SHIELDS WILSON
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STRUCTURAL AND CIVIL ENGINEERING

# GROUND INVESTIGATION REPORT

# UPON

# EXISTING BELL INN

# CHURCH STREET

# PINCHBECK, SPALDING, LINCS

**PROJECT No: SW 21-199**

**DOCUMENT REF: SW 21-199-GI-01** December 2021




Charlotte Properties Ltd.
c/o
Remway Design Ltd.
Treetops,
The Raceground,
Spalding, PE11 3AP

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# 1. INTRODUCTION

Acting upon the instruction of Remway Design, on behalf of Charlotte Properties Ltd, we attended site on 28th September 2021, the purpose being to observe the underlying ground conditions and determine the basic characteristics of the soil strata.

Mechanically excavated trial pits took place, and our comments are based upon a visual inspection of the disturbed samples obtained and the in-situ strata within the trial pits.

We would suggest the groundwater conditions may vary seasonally and that the water levels as recorded at the time of explorations should not necessarily be taken as being constant as they may be subject to fluctuations.

The opinions and comments expressed within this report are based upon ground conditions encountered in the trial pits excavated at the time of our visit.

This report has been prepared for the named client above and should not be relied upon by any other parties, with the exception of the client's professional advisors, for any use without the express written permission of Shields Wilson Limited.


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# 2. LOCATION & DESCRIPTION OF SITE

## 2.1. Site Location

The site is situated to the west of Church Street, Pinchbeck, Spalding, Lincolnshire. Appropriate national grid reference TF 241 257.

A Location plan is contained with Appendix A.

## 2.2. Site History Description

Desktop study of publicly available historical maps has been undertaken and found the site has not been previously developed and has stood as garden and parking for the Public House, The Bell Inn.

An extract of OS Lincolnshire map, 1932, is contained within Appendix B.

## 2.3. Site Description

The site currently stands as overgrown grassland with a gravel & road planning's covered parking area closest to the roadside.

The North of the site is bound by a neighbouring property.

The Western Boundary of the site is shared with an agricultural field and riparian drain.

The East of the site is boarded by neighbouring gardens.

The Southern boundary is formed by a fence line between the proposed site and a neighbouring property, Pinchbeck Church.

At the time of our visit the weather was dry and clear, however there had been some precipitation in the days leading up to the visit.


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## 2.4. Geological Description

Desktop study of the area has been undertaken using the British Geological Society Maps.

The maps indicate the site to be underlain by superficial tidal flat deposits of Sand and Silt over the Ampthill Clay (Mudstone) formation.

This information is based upon publicly available records. An extract is contained with Appendix C.


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## 3. SITE WORK

Six Number trial pits and two number soakaway test pits were excavated with the use of mechanical excavator. The siting of these explorations is shown on the Location plan shown within Appendix A.

A visual inspection of the disturbed samples was undertaken. A description of the strata and test results are shown on sheets SW21-199/TP01 thru TP06. The Trial pit logs are contained within Appendix D along with infiltration test results.

The historical investigation indicates that no previous development has been present, and no olfactory or visual signs of contamination were present. Therefore, no samples were sent to the laboratory contamination testing.

2No. Infiltration test was undertaken, however, after 2 hours the water level had not decreased measurably, meaning that the test was abandoned and provided sufficient evidence that the site would not be suitable for the use of soakaways.

A photographic record of site explorations is contained within Appendix E.


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## 4. GROUND CONDITIONS

The sequence of the strata encountered during the investigation is not what was expected to be found following our desktop research. The strata recovered from the trial pits below an average depth of 1.5m, was a grey, light blue clay.

The trial pits that were undertaken across the whole site, revealed that the ground conditions across the site are very similar.

It should be noted that in Appendix D of the trial pit logs, hand shear vane testing took place in a number of the trial pits, the results of which indicated that the soft sticky and saturated clay will not provide a high allowable bearing pressure.

The majority of the trial holes revealed that at depth the wet silty clays became soft and saturated significantly reducing the stability of the ground.

Trial pit logs can be found in Appendix D of this report.


