

APPENDIX III

THE COAL AUTHORITY, CONSULTANTS COAL MINING REPORT



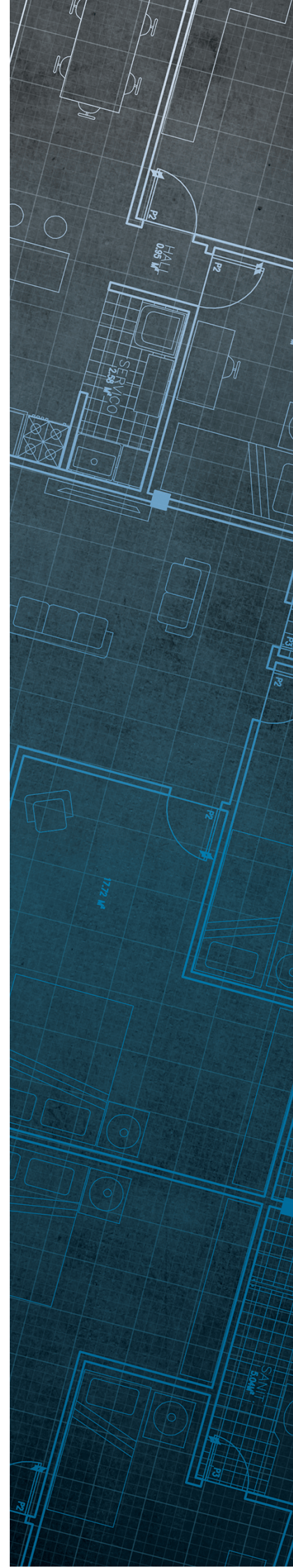
The Coal
Authority

Consultants Coal Mining Report

Land Adjacent Lancaster Lane
Brockholes
Holmfirth
Kirklees
HD9 7BP

Date of enquiry:	19 March 2020
Date enquiry received:	19 March 2020
Issue date:	19 March 2020

Our reference:	51002272887001
Your reference:	GEOL20-9775



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

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Enquiry address

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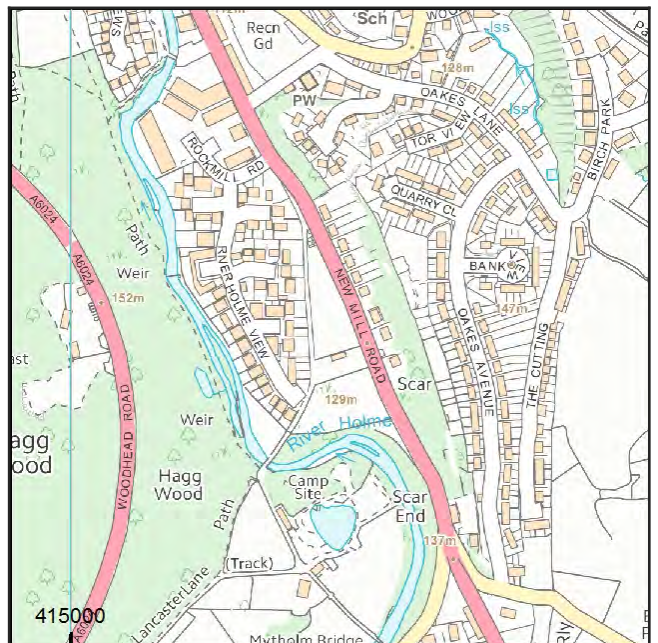
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Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

