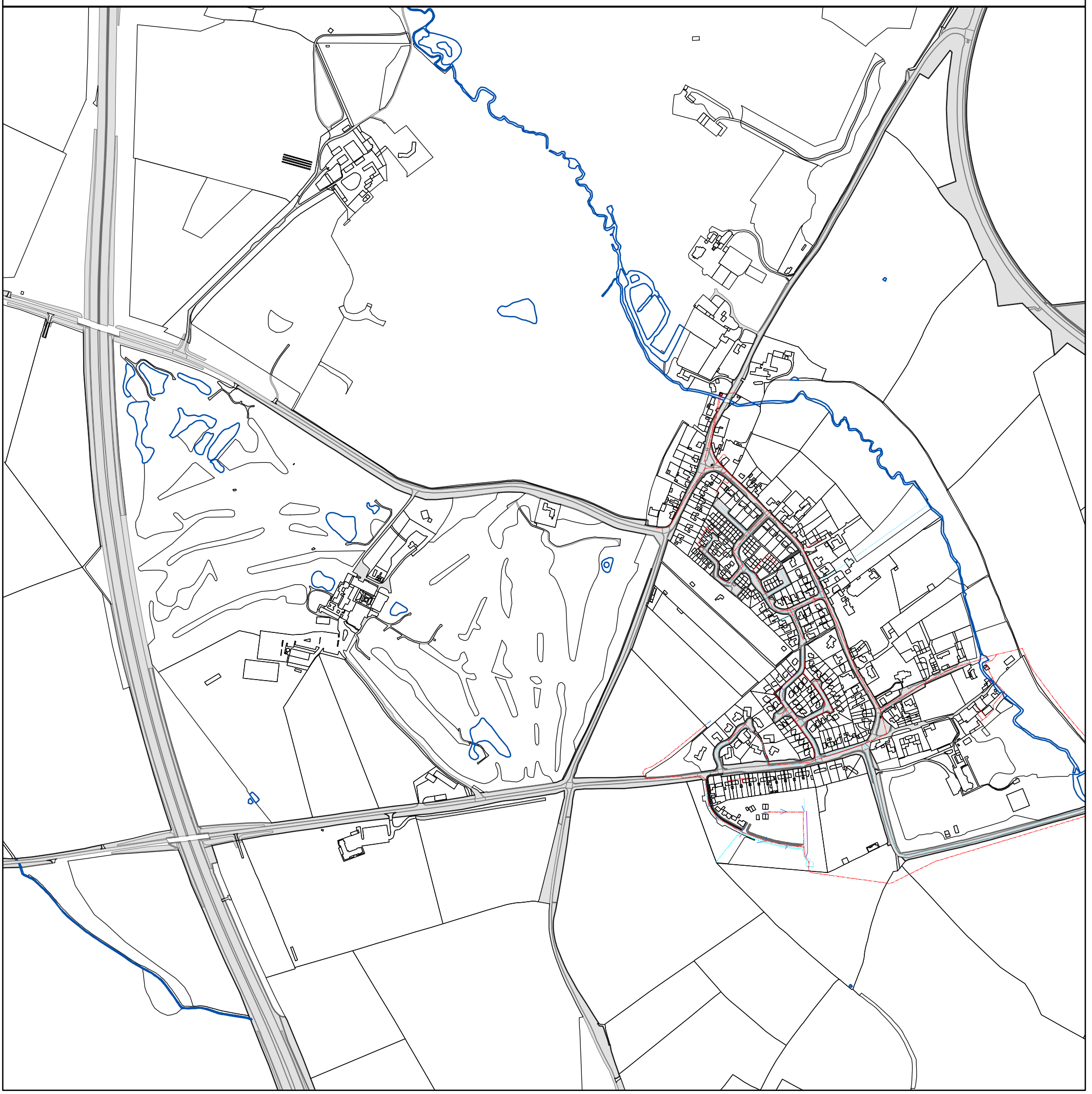

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,221250

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 9302 | 74.68 | 72.96 |
| 941E | n/a | n/a |
| 9404 | 76.12 | 74.35 |
| 9453 | 76.1 | 74.54 |
| 9201 | 74.52 | 72.94 |
| 9251 | 74.49 | 73.18 |
| 9351 | 74.54 | 73.2 |
| 9352 | 74.52 | 73.09 |
| 9303 | 74.43 | 72.76 |
| 9304 | 74.5 | 73.05 |
| 941A | n/a | n/a |
| 931A | n/a | n/a |
| 9353 | 74.41 | 72.93 |
| 9305 | 74.69 | 73.52 |
| 9301 | 74.78 | 73.47 |
| 9202 | 74.28 | 72.7 |
| 941G | n/a | n/a |
| 941F | n/a | n/a |
| 9451 | 75.35 | 74.2 |
| 0451 | 75.15 | 73.59 |
| 9452 | 75.85 | 73.67 |
| 9403 | 75.85 | 74.08 |
| 9405 | 76.27 | 74.55 |
| 9402 | 76.05 | 74.78 |
| 9454 | 76.33 | 75 |
| 9401 | 76.13 | 75.33 |
| 9101 | n/a | n/a |
| 9102 | n/a | n/a |
| 8201 | n/a | n/a |
| 8202 | 75.24 | 73.81 |
| 9254 | 74.78 | 73 |
| 8203 | 75.07 | 73.7 |
| 9255 | 74.78 | 73.11 |
| 8205 | 75.09 | 74.1 |
| 9204 | 74.35 | 72.47 |
| 8204 | 74.78 | 73.2 |
| 8206 | 74.79 | 73.63 |
| 9252 | 74.27 | 72.77 |
| 9203 | 74.28 | 72.54 |
| 811C | n/a | n/a |
| 811B | n/a | n/a |
| 811A | n/a | n/a |

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

# ALS/ALS Standard/2019_3986151



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Meters



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| **Width:** | 2000m |
| **Printed By:** | SAsirvat |
| **Print Date:** | 15/04/2019 |
| **Map Centre:** | 455522,221600 |
| **Grid Reference:** | SP5521NE |

**Comments:**

elliottwood | engineering a better society

D Drawing 2180501-EWP-ZZ-XX-DR-C-0010