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## 5. CONCLUSIONS & RECCOMENDATIONS

The proposed development is understood to comprise of 9 dwellings, varying in size from executive 4-5 bed houses to 3 bed bungalows, constructed using traditional load bearing masonry walls.

The ground floor should take the form of a suspended precast concrete beam and block system, design by the specialist supplier.

There should be a minimum clear void of 300mm beneath the suspended floor due to the Laboratory results returning results of high-volume change potential. Laboratory results are contained within Appendix F.

Due to the soft underlying wet clays, this site will require a pile and ground beam foundation solution. Careful consideration should be taken with regards to the heave protection required due to the clays and large number of trees on some boundaries of the existing site. Engineer designed foundations in accordance with the NHBC chapter 4.2 guidance should be utilised.

Prior to construction detailed foundation designs should be undertaken by a competent structural engineer.

Furthermore, the results from the infiltration test show that the ground is not suitable for an infiltration surface water drainage system and would therefore require an engineered design to suit the requirement of the development.

For and on behalf of **SHIELDS WILSON LIMITED**

**A.P.Wilson CEng MIStructE** **18th December 2021**


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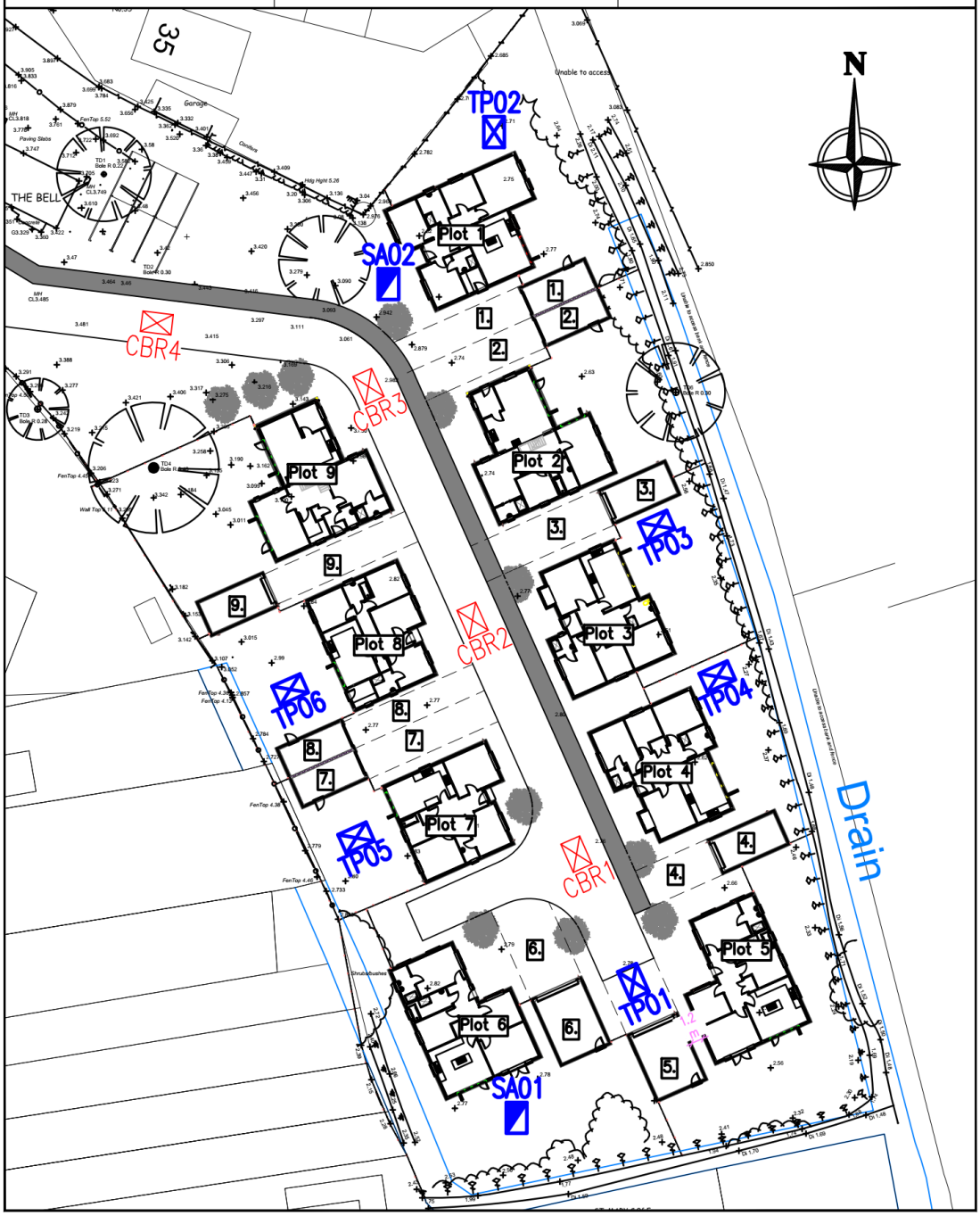
# APPENDIX A


