

CCG-C-22-13039

**GROUND STABILITY ASSESSMENT REPORT
FOR LAND FRONTING ONTO
WESLEY STREET & BRUNSWICK STREET
HEYWOOD
ROCHDALE
OL10 1JB
JUNE 2022**

Prepared for:

WESTCHURCH HOMES
Kennedy House
31 Stamford Street
Altrincham
Cheshire
WA14 1ES

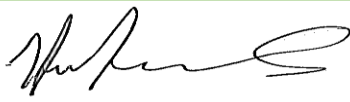
Telephone: 0161 233 4010

By:

CC GEOTECHNICAL LIMITED
Unit 1
Deltic Way
Knowsley Industrial Estate
L33 7BA

Telephone: 0151 545 2750
Facsimile: 0151 548 7892

DOCUMENT CONTROL FORM

Client:	Westchurch Homes
Project Title:	Ground Stability Assessment Report for land fronting onto Wesley Street and Brunswick Street, Heywood, Rochdale, OL10 1JB
Reference Number:	CCG-C-22-13039
Main Author:	Anthony Gerrard BSc (Hons) MSc FGS
Signature:	
Reviewed by:	Chris Bolan CEng MICE CEnv
Signature:	
Approved for Issue by:	Chris Bolan CEng MICE CEnv
Signature	
For and behalf of CC GEOTECHNICAL LTD	
Date:	June 2022
Revision Number:	01
Comments:	Report updated August 2022 to included supplementary fieldwork information
Status:	
Distribution:	Westchurch Homes

This document has been prepared by *CC GEOTECHNICAL LTD* within the terms of the contract, scope of work, and resources agreed in writing with the client. The limitations of liability of *CC GEOTECHNICAL LTD* for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

This document is intended for the sole use of the client indicated above and *CC GEOTECHNICAL LTD* accepts no responsibility of whatever nature to third parties to whom this document or any part of this document is made known. Any such party relies upon that information at their own risk.

The findings and opinions provided in this document are made in good faith and are subject to the limitations imposed by employing site assessment methods and techniques, appropriate to the time of investigation and within the limitations and constraints defined in this document. The findings and opinions are relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Seasonal groundwater levels, with the effects of precipitation, may affect the conditions found during the investigation. The report should be read in conjunction with the Notes on Limitations included in Appendix J.

Where opinions expressed in this report are based on current available guidance and legislation, no liability can be accepted by *CC GEOTECHNICAL LTD* for the effects of any future changes to such guidelines and legislation. Additional information, improved practices, new guidance, changes in legislation, or amendments to design proposals, may necessitate this report having to be reviewed in whole or in part after that date.

Factual data has largely been obtained from enquiries with third parties, the results of which are relied on unless indicated to be inaccurate by contradictory information. Further assessment, investigation, construction activities, could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, *CC GEOTECHNICAL LTD* reserves the right to modify such opinions expressed herein.

The findings and opinions conveyed, via this report, are based on information obtained from a variety of sources as detailed in this report, and which *CC GEOTECHNICAL LTD* assumes to be reliable, but has not been independently confirmed. Therefore, *CC GEOTECHNICAL LTD* cannot and does not guarantee the authenticity or reliability of third-party information it has referred to.

CC GEOTECHNICAL LTD possesses a non-exclusive and non-transferable Ordnance Survey Licence but does not possess any right to sub-license any of the rights granted by this licence to any party. Under the terms of *CC GEOTECHNICAL LTD*'s Ordnance Survey Licence, copying of figures containing Ordnance Survey data or using figures for any purpose other than as part of this report is not permitted.

1.0 INTRODUCTION

CC GEOTECHNICAL LIMITED (CCG) was commissioned by **WHITECHURCH HOMES** to prepare a Coal Mining Risk Assessment, in connection with the proposed partial redevelopment of land fronting onto Wesley Street and Brunswick Street, Heywood, Rochdale, OL10.

Following the demolition of existing structures and subsequent site clearance works, it is understood that the site is to be redeveloped for residential use by the construction of 61nr residential units, each constructed in traditional brick elevations under pitched roofs together with a new hard paved access road. Houses will have off road car parking and rear private gardens.

The existing and proposed site layouts are as shown on **AVION MAA SURVEYS**, and **MCK ASSOCIATES LIMITED** drawings contained herein.

The development falls under the jurisdiction of **ROCHDALE METROPOLITAN BOROUGH COUNCIL**.

The Rochdale District (B) Coal Plans show the site to be located in an area underlain by productive coal measures, and hence a Coal Mining Risk Assessment was required to assess if the site is at risk of surface instability or other risk factors arising from historical coal mining activities.

This Coal Mining Risk Assessment was required to demonstrate to **ROCHDALE METROPOLITAN BOROUGH COUNCIL** that coal mining information has been considered by the applicant, and that any issues of potential surface instability have been identified and, if warranted by the assessment, will be considered in the scope of any resulting intrusive site investigation.

It must be borne in mind that the data and opinions contained in this report should be read in conjunction with the **CCG** Notes on Limitations contained herein.

2.0 SITE LOCATION

The site comprises 2-distinct parcels of land – a relatively small site located to the north of Wesley Street and a large site to the south of Wesley Street, both sites being immediately to the east of Brunswick Street, Heywood, Rochdale, OL10 1JB as shown on **CCG** Drawing No. CCG-C-22-13039-1 and Aerial Plate No. CCG-C-22-13039-2 contained herein.

The **ORDNANCE SURVEY** coordinates for the approximate site centre are 385295, 410619. It stands at an approximate elevation of c.118ma Ordnance Datum.

3.0 PREVIOUS STUDIES

The site was the subject of an intrusive ground investigation, undertaken by **BETTS GEO CONSULTING ENGINEERS**, prepared under Report Reference No. 21WCH016/GI Rev' A, dated October 2021. Works associated with this investigation comprises the sinking of a combination of cable percussive, and light dynamic sampling boreholes and the mechanical excavation of trial pits.

The ground conditions encountered during the above intrusive investigation were seen to comprise hard pavement cover and associated sub-base overlying made ground deposits generally comprising loose sands and gravel with medium cobble content with high plastic (bails) content extending to depths varying between 0.5m > 2.8mbgl. There after the sequence continued in natural drift deposits comprising soft varying to firm clay interbedded with loose overlying bed rock.

4.0 COAL MINING RISK ASSESSMENT

Coal mining may present hazards to proposed development in a number of ways. Such hazards may currently exist or may be caused as a result of the construction of the proposed development, or could occur at some time in the future, and may include:

- Collapse of shallow historical coal workings
- Collapse of or risk of entry into historical shafts or adits
- Gas emissions from historical coal mines including methane and/or carbon dioxide
- Spontaneous combustion or ignition of coal which may lead to underground heating and production of CO₂
- Transmission of gases to adjacent properties
- Coal mining subsidence
- Water emissions from historical coal mine workings

In assessing mining related risks at this site, the following sources of information were consulted:

- BGS Geology Sheet 085 Manchester (2011) 1:50 000 and 1:10 000 Scale Solid and Drift Editions
- Solid geology extract showing positions of coal outcrops/inferred sub-crops and recorded mine entries in relation to development site (presented in Appendix A)
- Healy. P.R. *et.al* (1984) 'Construction over Abandoned Mine Workings' CIRA Special Publication No. 32. PSA Civil Engineering Technical Guide 34. CIRA. London
- Crofts, R.G *et.al*. (2012) 'Geology of the Manchester district: a brief explanation of the geological map Sheet 85 Manchester. Her Majesty's Stationery Office. London
- Rochdale District B Development Risk Plan
- Rochdale District B Specific Risk Plan
- Rochdale District B Surface Coal Resource Plan
- Coal Authority Residential Coal Mining Report (Reference No. 51002541977001, dated July 2021, Presented in Appendix B)
- Coal Authority Interactive Mine Entry Viewer (<http://coal.decc.gov.uk/en/coal/cms/publications/data/map/ map.aspx>) Accessed: April 2022)

5.0 **DOCUMENTED GEOLOGY**

5.1 **Solid & Drift Geology**

The geology of the site is summarised on **BRITISH GEOLOGICAL SURVEY (BGS)** Sheet No.085 Manchester (2010 - 2011): 1:50000 Scale: Solid and Drift Editions, and Crofts, R.G *et.al*. (2012) 'Geology of the Manchester district: a brief explanation of the geological map Sheet 85 Manchester. Her Majesty's Stationery Office. London

The **BGS** Drift mapping data shows that the site is underlain with natural deposits comprising glaciofluvial deposits (sands and gravel) overlying diamicton (boulder clay). Both geological units being of glacial origin (*Pleistocene Epoch - Late Quaternary - Devensian Sub Age*)

The documented solid geology comprises the Pennine Lower Coal Measures Formation (*formerly the Lower Coal Measures*) of the Pennine Coal Measures Group comprising interbedded argillaceous mudstone, siltstones, fluvial sandstones and productive coal measure, of the Upper Carboniferous Period (*Silesian Stage: Westphalian A: Langsettian Sub Age*).

5.2 **Geological Lines of Weakness – Faults, Marine Bands, Coal Seams**

The study site is located within an area where ancient earth movements have caused significant displacements and misalignments of the underlying and surrounding country rock.

The general dip of the solid geology within the surrounding area is documented to be in the order of 10° in a southerly direction.

As illustrated on the **BGS** solid mapping data, the documented seams of coal and geological faults sub-cropping within the surrounding area are as follows:

1. The Arley Coal (South Lancashire), sub-cropping c. 406m east of the study site
2. Geological fault (inferred) c.340m west of the study site
3. Geological fault (inferred) c.454m southwest of the study site
4. The Arley Coal (South Lancashire), sub-cropping c. 699m northwest of the study site

Given that the above referenced seam of coal is identifiable by name, it may be assumed that this coal may have been worked in the past.

The general dip of the solid geology within the surrounding area, it is assumed that the Arley Coal will extend beneath the site.

5.3 Radon Data

The 'Indicative Atlas of Radon in England and Wales' (Miles. J.C.H *et.al*, 2007) Map 13 'Northern Welsh Marches and Liverpool', shows the site to be situated within an area where it is believed that less than 1% of the properties within the area are affected by Radon and therefore no Radon Protection Measures will be required for new structures in contact with the ground

6.0 HISTORICAL COAL MINING

6.1 Historical Coal Mining/Mine Entries

The **COAL AUTHORITY** Viewer confirm the presence of numerous mine entries within the surrounding area, with the nearest historical mine entry being positioned to the rear of residential properties fronting on to Coomassie Street and Seymour Street, c.92m southwest of the southern site boundary. The **COAL AUTHORITY** Reference No. for this feature is: 385410-001. **ORDNANCE SURVEY** coordinates being 385285 410439.

6.2 Coal Authority Report Summary

Geological mapping, the Coal Authority Gazetteer and the Coal Authority Coal Mine Inventory Viewer confirm the site lies within the Rochdale (B) Coal Mining Development Referral Area, and therefore located within an area which may be affected by historical coal mining activity thus a **COAL AUTHORITY** Coal Mining Report was procured (Report Reference No. 51002541977001, dated July 2021), presented in Appendix D, and summarised hereunder:

6.2.1 Historical Underground Coal Mining / Possible Shallow Workings

The site is not within a zone of likely physical influence at the surface from historical underground coal mining activities.

The site is in an area where the **COAL AUTHORITY** believes there is coal at or close to the surface which may have been worked at some time in the past and therefore the potential for unrecorded coal works, at or close to, the surface should be considered prior to the commencement of any future redevelopment activity.

The site is not in the likely zone of influence of any present underground coal workings

The site is not in an area for which the Coal Authority is determining to grant a licence to extract coal using underground methods: the site however is in an area where reserves of coal may be extracted at some time in the future

No notice of the risk of the land being affected by subsidence has been given under Section 46 of the Coal Mining Subsidence Act 1991

6.2.2 Historical Mine Entries

The Coal Authority Mining Report states that there is 1nr mine entry within 100m of the study site, this being located positioned to the rear of residential properties fronting on to Coomassie Street and Seymour Street, c.89m southeast of the southern site boundary. Notwithstanding the above, there may be further mine entries within the local area for which the **COAL AUTHORITY** has no knowledge.

6.2.3 Geological Lines of Weakness

The **COAL AUTHORITY** is not aware of any evidence of damage arising due to geological faults, or other lines of weakness that have been affected by coal mining

6.2.4 Geological Faults, Fissure and Breaklines

There are no recorded faults, fissures or breaklines which are believed to contribute to surface subsidence damage as a consequence of historical underground coal mining activities.

6.2.5 Opencast Coal Mining

The site is not within the boundary of an opencast site from which coal has been removed by opencast methods

The site does not lie within 200m of the boundary of an opencast site from which is being extracted by opencast methods

The site is not within 800m of the boundary of an opencast site for which the Coal Authority is determining to grant a licence to extract coal by opencast methods

6.2.6 Coal Mining Subsidence

The Coal Authority has not received a damage notice or claim for the subject site, or any property within 50m since 31st October 1994

6.2.7 Mine Gas Emissions

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property

6.2.8 Coal Authority Managed Tips

There are no records relating to the presence of any **COAL AUTHORITY** managed tips within 500m of the study site

6.2.9 Remediated Sites

The **COAL AUTHORITY** has no records relating to the undertaking of site remedial works within, or within 50m of, the study site.

6.2.10 Coal Mining Subsidence

There are records pertaining to 1nr claim within 50m of the study site.

There are no current stop notices or enforcements in place of this site that may delay the start of any remedial works, or repairs, to the property

The **COAL AUTHORITY** is not aware of any request having been made to carry out preventive works before coal is worked under Section 33 of the 'Coal Mining Subsidence Act 1991'

6.2.11 Mine Gas Emissions

There is no record of a mine gas emission requiring action by the **COAL AUTHORITY** within the boundary of the property

6.2.11 Mine Water Treatment Schemes

There are no records pertaining to the treatment of mine water schemes within 500m of the site boundary

6.2.12 Future Underground Mining

There are no plans to grant licenses to extract coal to in the future using underground coal mining methods

6.2.13 Section 46 Notices

No notices have been issued under Section 46 of the 'Coal Mining Subsidence Act 1991', stating that the land is at risk of subsidence

7.0 SUMMARY RISK

By reference to the information sources listed above a risk assessment was constructed as tabulated in Table 1 hereunder:

Table 1: Summary of Coal Mining Information

Potential Hazards	Source	Comments
Is the site within a Coal Mining Referral Area?	Rochdale District (B) Coal Mining Development Referral Area Rochdale District (B) Specific Coal Mining Risk Plan	Mapping indicates a strong probability that the site lies over an area of coal mining as defined on the Rochdale District (B) Plan of Coal Mining Development Referral Area, & Rochdale District (B) Specific Coal Mining Risk Plan
Is the site within a Surface Mining Resource Area?	Rochdale District (B) Surface Coal Resources Plan	Mapping indicates that the site is not within an area of surface mining resources as defined on the Rochdale District (B) Surface Mining Coal Resource Area
Is the site within the likely zone of influence of present underground coal mining?	Coal Authority Residential Coal Report (Reference No. 51002541977001)	Report indicates that the property is not within the likely zone of influence of any present underground coal workings
Is the site within the likely zone of influence of past underground coal mining?	Coal Authority Residential Coal Report (Reference No. 51002541977001)	Report indicates that the property is not in the likely zone of influence at the surface from any historical underground workings
Is there a possibility of unrecorded shallow mine workings and/or mine entries?	Coal Authority Residential Coal Report (Reference No. 51002541977001) BGS mapping Sheet 085: Manchester (2010 - 2011) Coal Authority Interactive Mine Entry Viewer	The property is in an area where the Coal Authority believes there is coal at, or close to, the surface which may have been worked in the past. Where shallow seams (<30mbgl) are present then a presumption of a risk of unrecorded workings should be made BGS Solid & Drift mapping data shows 2nr named seams of coal

		within the surrounding area, with the nearest named coal seam being the Arley Coal which sub-crops to the north and east of the study site Given that the above referenced seam of coal is identifiable by name, it may be assumed that this coal may have been worked in the past. The general dip of the solid geology within the surrounding area, it is assumed that the Arley Coal will extend beneath the site. The Coal Authority Mining Report states that there is 1nr mine entry within 100m of the study site, this being located positioned to the rear of residential properties fronting on to Coomassie Street and Seymour Street, c.89m southeast of the southern site boundary. Notwithstanding the above, there may be further mine entries within the local area for which the Coal Authority has no knowledge.
Is there a record of mine gas emissions within the site boundary?	Coal Authority Residential Coal Report (Reference No. 51002541977001)	Report indicates that there are no records of the property ever having been affected by mine gas emissions
Is the proposed development in an area for which the Coal Authority is determining or has granted a license to remove coal by underground methods?	Coal Authority Residential Coal Report (Reference No. 51002541977001)	Report indicates that the property is not in an area for which a licence has been granted to remove coal by underground methods
Are there any known faults or other lines of weakness due to coal mining at the site?	BGS mapping Sheet 085: Manchester (2010 - 2011)	There are records pertaining to a geological fault within the southern section of the site
Has the site been subject to any remedial works by or on behalf of the Coal Authority under its surface hazard call out procedures?	Coal Authority Residential Coal Report (Reference No. 51002541977001)	Report indicates that the site has not been subject to remedial works by or on behalf of the Authority under its Emergency Surface Hazard Call Out procedures

8.0 **MINING RISK ASSESSMENT CONCLUSIONS & RECOMMENDATIONS**

The conclusion of the foregoing assessment is that it was highly possible that the site is at risk of surface instability.

In the absence of any existing site investigation information pertaining directly to the site or its immediate surroundings, it could not be conclusively demonstrated that the site is not underlain by collapsible voids, and hence a ground investigation was undertaken. Workings in the shallow seams, if present, are likely to be pillar and stall and/or longwall, and for confidence in the investigation findings, and given that coal sub-cropping occurs to the south and west of the site, given the size of the site, it was concluded that 4nr boreholes should be sunk in the underlying bedrock strata to c.30mbgl by cable percussive and rotary open hole drilling methods using water flush in the bedrock (coal bearing) strata.