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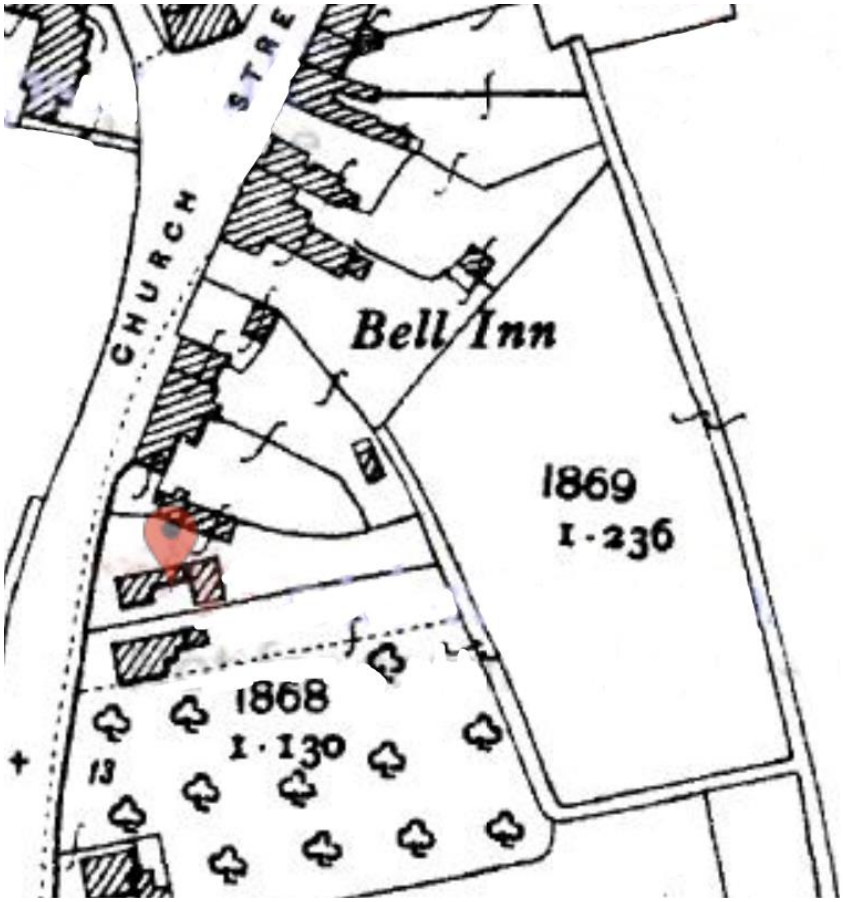
| Structural Calculations | Project: Bell Inn, Pinchbeck | Date: Oct. '21 | Designer: JL |
|---|---|---|---|
| Project No: SW 21-199 | Subject: | Sheet No: | Rev: - |