Given the presence of mine related voids / disturbed ground at 1nr borehole (RBH04), 2nr additional boreholes (RBH4A and RBH04B) were later sunk immediately alongside RBH04 using rotary coring methods to probe for the presence of voided zones in the underlying mudstone formation.

A layout of the proposed borehole locations is as annotated on **CCG** Drawing No. CCG-C-22-13039-3 & 4 'Site Investigation Layout Plan' contained herein.

9.0 **FIELDWORK**

9.1 **Introduction**

Taking into account the above assessment, an intrusive investigation was instigated to probe in the solid strata for the presence/absence of voided ground and/or weak zones potentially associated with historical coal workings.

The primary objective of this intrusive ground investigation was to assess the risk of mining related instability. The fieldwork was undertaken in May 2022 and was planned in accordance with BS10175: 2011, EuroCode 7: Part 2, and carried out in accordance with BS10175: 2011 and BS5930: 2015 insofar as they related to the scope of the investigation.

Prior to undertaking these works, a **COAL AUTHORITY** permit granting permission to drill, was obtained (Permit Reference No. 24889, dated April 2022, presented in Appendix C).

The scope of works comprised the following:

- The manual excavation of 4nr service avoidance pits
- The advancement of borehole starter pits to '*refusal*' on the bedrock formation using cable percussive boring methods deploying 150mm dia. casing and associated tools
- The further advancement of boreholes to 30mbgl in the bedrock formation using rotary open-hole drilling methods deploying water flush methods
- The monitoring of boreholes for mine gases emissions during drilling
- The grouting of boreholes on completion

Given the presence of voided / disturbed ground, a supplementary phase of works was undertaken in July 2022 to assess the geotechnical properties of the underlying mudstone formation at borehole RBH04.

The supplementary scope of works comprised.

- The manual excavation of 2nr borehole starter pits
- The advancement of each borehole starter pits using cable percussive boring methods using 150mm diameter tools and casings
- The further advancement of each borehole position using rotary coring methods, using a tracked Apageo rotary rig, deploying 90mm diameter coring equipment and water flush
- The monitoring of boreholes for mine gases emissions during drilling
- The retention of core recovery for laboratory testing
- The grouting of boreholes on completion

9.2 Borehole Drilling

The borehole locations were positioned clear of all known buried services and overhead electrical power lines and were scanned using CAT service scanner before and during hand excavation of a starter pits extending to 1.2mbgl.

In accordance with the ground investigation plan, each borehole was advanced through the superficial deposits to rockhead using light cable percussive boring methods, deploying 150mm dia. casing and associated tools. At rockhead each borehole was then further advanced into the bedrock formation by open-hole rotary drilling methods to 30mbgl.

Rotary boring was carried out using a tracked Apageo rotary rig, deploying 90mm diameter drilling equipment and water flush. Rate of drilling progress and flush returns were continuously monitored for evidence of voids or loose/broken ground.

Borehole logs annotated with observed ground conditions are presented in Appendix C.

Each borehole was continuously monitored for mine gas emissions (O₂, CH₄, and CO₂) at regular depth increments during the site investigation using a GA2000 gas analyser, the calibration certificate of which is contained in Appendix E.

On completion, each borehole was grouted to above rock-head using PFA / cement grout.

10.0 OBSERVED GROUND CONDITIONS

This site investigation confirms the presence of made ground deposits extending to depths varying between 0.6m - 2.5mbgl. Thereafter, the sequence continued in natural drift deposits comprising soft to firm becoming firm then stiff brown locally grey diamicton (boulder clay) locally interbedded with sands and gravel extending to depths of 6.7m - 9.1mbgl before continuing in grey weathered becoming competent mudstone, with localised bands of intact coal standing at c. 14.3 -14.7mbgl and 21.5m - 22.8mbgl at boreholes RBH02 and RBH03.

No loss of flush was encountered at boreholes RBH01 - RBH03, and hence no evidence of mine related voids and/or broken ground was detected.

At RBH04, RBH04A and RBH04B, broken / loose ground was detected at 24m > 26mbgl where 80% / 100% flush loss was recorded, thus indicating historical coal workings.

11.0 GROUND GAS – GROUNDWATER OBSERVATIONS

11.1 Ground Gas

Boreholes were monitored for mine gases during borehole drilling using a Geotechnical Instruments GA 2000 infra-red analyser (instrument calibration certificate presented in Appendix E). No mine gas emissions were recorded at any borehole location.

11.2 Groundwater

Groundwater ingresses were encountered locally from within the sand and gravel deposits.

12.0 DISCUSSION & CONCLUSIONS

12.1 Introduction

Following the demolition of existing structures and subsequent site clearance works, it is understood that the site is to be redeveloped for residential use by the construction of 61nr residential units, each constructed in traditional brick elevations under pitched roofs together with a new hard paved access road. Houses will have off road car parking and rear private gardens.

The existing and proposed layout of the proposed development are as annotated on **AVION MAA SURVEYS**, and **MCK ASSOCIATES LIMITED** architectural drawings contained herein.

In this site investigation, no loss of flush was encountered at boreholes RBH01, RBH02 and RBH03, and hence no evidence of mine related voids and/or broken ground was detected.

At RBH04, RBH04a and RBH04b, voided, broken/ loose ground was detected at 24.4m – 26.2mbgl (2m section) where between 80% > 100% flush loss was observed, thus potentially indicating historical shallow mine coal workings.

12.2 Risk Arising from Historical Mine Workings

The assessment of the risk of surface instability is commonly based on the application of the so called 10:1 rule, where the risk of collapse is considered sufficiently low if the ratio of the thickness of competent rock cover to the thickness of any collapsible section is greater than 10.

This investigation identified a 2m deep voided and/or broken ground section within 18.2m of rockhead level at boreholes RBH04, RBH04a and RBH04b respectively, thus giving a rock cover / void ratio of <10 indicating an unsafe situation when assessed against the guidance in CIRIA C758D: 2019. This document also requires that rock quality be considered in assessing risk of instability, and in this instance, the mudstone formation is generally of poor quality. Some guidance suggests that the drift strata can be regarded as a contributor to surface stability where the strata is deep and dense / stiff. This not the case here, and taking all factors into account it, is concluded that there is a significant risk of surface instability and the site should be stabilised by grouting.

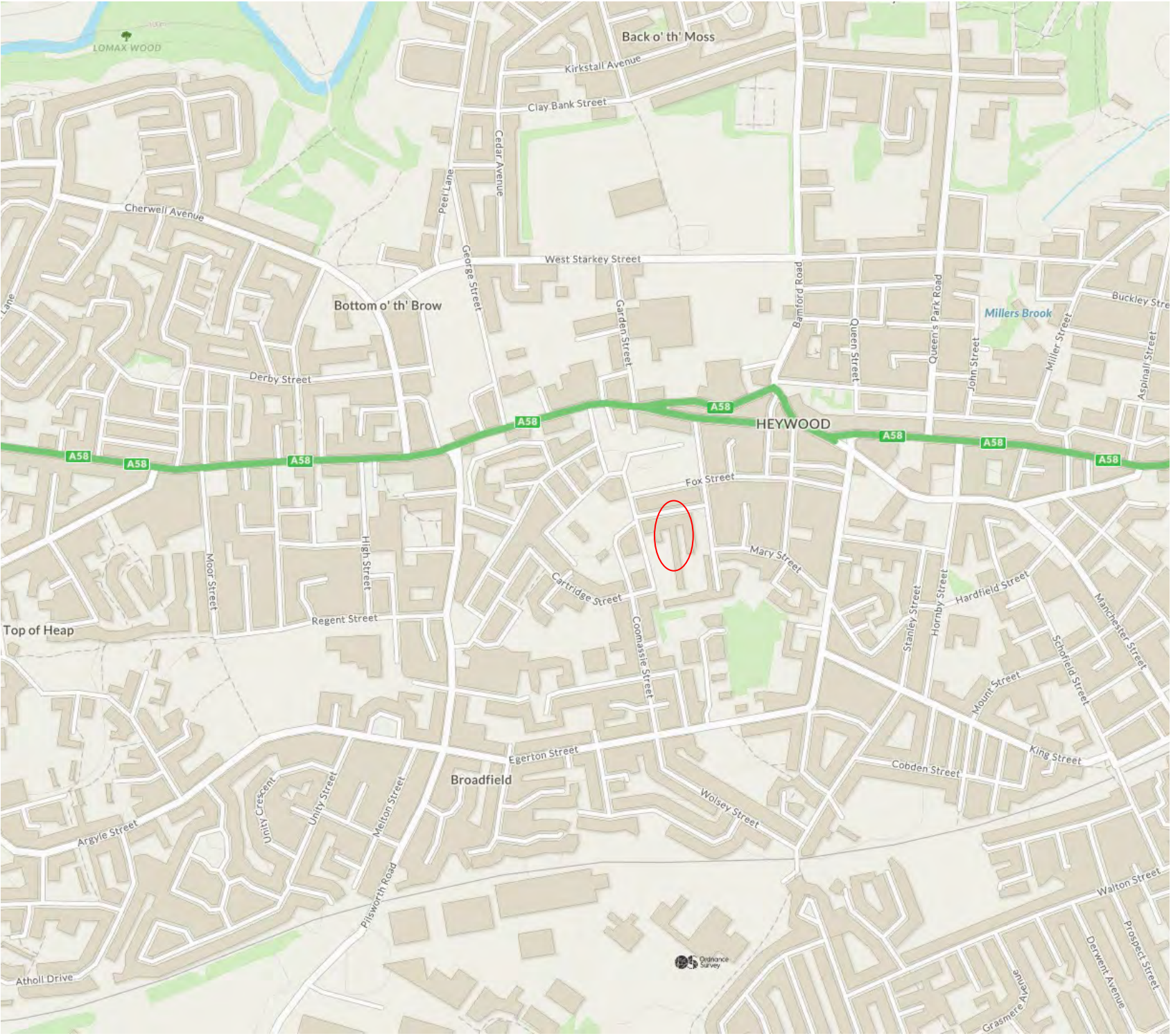
Considering the findings of the previous and current geotechnical investigations on the site which indicate a high likelihood of piled foundations – likely to be end bearing in the bedrock formation. This choice of foundation is driven by the deep deposits of plastic sheeting bales buried on the site. In the light of the mining issues, it may be preferable to consider reinforced strip foundations on ground improved by vibro replacement stone columns, but this would require remediation of the site by excavation of the plastic wastes and replacement by clean imported granular fill.