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# APPENDIX B


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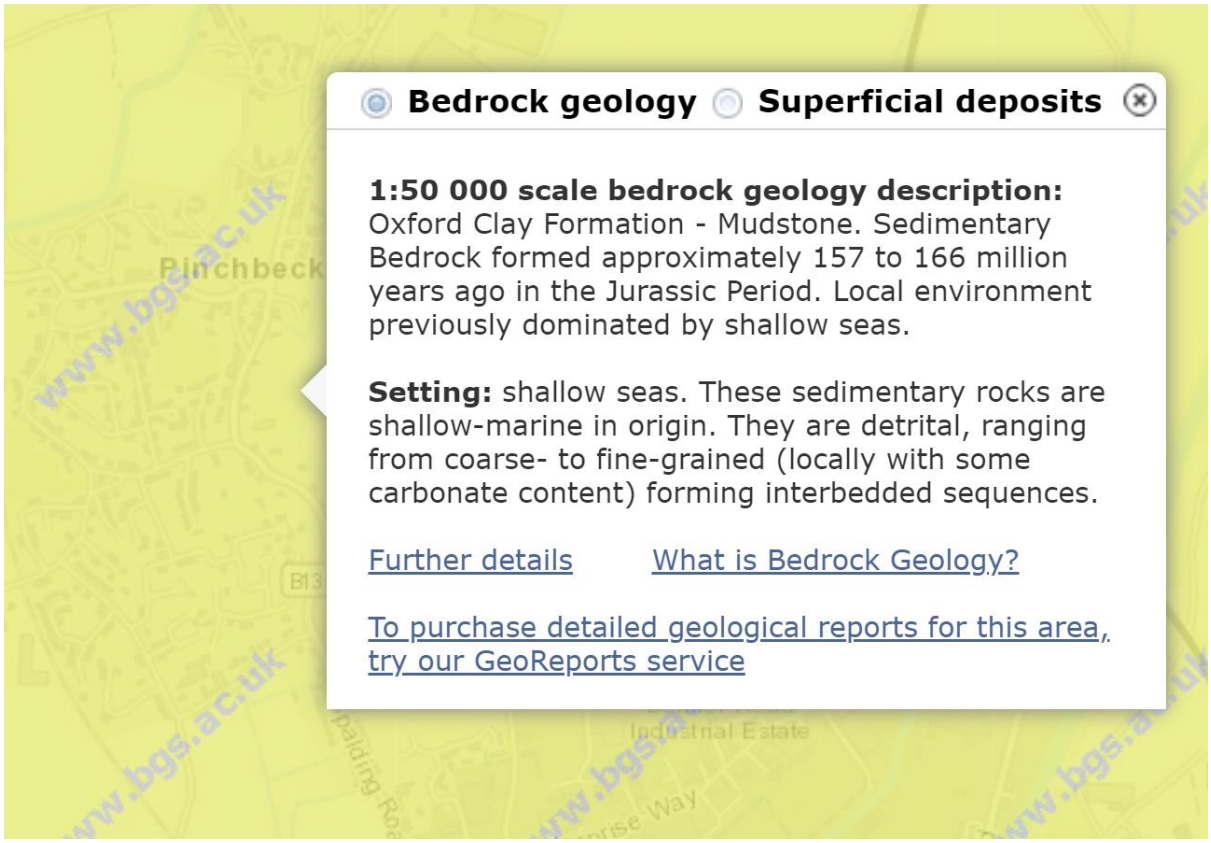


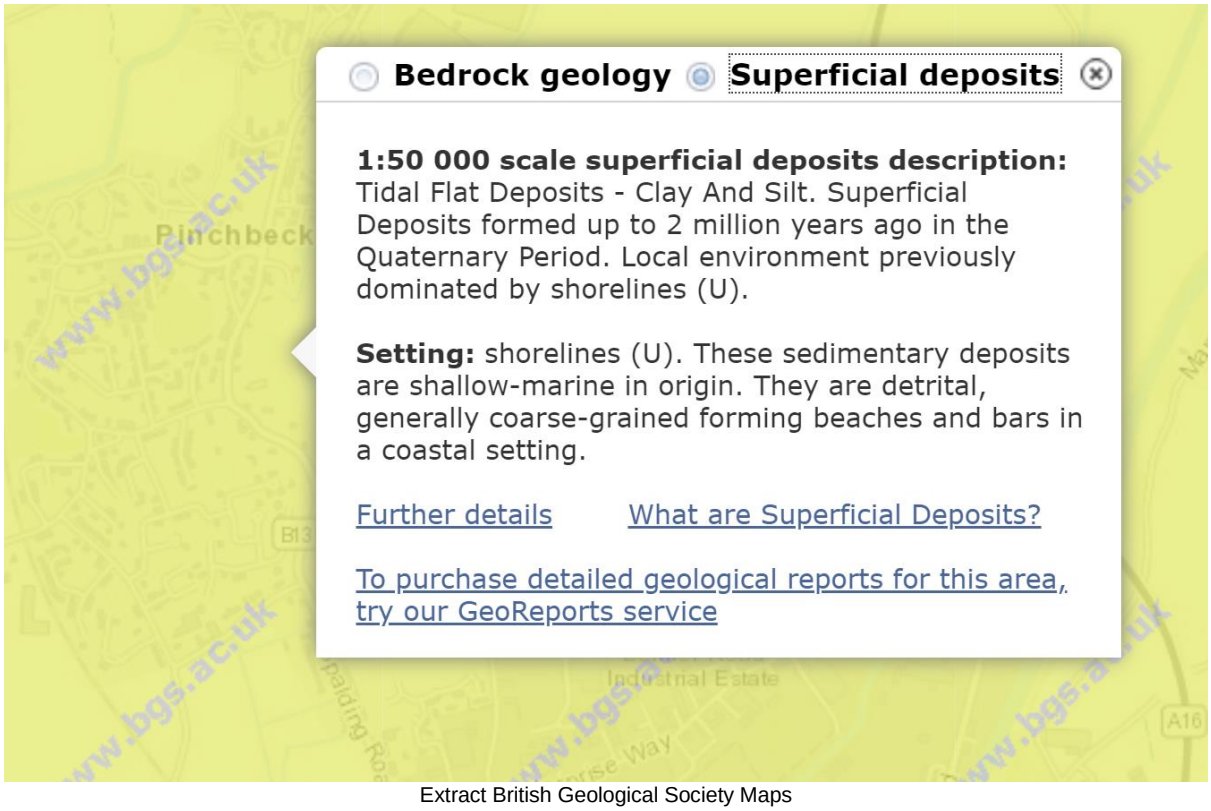

Extract OS County Series, 1932


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# APPENDIX C


© Shields Wilson Limited.




Extract British Geological Society Maps


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# APPENDIX D


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| | |
|---|---|
| Project No. | SW21-163 |
| Log Ref | TP01 |
| Exploration Method | Excavator |
| Site Coordinates | TF 241257 |
| Location | Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs |
| Carried Out For | Charlotte Properties Ltd. |
| Date Undertaken | 28/09/21 |
| Logged By | JL |

| Description | Reduced Level | Legend | Depth (Thick) | Samples: Depth | Samples: Sample Reference | Samples: Sample Type | Samples: Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| TOP SOIL. | | | 0.500m | | | | | | |
| DARK BROWN SANDY SILT. | | | (0.400m) 0.900m | | | | | | |
| DARK GREY CLAY WITH BLACK INCLUSIONS. | | | (0.300m) 1.200m | | | | | | |
| BLUEY GREY CLAY, BECOMING SOFTER WITH DEPTH. | | | (1.100m) 2.300m | | | | | | 16kPa @ 2.3m BGL |

**Remarks**
TRIAL PIT TERMINATED @ 2.3m BELOW GROUND LEVEL. WATER LEVEL ROSE TO 1.8M BGL AFTER 2.5 HOURS.

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| | |
|---|---|
| Project No. SW21-163 | Log Ref TP02 |
| Exploration Method Excavator | |
| Site Coordinates TF 241257 | |
| Location Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs | Carried Out For Charlotte Properties Ltd. |
| Date Undertaken 28/09/21 | |
| Logged By JL | |

| Description | Reduced Level | Legend | Depth (Thick) | Samples Depth | Sample Reference | Sample Type | Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| Top Soil. | | | 0.500m | | | | | | |
| DARK BROWN SANDY SILT. | | | (0.300m) 0.800m | | | | | | |
| DARK GREY CLAY WITH BLACK INCLUSIONS. | | | (1.400m) 2.200m | SAMPLE 1 2.100m | | | | | 37kPa @ 1.3m BGL |