However, prior to any redevelopment works, it is recommended that a series of grout injection holes be sunk on a suitable grid formation within the 'Red' hatched areas as illustrated on **CCG** Drawing No. CCG-C-22-13091-3 by a competent grouting contractor and the workings infilled with 10:1 pfa: cement grout injected under pressure. There is some doubt as the extent of voided ground south of Wesley Street and initial grouting trials are recommended on this area to confirm the extent of grout take. The depth of the grouting boreholes should extend c.2m below the underside of the identified voided ground i.e. to a notional depth of 27m

On completion of drilling, each borehole should be grouted under pressure with the amount of grout uptake being recorded.

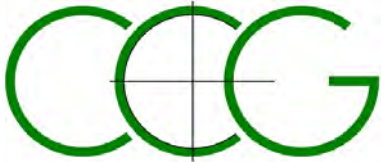
The Coal Authority will require the submission of a method statement and Application for Drilling in connection with the proposed grouting works.

APPENDIX A: DRAWINGS



DO NOT SCALE

Notes: Study Site



CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
Whitechurch Homes

Project:
Wesley Street and Brunswick Street, Heywood,
Rochdale, OL10 1JB

Title:
Aerial Photograph

Scale:
NTS

Issue:
01

Drawn by:
DG

Date:
May 2022

Project No.
CCG-C-22-13039

Drawing No.
01

© CC GEOTECHNICAL LIMITED



DO NOT SCALE

Notes: Study Site



CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
Whitechurch Homes

Project:
Wesley Street and Brunswick Street, Heywood,
Rochdale, OL10 1JB

Title:
Aerial Photograph

Scale:
NTS

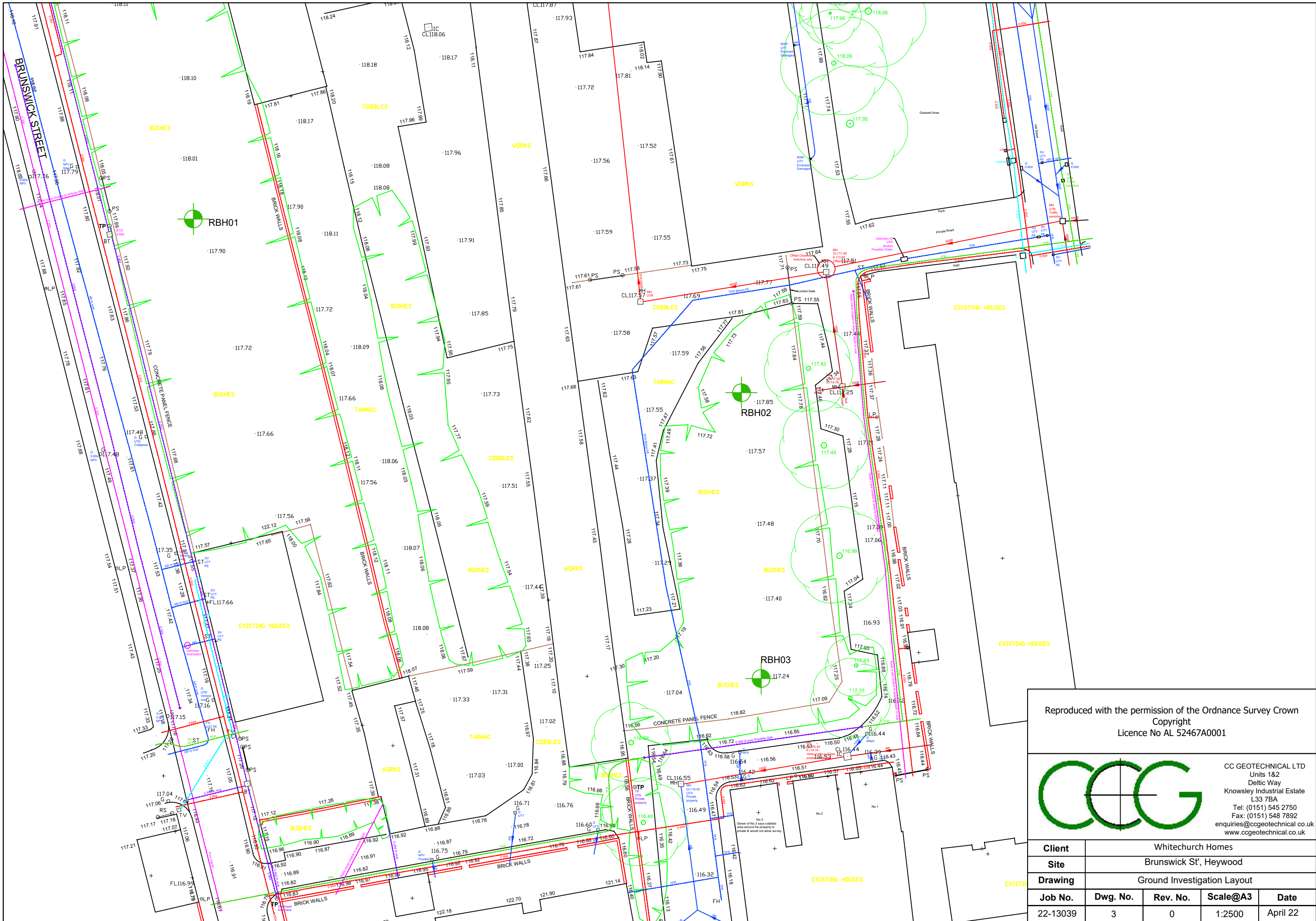
Issue:
01

Drawn by:
DG

Date:
May 2022

Project No.
CCG-C-22-13039

Drawing No.
02



Reproduced with the permission of the Ordnance Survey Crown
Copyright
Licence No AL 52467A0001

CCG

CC GEOTECHNICAL LTD
Units 1&2
Deltic Way
Knowsley Industrial Estate
L33 7BA
Tel: (0151) 545 2750
Fax: (0151) 548 7892
enquiries@ccgeotechnical.co.uk
www.ccgeotechnical.co.uk

Client	Whitechurch Homes			
Site	Brunswick St', Heywood			
Drawing	Ground Investigation Layout			
Job No.	Dwg. No.	Rev. No.	Scale@A3	Date
22-13039	3	0	1:2500	April 22

general notes:
do not scale the drawing.
all dimensions to be checked on site prior to commencement of work and any discrepancy shall be immediately reported and resolved prior to work commencing.
this drawing is to be read in conjunction with all relevant drawings and specifications relating to the job whether or not indicated on the drawing.
copyright reserved to mck associates ltd. and this drawing may not be used or reproduced without prior written consent.