**Remarks**
TRIAL PIT TERMINATED @ 2.2m BELOW GROUND LEVEL.

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| | |
|---|---|
| Project No. | SW21-163 |
| Log Ref | TP03 |
| Exploration Method | Excavator |
| Site Coordinates | TF 241257 |
| Location | Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs |
| Carried Out For | Charlotte Properties Ltd. |
| Date Undertaken | 28/09/21 |
| Logged By | JL |

| Description | Reduced Level | Legend | Depth (Thick) | Samples: Depth | Samples: Sample Reference | Samples: Sample Type | Samples: Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| TOP SOIL. | | | 0.500m | | | | | | |
| DARK BROWN SANDY SILT. | | | (0.700m) 1.200m | | | | | | |
| DARK BROWN SILTY SAND, BECOMING MOIST WITH DEPTH. | | | (0.300m) 1.500m | | | | | | 42kPa @ 1.2m BGL |
| LIGHT GREY CLAY WITH BLACK INCLUSIONS. | | | (1.100m) 2.600m | | | | | | |

**Remarks**

TRIAL PIT TERMINATED @ 2.6m BELOW GROUND LEVEL.

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| | |
|---|---|
| Project No. | SW21-163 |
| Log Ref | TP04 |
| Exploration Method | Excavator |
| Site Coordinates | TF 241257 |
| Location | Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs |
| Carried Out For | Charlotte Properties Ltd. |
| Date Undertaken | 28/09/21 |
| Logged By | JL |

| Description | Reduced Level | Legend | Depth (Thick) | Samples: Depth | Samples: Sample Reference | Samples: Sample Type | Samples: Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| TOP SOIL. | | | 0.600m | | | | | | |
| DARK BROWN SANDY SILT. | | | (0.800m) 1.400m | SAMPLE 2 1.400m | | | | | 26kPa @ 1.4m BGL |
| LIGHT GREY CLAY, WITH MINOR BLACK INCLUSIONS. | | | (1.100m) 2.600m | | | | | | |

**Remarks**
TRIAL PIT TERMINATED @ 2.6m BELOW GROUND LEVEL.

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| | |
|---|---|
| Project No. | SW21-163 |
| Log Ref | TP05 |
| Exploration Method | Excavator |
| Site Coordinates | TF 241257 |
| Location | Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs |
| Carried Out For | Charlotte Properties Ltd. |
| Date Undertaken | 28/09/21 |
| Logged By | JL |

| Description | Reduced Level | Legend | Depth (Thick) | Samples: Depth | Samples: Sample Reference | Samples: Sample Type | Samples: Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| TOP SOIL. | | | 0.400m | | | | | | |
| DARK BROWN SANDY SILT. | | | (0.500m) 0.900m | | | | | | |
| DARK GREY/BLACK CLAY, BECOMING SOFTER WITH DEPTH. | | | (1.700m) 2.600m | SAMPLE 3 1.300m | | | | | 32kPa @ 1.3m BGL |

**Remarks**

TRIAL PIT TERMINATED @ 2.6m BELOW GROUND LEVEL.

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| | |
|---|---|
| Project No. SW21-163 | Log Ref TP06 |
| Exploration Method Excavator | |
| Site Coordinates TF 241257 | |
| Location Proposed Development, Land West of Bell Inn, Church Street, Pinchbeck Spalding, Lincs | Carried Out For Charlotte Properties Ltd. |
| Date Undertaken 28/09/21 | |
| Logged By JL | |

| Description | Reduced Level | Legend | Depth (Thick) | Samples Depth | Samples Sample Reference | Samples Sample Type | Samples Sample No. | Test Required | HAND SHEAR VANE 19mm VANE |
|---|---|---|---|---|---|---|---|---|---|
| TOP SOIL. | | | 0.600m | | | | | | |
| VERY DARK BROWN SANDY SILT. | | | (0.700m) 1.300m | | | | | | 18kPa @ 1.3m BGL |
| DARK GREY CLAY, BECOMING SOFTER WITH DEPTH. | | | (1.700m) 2.600m | | | | | | |

**Remarks**
TRIAL PIT TERMINATED @ 2.3m BELOW GROUND LEVEL.

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# APPENDIX E


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# TEST CERTIFICATE

## Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

| | | | |
|---|---|---|---|
| Client: | Shields Wilson Ltd | Certificate Number: | PL7619-1/1/704 |
| Client Address: | Bank House<br>Broad Street<br>Spalding, Lincs<br>PE11 1TB | Client Reference: | L10065 |
| | | Job Number: | PL7619-1 |
| | | Date Sampled: | Unknown |
| Contact: | Adam Wilson | Date Received: | 29.09.2021 |
| | | Date Tested: | 07.10.2021 |
| Site Name: | Bell Inn | Certificate of Sampling: | N/A |
| Site Address: | Pinchbeck | Sampling Certificate No.: | N/A |
| | | Sampled By: | Client |

**Test Results:**

**Laboratory Reference:** PL7619-1/1
**Sample Reference:** S01

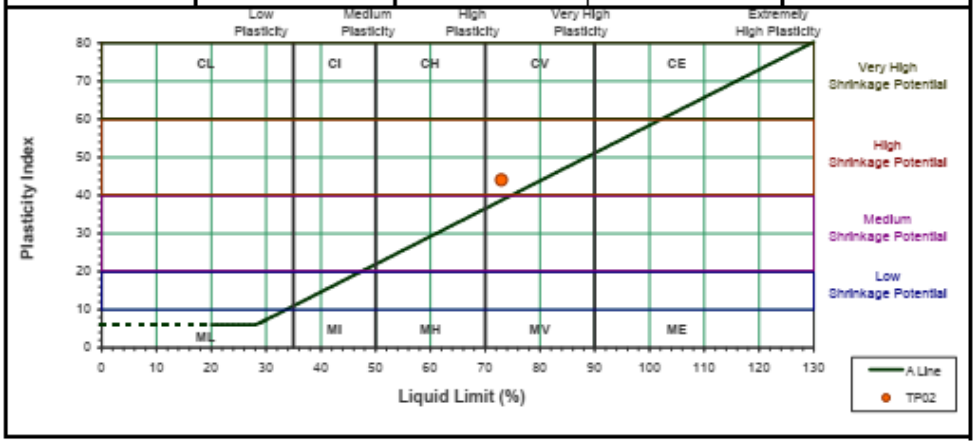
**Sample Description:** Very soft to soft dark-grey grey slightly silty slightly organic CLAY with rare roots less than 2mm in diameter.

**Location:** TP02 **Depth:** 2.10m

**Sample Preparation:** As Received

Estimated % Passing 425µm BS Test Sieve

| Moisture Content (%) | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 58 | 73 | 29 | 44 | 100 |




Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 13.10.2021 Page 1 of 1
Form Number: GELab/C/704 Version 46

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# TEST CERTIFICATE

## Determination of California Bearing Ratio

Tested in accordance with BS 1377-4: 1990: Clause 7.4

| | | | |
|---|---|---|---|
| Client: | Shields Wilson Ltd | Certificate Number: | PL7619-1/4/736-1 |
| Client Address: | Bank House<br>Broad Street<br>Spalding, Lincs<br>PE11 1TB | Client Reference: | L10065 |
| | | Job Number: | PL7619-1 |
| | | Date Sampled: | Unknown |
| | | Date Received: | 29.09.2021 |
| Contact: | Adam Wilson | Date Tested: | 11.10.2021 |
| | | Certificate of Sampling: | N/A |
| Site Name: | Bell Inn | Sampling Certificate No.: | N/A |
| Site Address: | Pinchbeck | Sampled By: | Client |

**Test Results:**

**Laboratory Reference:** PL7619-1/4

**Sample Reference:** S04

**Sample Description:** Firm and Stiff brown orange-brown grey-brown slightly silty CLAY with occasional roots <2mm in diameter and rare shell fragments.