- | | |
|---|--|
|  | Application Boundary |
|  | Existing trees to be retained |
|  | Indicative planting |
|  | Indicative hedging |
|  | Existing trees to be removed |
|  | Denotes shared drives |
|  | Denotes handstanding for refuse collection |
|  | Easement |

Schedule of Accommodation

Code	House Type	Beds	Size	Qty	Sq.Ft.
BUR	Burghley GF	1	545	4	2180
BUR	Burghley FF	1	614	4	2456
WOB	Wobum	2	724	20	14480
WOB ALT	Wobum Alt	2	740	2	1480
ARU	Arundel	3	872	11	9592
GOS	Gosford	3	912	5	4560
WOB 2.5	Wobum Plus	3	1002	6	6012
ARU 2.5	Arundel Plus	3	1212	9	10908
TOTAL				61	51668

A	19/11/2021	ELC	Shared driveway from plots 40-50 split into two.
Rev.	Date	By	Description
Client:			

Z:\Company logos\Westchurch.jpg



associates limited

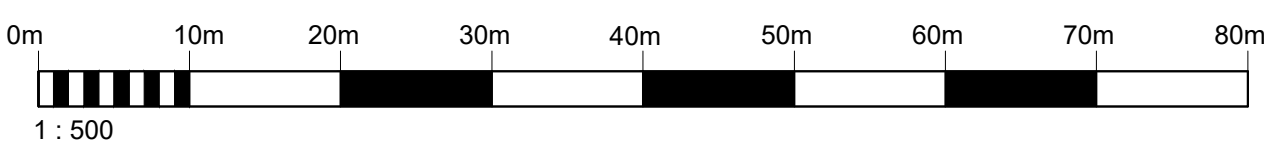
architecture ■ building surveying ■ urban design

Project:
BRUNSWICK STREET
HEYWOOD

Drawing Title:

PROPOSED SITE LAYOUT

Drawn: ELC	Checked: CT	Scale: 1:500	Date: 19/11/2021
Job No: 21-069		Drawing No: 0001	Rev: A



APPENDIX B: PERMIT TO DRILL IN PRODUCTIVE COAL MEASURES



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 24889

Name and Address of Permit Holder:

Westchurch Homes
Kennedy House
31 Stamford St
Altrincham
WA14 1ES

Site Location:

Former works
Brunswick Street
Heywood
Oldham
OL10 1JB

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

A Ground Investigation comprising four boreholes to 40m within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- Manned entry (i.e.) into mine entries/workings) is strictly prohibited.
- Water flush
- Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig
- Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works
- Appropriate borehole sealing without delay and to withstand site level changes

Signed: Michael Amirtash Granted Date: 12th May 2022

For and on behalf of The Coal Authority

Nominated Representative: Michael Amirtash, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk



The Coal
Authority

Granted Permit Boundary

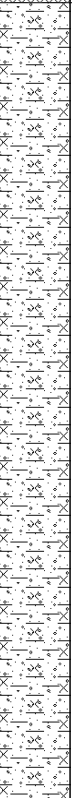
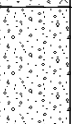
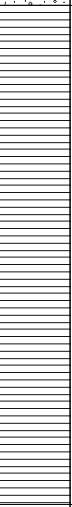
Permit Ref: 24889

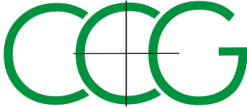
Permit Boundary:

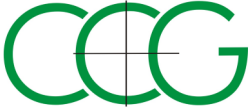


These maps are reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationary Office. © Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. The Coal Authority. Licence No: 100020315. [216]

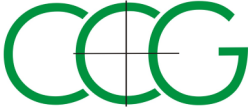
APPENDIX C: BOREHOLE LOGS

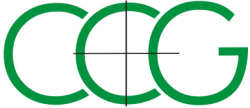
	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH01						
	Contract Number: CCG-C-22-13039		Date Started: 18/05/2022		Logged By:		Checked By: CB		Status: FINAL						
	Easting: 385270.8		Northing: 410612.0		Ground Level: 118.25mAOD		Plant Used:		Rig Crew:						
Rotary Open Drilling Log				Termination:				Scale: 1:50							
Samples & In Situ Testing						Strata Details						Groundwater			
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/Installation			
						118.10	0.15		TARMAC paving						
							(0.45)		Grey slightly silty sandy GRAVEL. Gravel is fine to coarse angular to subround of brick and sandstone (MADE GROUND)						
						117.65	0.60		Soft to firm becoming firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies		1				
											2				
											3				
											4				
											5				
							(5.30)								
						112.35	5.90		Brown slightly silty SAND and GRAVEL. Gravel is fine to coarse of various lithologies		6				
							(0.80)								
						111.55	6.70		Grey weathered becoming competent MUDSTONE No flush loss No voids		7				
											8				
											9				
											10				
						Continued next sheet									
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids						
					6.70 30.00	150 90	6.70 30.00	150 90							
										Water Strikes					
										Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Flush Information															
Top (m)	Base (m)	Flush Type	Return	Flush Colour											
										Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %					
										CC GEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com					

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH01						
	Contract Number: CCG-C-22-13039		Date Started: 18/05/2022		Logged By:		Checked By: CB		Status: FINAL						
	Easting: 385270.8		Northing: 410612.0		Ground Level: 118.25mAOD		Plant Used:		Rig Crew:						
Rotary Open Drilling Log				Termination:				Scale: 1:50							
Samples & In Situ Testing						Strata Details						Groundwater			
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation		
									Grey weathered becoming competent MUDSTONE No flush loss No voids						
												11			
												12			
												13			
												14			
												15			
												16			
												17			
												18			
												19			
												20			
Continued next sheet															
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)		Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids					
						6.70 30.00	150 90	6.70 30.00	150 90						
										Water Strikes					
										Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Flush Information															
Top (m)	Base (m)	Flush Type	Return	Flush Colour											
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %															
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com															

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH01					
	Contract Number: CCG-C-22-13039		Date Started: 18/05/2022		Logged By:		Checked By: CB		Status: FINAL					
	Easting: 385270.8		Northing: 410612.0		Ground Level: 118.25mAOD		Plant Used:		Rig Crew:					
Rotary Open Drilling Log				Termination:				Scale: 1:50						
Samples & In Situ Testing						Strata Details						Groundwater		
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/Installation	
									Grey weathered becoming competent MUDSTONE No flush loss No voids					
												21		
												22		
												23		
												24		
												25		
												26		
												27		
												28		
												29		
						88.25	30.00		End of Borehole at 30.00m			30		
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids					
					6.70	150	6.70	150						
					30.00	90	30.00	90						
Flush Information						Top (m)		Base (m)		Water Strikes				
Top (m)	Base (m)	Flush Type	Return	Flush Colour					Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %														
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH02						
	Contract Number: CCG-C-22-13039		Date Started: 05/05/2022		Logged By: AR		Checked By: CB		Status: FINAL						
	Easting: 385331.9		Northing: 410592.6		Ground Level: 117.50mAOD		Plant Used: Dando 150 S&A		Rig Crew: AR/CMcG CB/JC						
Rotary Open Drilling Log										Sheet 1 of 3 Scale: 1:50					
Weather: Dry				Termination:											
Samples & In Situ Testing						Strata Details						Groundwater			
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation		
						117.10	(0.40)		Black / grey gravelly SAND. Gravel is fine to coarse angular to subangular of cinders (MADE GROUND)						
							0.40								
						116.50	(0.60)		Soft to firm grey varying to brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subround of brick (MADE GROUND)						
							1.00					1			
									Firm brown slightly sandy silty CLAY						
												2			
							(2.90)								
												3			
															
						113.60	3.90		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse subangular to subround of various lithologies			4			
							(0.70)								
						112.90	4.60		Light brown slightly silty SAND and GRAVEL. Gravel is fine to coarse of various lithologies			5			
							(1.30)								
						111.60	5.90		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse subangular to subround of various lithologies			6			
							(1.10)								
						110.50	7.00		Brown slightly silty SAND and GRAVEL. Gravel is fine to coarse of various lithologies			7			
							(0.60)								
						109.90	7.60		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse subangular to subround of various lithologies			8			
							(0.90)								
						109.00	8.50		Brown slightly silty SAND and GRAVEL. Gravel is fine to coarse of various lithologies			9			
							(0.60)								
						108.40	9.10		Grey weathered becoming competent / hard MUDSTONE with occasional thin intact carbonaceous shale / coal bands (<100mm) at c. 22mbgl No flush loss No voids			9			
												10			
						Continued next sheet									
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids						
					9.10	150	9.10	150							
					30.00	90	30.00	90							
										Water Strikes					
										Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks					
										6.80 6.80 0 SOS SWL					
Flush Information						Top (m)		Base (m)							
Top (m)	Base (m)	Flush Type	Return	Flush Colour											
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %															
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com															

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH02						
	Contract Number: CCG-C-22-13039		Date Started: 05/05/2022		Logged By: AR		Checked By: CB		Status: FINAL						
									Sheet 2 of 3						
Rotary Open Drilling Log		Easting: 385331.9		Northing: 410592.6		Ground Level: 117.50mAOD		Plant Used: Dando 150 S&A		Rig Crew: AR/CMcG CB/JC					
Weather: Dry				Termination:				Scale: 1:50							
Samples & In Situ Testing						Strata Details						Groundwater			
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation		
									Grey weathered becoming competent / hard MUDSTONE with occasional thin intact carbonaceous shale / coal bands (<100mm) at c. 22mbgl No flush loss No voids						
												11			
												12			
												13			
												14			
												15			
												16			
												17			
												18			
												19			
												20			
									Continued next sheet						
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids						
					9.10 30.00	150 90	9.10 30.00	150 90							
										Water Strikes					
										Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
										6.80	6.80		0		SOS SWL
Flush Information						Top (m)		Base (m)		Type		Dia (mm)			
Top (m)	Base (m)	Flush Type	Return	Flush Colour											
									Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com															

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH02					
	Contract Number: CCG-C-22-13039		Date Started: 05/05/2022		Logged By: AR		Checked By: CB		Status: FINAL					
	Easting: 385331.9		Northing: 410592.6		Ground Level: 117.50mAOD		Plant Used: Dando 150 S&A		Rig Crew: AR/CMcG CB/JC					
Rotary Open Drilling Log										Sheet 3 of 3				
Weather: Dry				Termination:										
Samples & In Situ Testing						Strata Details						Groundwater		
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation	
									Grey weathered becoming competent / hard MUDSTONE with occasional thin intact carbonaceous shale / coal bands (<100mm) at c. 22mbgl No flush loss No voids					
												21		
												22		
												23		
												24		
												25		
												26		
												27		
												28		
												29		
						87.50	30.00		End of Borehole at 30.00m			30		
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids					
					9.10 30.00	150 90	9.10 30.00	150 90						
Flush Information						Top (m)		Base (m)		Water Strikes				
Top (m)	Base (m)	Flush Type	Return	Flush Colour					Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									6.80	6.80		0		SOS SWL
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %														
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH03						
	Contract Number: CCG-C-22-13039		Date Started: 03/05/2022		Logged By: AR		Checked By: CB		Status: FINAL						
	Easting: 385334.1		Northing: 410560.8		Ground Level: 117.25mAOD		Plant Used: Dando 150 S&A		Rig Crew: AR/CMcG CB/JC						
Rotary Open Drilling Log										Sheet 1 of 3					
Weather: Dry				Termination:											
Samples & In Situ Testing						Strata Details						Groundwater			
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation		
						116.85	(0.40) 0.40		Brown / red slightly silty gravelly SAND with medium cobble content. Gravel is fine to coarse angular to subround of brick (MADE GROUND) Brown clayey gravelly SAND. Gravel is fine to coarse angular to subround of brick (MADE GROUND)			1			
						116.15	(0.70) 1.10								
									Soft grey varying to brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse of various angularities and lithologies			2			
							(2.90)		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			3			
						113.25	4.00		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			4			
						112.75	(0.50) 4.50								
									Brown slightly silty SAND and GRAVEL. Gravel is fine to coarse of various angularities and lithologies			5			
							(2.40)		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			6			
						110.35	6.90		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			7			
							(2.10)		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			8			
						108.25	9.00		Grey trending to black weathered becoming competent MUDSTONE			9			
									Continued next sheet			10			
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)		Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids					
						10.50 30.00	150 90	10.50 30.00	150 90						
										Water Strikes					
										Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
										4.50			0		Slight seepage
Flush Information															
Top (m)	Base (m)	Flush Type	Return	Flush Colour											
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %															
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com															

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes				Borehole ID: RBH03				
	Contract Number: CCG-C-22-13039		Date Started: 03/05/2022		Logged By: AR		Checked By: CB		Status: FINAL				
	Easting: 385334.1		Northing: 410560.8		Ground Level: 117.25mAOD		Plant Used: Dando 150 S&A		Rig Crew: AR/CMcG CB/JC				
Rotary Open Drilling Log										Sheet 2 of 3			
Weather: Dry				Termination:									
Samples & In Situ Testing						Strata Details						Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/Installation
									Grey trending to black weathered becoming competent MUDSTONE				
							(5.30)					11	
												12	
												13	
												14	
						102.95	14.30 (0.40)		Black intact COAL No flush loss				
						102.55	14.70		Black becoming grey MUDSTONE				
												15	
												16	
												17	
							(6.80)					18	
												19	
												20	
Continued next sheet													
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:			
Date	Time	Depth (m)	Casing (m)	Water (m)		Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl			
						10.50	150	10.50	150	No flush loss			
						30.00	90	30.00	90	No voids			
						Water Strikes							
						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks		
						4.50			0		Slight seepage		
Flush Information													
Top (m)	Base (m)	Flush Type	Return	Flush Colour									
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %													
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													



Contract Name:
Wesley St & Brunswick St', Heywood

Client:	Westchurch Homes
---------	------------------

Borehole ID:	RBH03
--------------	-------

Contract Number:
CCG-C-22-13039

Date Started: 03/05/2022

Logged By:	AR
------------	----

Checked By:	CB
-------------	----

Status:	FINAL
---------	-------

Sheet 3 of 3

Rotary Open
Drilling Log

Easting:	385334.1
----------	----------

Northings:	410560.8
------------	----------

Ground Level:
117.25mAOD

Plant Used:	Dando 150 S&A
-------------	---------------

Rig Crew:	AR/CMcG CB/JC
-----------	---------------

Scale: 1:50

Weather: Dry

Termination:

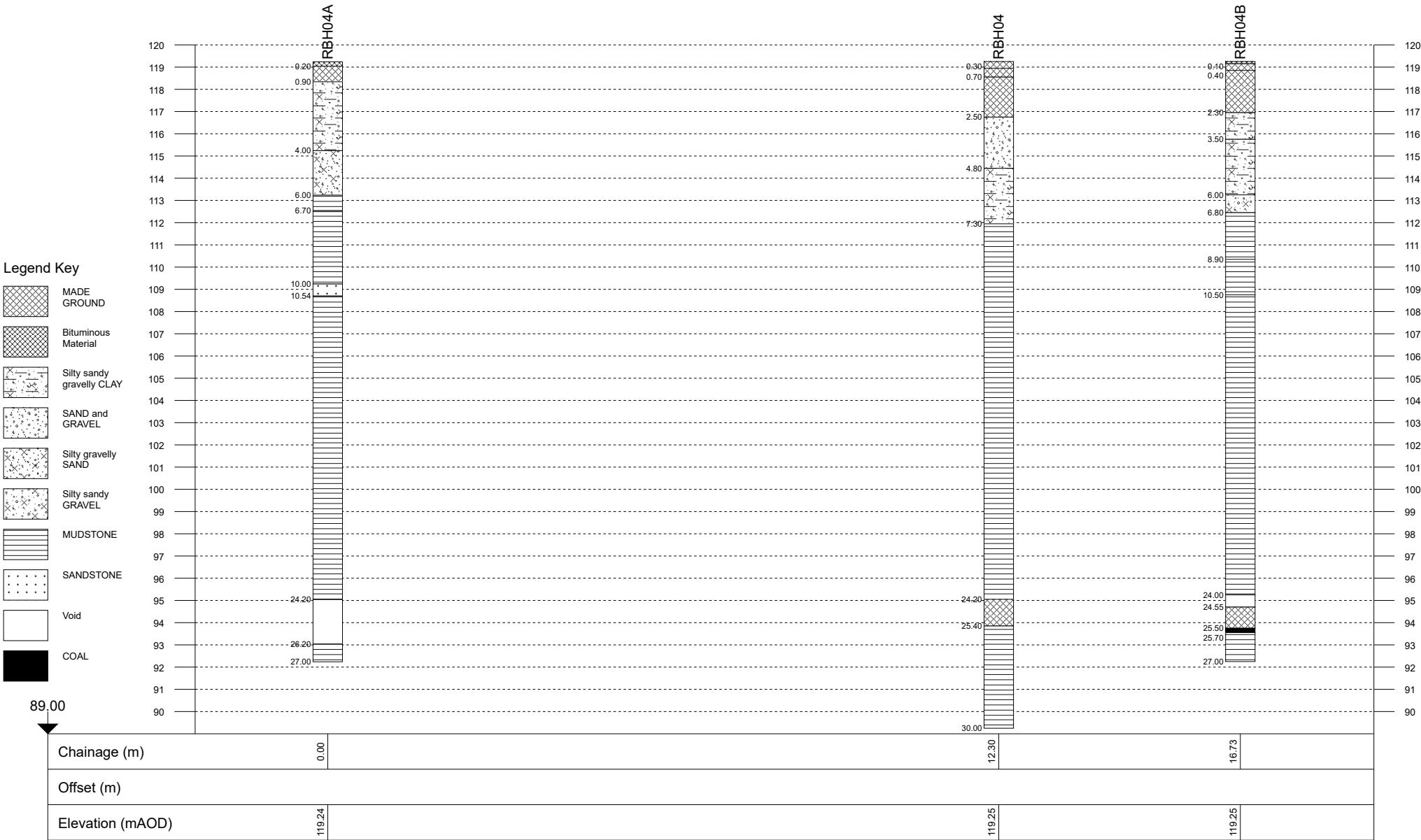
Samples & In Situ Testing

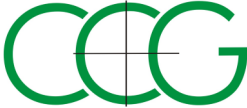
Strata Details

Groundwater

Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
									Black becoming grey MUDSTONE	21		
						95.75	21.50 (1.30)	Black intact COAL No flush loss		22		
						94.45	22.80		Black becoming grey MUDSTONE	23		
										24		
										25		
										26		
							(7.20)			27		
										28		
										29		
						87.25	30.00		End of Borehole at 30.00m	30		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl No flush loss No voids						
					10.50	150	10.50	150							
					30.00	90	30.00	90							
Flush Information					Water Strikes										
					Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks					
					4.50			0		Slight seepage					
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Installation	Type	Size (mm)	Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in % CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					