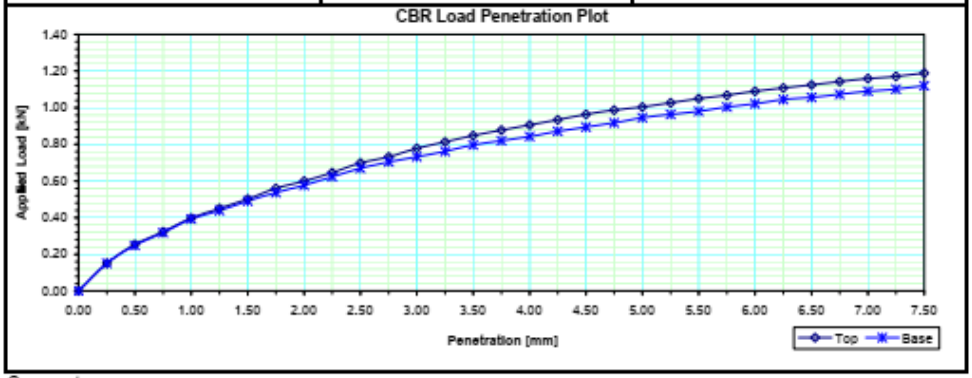
**Sample Location:** CBR1 **Depth:** 0.60m

**Sample Soaked:** No

**Sample Preparation:** Recompacted at 'as received moisture content' using a 2.5kg rammer

| | | | | |
|---|---|---|---|---|
| Retained on 20mm test sieve: | 0 | (%) | Applied Seating Load (top): | 46 N |
| Moisture Content (Top): | 32 | (%) | Applied Seating Load (base): | 46 N |
| Moisture Content (Base): | 32 | (%) | Applied Surcharge: | 12.0kg |
| Moisture Content (Mean): | 32 | (%) | | |
| Initial Bulk Density: | 1.87 | (Mg/m³) | | |
| Initial Dry Density: | 1.42 | (Mg/m³) | | |
| Initial Moisture Content: | 32 | (%) | | |

| CBR Top (%): | 5.3 | CBR Base (%): | 5.1 | Average CBR (%): | 5.2 |
|---|---|---|---|---|---|




Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 13.10.2021 Page 1 of 1

Form Number: GELab/C/736-1 Version 32

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# TEST CERTIFICATE

## Determination of Moisture Content

Tested in Accordance with BS 1377-2: 1990: Clause 3.2

Client: Shields Wilson Ltd
Client Address: Bank House, Broad Street, Spalding, Lincs, PE11 1TB
Contact: Adam Wilson
Site Name: Bell Inn
Site Address: Pinchbeck

Certificate Number: PL7619-1/1/705
Client Reference: L10065
Job Number: PL7619-1
Date Sampled: Unknown
Date Received: 29.09.2021
Date Tested: 04.10.2021
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

**TEST RESULTS**

| Laboratory Reference | Sample Reference | Location | Depth Top | Depth Base | Description | Moisture Content [%] |
|---|---|---|---|---|---|---|
| PL7619-1/1 | S01 | TP02 | 2.10m | N/A | Very soft to soft dark-grey grey slightly silty slightly organic CLAY with rare roots less than 2mm in diameter. | 58 |
| PL7619-1/2 | S02 | TP04 | 1.40m | N/A | Very soft grey-brown dark-grey slightly silty slightly organic CLAY. | 54 |
| PL7619-1/3 | S03 | TP05 | 1.30m | N/A | Soft grey-brown grey slightly silty CLAY. | 35 |
| | | | | | | |
| | | | | | | |

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 13.10.2021 Page 1 of 1
Form Number: GELab/C/705 Version 19

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