	Contract Name: Wesley St & Brunswick St', Heywood			Client: Westchurch Homes			Borehole ID: RBH04						
	Contract Number: CCG-C-22-13039		Date Started: 17/05/2022		Logged By: NW		Checked By: CB		Status: FINAL				
	Easting: 385281.9		Northing: 410692.1		Ground Level: 119.25mAOD		Plant Used: Dando 150 S&A		Rig Crew: NW/JC CB/JC				
Rotary Open Drilling Log										Scale: 1:50			
Weather: Dry				Termination:									
Samples & In Situ Testing						Strata Details						Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
						118.95	(0.30) 0.30		Brown slightly silty gravelly SAND. Gravel is fine to coarse angular to subangular of brick (MADE GROUND)				
						118.55	(0.40) 0.70		Large Granite COBBLES				
									Brown locally red slightly silty gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subround of brick and sandstone (MADE GROUND)			1	
							(1.80)					2	
						116.75	2.50		Brown slightly silty SAND and GRAVEL. Gravel is fine to coarse angular to subround of various lithologies			3	
							(2.30)					4	
						114.45	4.80		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies			5	
							(2.50)					6	
						111.95	7.30		Grey weathered becoming competent MUDSTONE			7	
												8	
												9	
												10	
Continued next sheet													
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:			
Date	Time	Depth (m)	Casing (m)	Water (m)		Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl			
						7.50	150	7.50	150	21.6m > 22.8mbgl LOOSE / BROKEN GROUND			
						30.00	90	30.00	90	50% bit resistance drop			
										80% flush loss			
										Water Strikes			
										Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks			
Flush Information													
Top (m)	Base (m)	Flush Type	Return	Flush Colour									
										Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %			
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													



Contract Name:
Wesley St & Brunswick St', Heywood

Client:	Westchurch Homes
---------	------------------

Borehole ID:	RBH04
--------------	-------

Contract Number:
CCG-C-22-13039

Date Started: 17/05/2022

Logged By:	NW
------------	----

Checked By:
CB

Status:	FINAL
---------	-------

Sheet 2 of 3

Rotary Open
Drilling Log

Easting:	385281.9
----------	----------

Northings:	410692.1
------------	----------

Ground Level:	119.25mAOD
---------------	------------

Plant Used:	Dando 150 S&A
-------------	---------------

Rig Crew:	NW/JC CB/JC
-----------	-------------

Scale: 1:50

Weather: Dry

Termination:

Samples & In Situ Testing

Strata Details

Groundwater

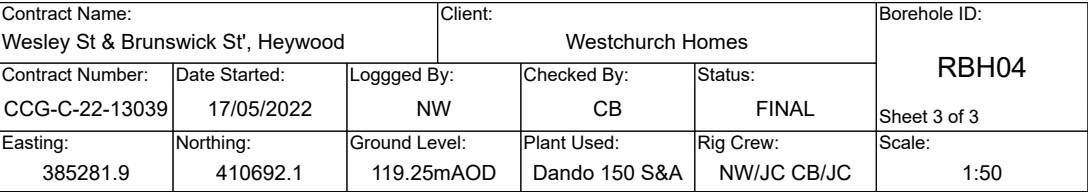
[illegible]

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)		
					7.50 30.00	150 90	7.50 30.00	150 90		
									1hr hand digging borehole starter pit GL-1.2mbgl 21.6m > 22.8mbgl LOOSE / BROKEN GROUND 50% bit resistance drop 80% flush loss	
									Water Strikes	
					Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Flush Information										
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Drainage Type	Flow (m/s)		
					Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %					
					CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

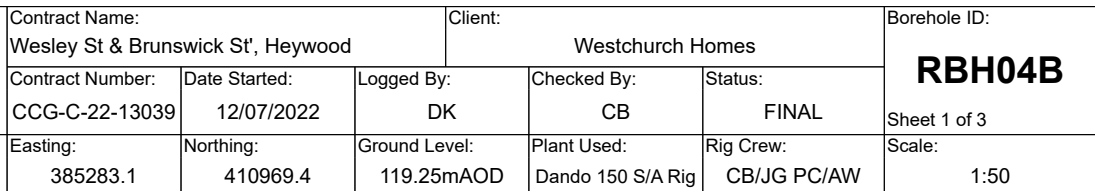
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com



Termination:

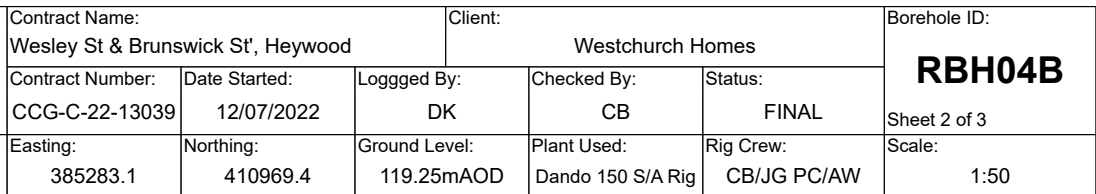
[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:								
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging borehole starter pit GL-1.2mbgl 21.6m > 22.8mbgl LOOSE / BROKEN GROUND 50% bit resistance drop 80% flush loss								
					7.50	150	7.50	150									
					30.00	90	30.00	90									
Flush Information					Sampling				Water Strikes								
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Interval	Type	Time (mins)	Rose to (m)	Remarks	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %																	
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com																	



Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)							
12-07-2022	16:00	9.00	9.00												
									1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl						
Water Strikes															
Chiselling					Top (m)	Base (m)	Condition	Type	Size (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks							3.00			0		Slight seepage
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com															



Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:																			
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl																			
12-07-2022	16:00	9.00	9.00																									
					Water Strikes																							
					Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																		
					3.00			0		Slight seepage																		
Flush Information					Top (m)						Bore (m)						Type						Dia (mm)					
Top (m)	Base (m)	Flush Type	Return	Flush Colour																								
					Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %																							
					CCGEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com																							

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes			Borehole ID: RBH04B					
	Contract Number: CCG-C-22-13039		Date Started: 12/07/2022		Logged By: DK		Checked By: CB		Status: FINAL				
	Easting: 385283.1		Northing: 410969.4		Ground Level: 119.25mAOD		Plant Used: Dando 150 S/A Rig		Rig Crew: CB/JG PC/AW				
Rotary Core Drilling Log										Sheet 3 of 3			
										Scale: 1:50			
Weather:				Termination:									
Samples & In Situ Testing						Strata Details						Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
19.50 - 21.00	95	6	0	NI					Grey thickly laminated MUDSTONE. Highly weathered. Recovered as gravel			20	
21.00 - 22.50	56	5	0	NR					NO RECOVERY - 21.00-21.66mbgl			21	
				NI				NON-INTACT. RECOVERED AS GRAVELLY CLAY - 21.66-22.00mbgl					
				NI				NON-INTACT. RECOVERED AS GRAVEL - 22.00-22.20mbgl			22		
				29				NON-INTACT. RECOVERED AS GRAVEL - 22.27-23.17mbgl					
22.50 - 24.00	100	29	15	NI								23	
				26									
				NI				NON-INTACT. RECOVERED AS GRAVEL - 23.56-23.74mbgl					
24.00 - 25.50	66	0	0	NR	95.25	24.00		VOIDED GROUND Zero bit resistance 100% flush loss NO RECOVERY - 24.00-24.85mbgl			24		
				NI	94.70	24.55		Dark grey / black very weak MUDSTONE with occasional carbonaceous mudstone / siltstone and thin coal bands, recovered as clayey gravel NON-INTACT. RECOVERED AS CLAYEY GRAVEL - 24.55-25.5mbgl			25		
25.50 - 27.00	100	67	49	9	93.75	25.50		Black non-intact COAL					
				NI	93.55	25.70		Grey thickly laminated MUDSTONE. Moderately weathered. Recovered locally as gravel. Discontinuities are very close to closely spaced, horizontal occasionally sub-vertical (drilling induced), clean, smooth and wide NON-INTACT. RECOVERED AS GRAVEL - 26.46-26.61mbgl			26		
				5									
					92.25	27.00					27		
												28	
												29	
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:			
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl				
12-07-2022	16:00	9.00	9.00										
Flush Information						Top (m)		Base (m)		Remarks			
Top (m)	Base (m)	Flush Type	Return	Flush Colour									
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %						CCGEOTECHNICAL LTD 0151 545 2750 www.ccgtechnical.com							

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

PROJECT No.:- CCG-C-22-13039 SITE:- BRUNSWICK STREET, HEYWOOD

DATE: 27.07.22

[illegible]

* NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)

p = perpendicular; l = parallel, u = unknown

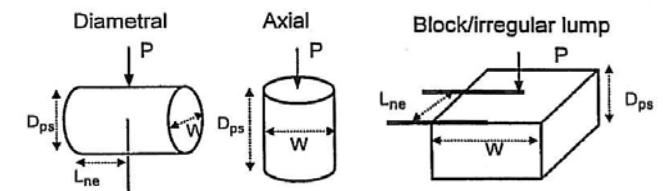
DIA. KEY- P = load ; Dps = platen separation ;

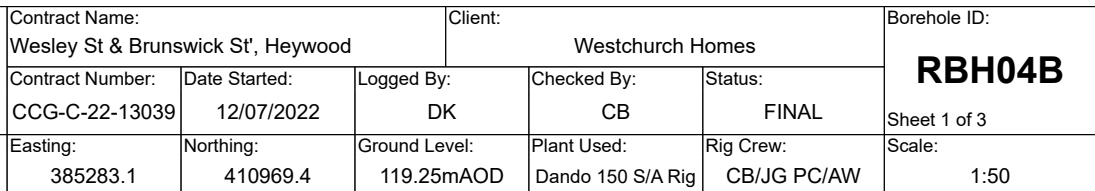
W = width of shortest dimension perpendicular to load ;

L_{ne} = length from platens to nearest free end

TESTED BY: DK

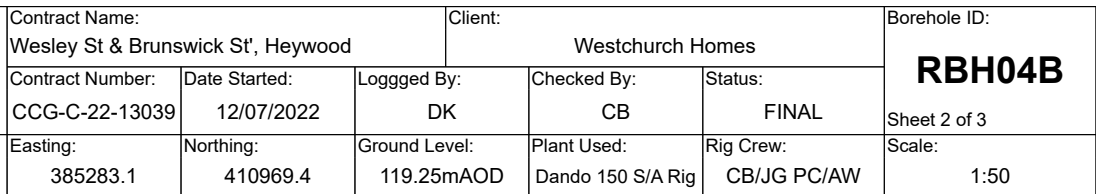
APPROVED BY: DK





Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)							
12-07-2022	16:00	9.00	9.00												
									1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl						
Water Strikes															
Chiselling					Top (m)	Base (m)	Condition	Type	Size (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks							3.00			0		Slight seepage
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com															



Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

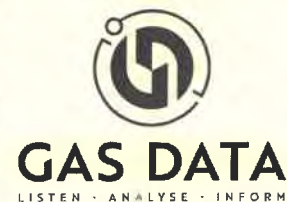
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl						
12-07-2022	16:00	9.00	9.00												
										Water Strikes					
										Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
										3.00			0		Slight seepage
Flush Information					Fracture Data										
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dis (mm)							
									Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %						
CCGEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com															

	Contract Name: Wesley St & Brunswick St', Heywood				Client: Westchurch Homes			Borehole ID: RBH04B					
	Contract Number: CCG-C-22-13039		Date Started: 12/07/2022		Logged By: DK		Checked By: CB		Status: FINAL				
	Easting: 385283.1		Northing: 410969.4		Ground Level: 119.25mAOD		Plant Used: Dando 150 S/A Rig		Rig Crew: CB/JG PC/AW				
Rotary Core Drilling Log										Sheet 3 of 3			
										Scale: 1:50			
Weather:				Termination:									
Samples & In Situ Testing						Strata Details						Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
19.50 - 21.00	95	6	0	NI					Grey thickly laminated MUDSTONE. Highly weathered. Recovered as gravel			20	
21.00 - 22.50	56	5	0	NR					NO RECOVERY - 21.00-21.66mbgl			21	
				NI				NON-INTACT. RECOVERED AS GRAVELLY CLAY - 21.66-22.00mbgl					
				NI				NON-INTACT. RECOVERED AS GRAVEL - 22.00-22.20mbgl			22		
				29				NON-INTACT. RECOVERED AS GRAVEL - 22.27-23.17mbgl					
22.50 - 24.00	100	29	15	NI								23	
				26									
				NI				NON-INTACT. RECOVERED AS GRAVEL - 23.56-23.74mbgl					
24.00 - 25.50	66	0	0	NR	95.25	24.00		VOIDED GROUND Zero bit resistance 100% flush loss NO RECOVERY - 24.00-24.85mbgl			24		
				NI	94.70	24.55		Dark grey / black very weak MUDSTONE with occasional carbonaceous mudstone / siltstone and thin coal bands, recovered as clayey gravel NON-INTACT. RECOVERED AS CLAYEY GRAVEL - 24.55-25.5mbgl			25		
25.50 - 27.00	100	67	49	9	93.75	25.50		Black non-intact COAL					
				NI	93.55	25.70		Grey thickly laminated MUDSTONE. Moderately weathered. Recovered locally as gravel. Discontinuities are very close to closely spaced, horizontal occasionally sub-vertical (drilling induced), clean, smooth and wide NON-INTACT. RECOVERED AS GRAVEL - 26.46-26.61mbgl			26		
				5									
					92.25	27.00					27		
												28	
												29	
Start & End of Shift Observations						Borehole Diameter		Casing Diameter		Remarks:			
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit Some flush loss 26.00-27.00mbgl				
12-07-2022	16:00	9.00	9.00										
Flush Information						Top (m)		Base (m)		Remarks			
Top (m)	Base (m)	Flush Type	Return	Flush Colour									
Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %						CCGEOTECHNICAL LTD 0151 545 2750 www.ccgtechnical.com							

APPENDIX D: GAS MONITOR CALIBRATION CERTIFICATE

TEST DATE AND CONDITIONS	
Date	10/02/22
Atmospheric pressure	1008mb
Ambient Temp	23.3°C
Enviroics Serial No.	2518/3268

GAS DATA LTD
Unit 4 Fairfield court
Seven Stars Estate
Coventry
CV3 4LJ, UK
+44 (0) 24 7630 3311



GFM436-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
12667	CC Geotechnical Ltd

INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	500cc/min
Display Contrast	✓	Pump Flow @ -200mB	300cc/min
Clock Set / Running	✓	S/W Version	G436.0027/0010
Labels Fitted	✓	Recalibration Date	10/02/23

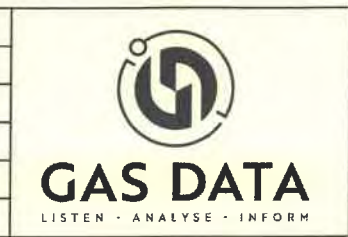
GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+/-0.1
CH4	5%	5.0	+/-0.3	0.0	0.0	0.0	+/-0.1
	60%	59.9	+/-3.0	0.0	0.0	0.0	+/-0.1
CO2	5%	0.0	0.0	5.1	+/-0.3	0.0	+/-0.1
	40%	0.0	0.0	40.2	+/-3.0	0.0	+/-0.1
O2	20.9%	0.0	0.0	0.1	+0.1	20.8	+/-0.5

OPTIONAL GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	Label Range	H2S 5000ppm	CO 2000ppm		Hexane 2.00%	tol. (% vol.)
N2	100%		0	0		0	0.0
H2S	1500ppm		1500	0			+/- 5.0
CO	1000ppm		110	1000			+/- 5.0
Hexane	2.00%					1.849	+/- 10.0

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)				
All Ports	Current Atmospheric	1009	+/-2.0				
Ap Port (Internal)	+800mB(a)	802	+/-5.0				
	+1200mB(a)	1201	+/-5.0				

TEST DATE AND CONDITIONS	
Date	10/02/22
Atmospheric pressure	1008mb
Ambient Temp	23.3°C
EnviroNics Serial No.	2518/3268

GAS DATA LTD
Unit 4 Fairfield court
Seven Stars Estate
Coventry
CV3 4LJ, UK
+44 (0) 24 7630 3311



GFM436-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

FLOW CHECKS					
Calibration Flow		Instrument Flow Channels Read			
Applied Flow (l/hour)	Applied Pressure (Pa)	Flow [Flow] (l/hour)	tol. (l/hour)	Differential Pressure [Dp] (Pa)	tol. (Pa)
-30.0	-378	-29.5	+/-3.0	-366	+/-50
-3.0	-14	-3.0	+/-1.0	-14	+/-6
0.0	0	0.0	0.0	0	0.0
+3.0	12	3.1	+/-0.5	11	+/-3
+30.0	309	29.8	+/-3.0	308	+/-50
+60.0	931	60.3	+/-6.0	929	+/-130
+90.0	1833	91.3	+/-9.0	1886	+/-250

TEMPERATURE CHECK		
Calibration Temperature	Instrument Temperature Channel Read	
Applied Equivalent Temperature (°C)	Temperature [Temp] (°C)	tol. (°C)
-10.0	-10.0	+/- 2.0
0.0	0.0	+/- 1.0
30.0	30.0	+/- 1.0
60.0	60.0	+/- 1.0
100.0	99.5	+/- 1.0

Notes:

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO 14001:2015 and BS EN ISO 45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to: BS EN ISO 9001:2015
BS EN ISO 14001:2015
BS EN ISO 45001:2018

APPENDIX E: NOTES ON LIMITATIONS

Standard Terms and Conditions of Engagement

Notes on Limitations For Geoenvironmental and Geotechnical Consultancy Services

General

CC GEOTECHNICAL LTD has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from CC GEOTECHNICAL LTD and a charge may be levied against such approval.

CC GEOTECHNICAL LTD accepts no responsibility or liability for:

the consequences of this document being used for any purpose or project other than for which it was commissioned and/or

the consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.