None available.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of 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.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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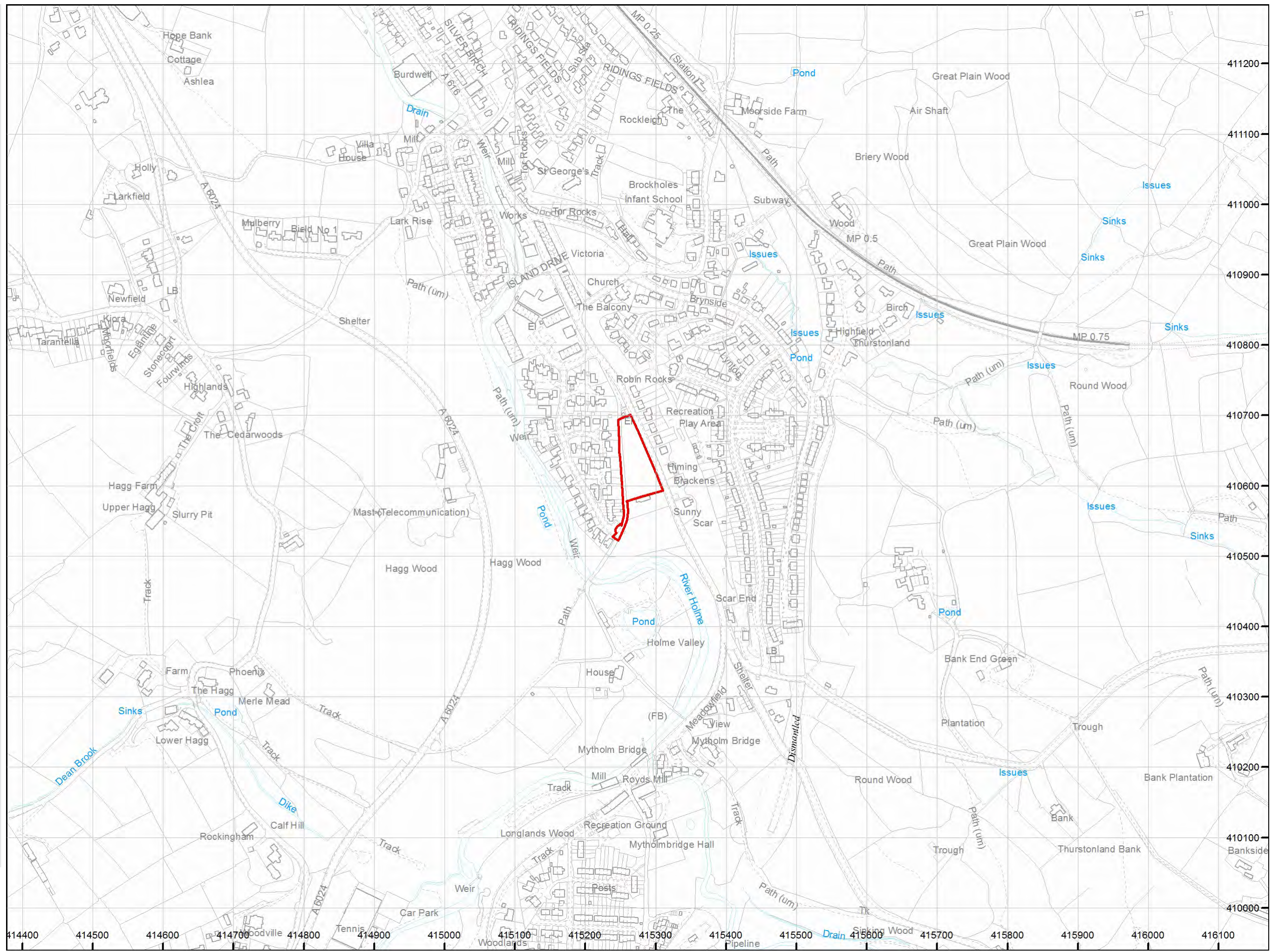
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown 

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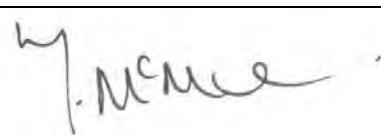
PHASE II GROUND INVESTIGATION REPORT



LAND OFF NEW MILL ROAD, BROCKHOLES, WEST YORKSHIRE, HD9 7BP
HOLLOWAY JENNINGS CONSULTING ENGINEERS LIMITED



QUALITY CONTROL

Project No.	GEOL20-9775	Client	Holloway Jennings Consulting Engineers Limited
Report Type	Phase II Ground Investigation Report		
Project Type	Proposed Residential Development		
Site Address	Land off New Mill Road, Brockholes, West Yorkshire, HD9 7BP		
NGR	415260, 410610		
Date	16/04/2020		
Prepared by	Richard Stripp		
Qualifications	BSc (Hons) MSc FGS MEnvSc		
Position	Director		
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Qualifications	BSc (Hons) CSci CEnv FGS MEnvSc FCMI MIoD		
Position	Director		

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The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources. GEOL assumes the third-party information to be reliable, but has not independently confirmed this, therefore, GEOL cannot and does not guarantee the authenticity or reliability of third-party information it has relied upon. The findings and opinions presented in this report are also relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, GEOL reserves the right to modify the opinions expressed in this report. Where opinions expressed in this report are based on current available guidelines and legislations, no liability can be accepted by GEOL for the effects of any future changes to such guidelines and legislation.

REPORT REVISION HISTORY				
Issue	Description	Date	Author	Approval
1	Final Issue	16/04/2020	RS	TMc

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1.0 Introduction

Geol Consultants Limited (GEOL) were instructed by Holloway Jennings Consulting Engineers Limited (HJCE) on behalf of their client Petrian Construction Limited to undertake appropriate Phase II Ground Investigation Works over a parcel of undeveloped sloping land, located off New Mill Road within the West Yorkshire village of Brockholes. Proposals have been made to develop the site for residential purposes, comprising the construction of nine individual residential building plots with driveways and private rear gardens sometime soon. A copy of the proposed development layout plan can be seen attached in Appendix I.

The purpose of this report is to provide information relating to the following.

- ▼ Identify the ground conditions and assess the geotechnical properties of the underlying deposits, with a view to assisting with new building foundation designs
- ▼ Determine with more certainty the ground gas regime and required protection measures for the proposed residential dwelling
- ▼ Determine the levels of contamination within the existing shallow soil deposits and to assess the impacts from those contaminants towards the future site end-users (Human Health) and the wider environment
- ▼ Determine the scope of any further investigation works or remediation works required for the site prior to commencing with the proposed residential development

This technical report should be read in conjunction with the Phase I Preliminary Contamination Risk Assessment Report produced for this site by GEOL, reference GEOL20-9775, dated March 2020. The findings contained within the aforementioned Phase I report were used to aid the design and scope of the Phase II intrusive investigation works completed on site by GEOL. The findings of the Phase I Report identified no abnormal or significant issues with regards to geotechnical hazards or potential sources of contamination affecting Human Health or Controlled Waters, with the risks assessed to be LOW.

The information contained in this technical report is limited to the area of the site as shown on the proposed development layout plan attached in Appendix I, and to those areas accessible at the time of the ground investigation works being undertaken. When considering the scope of works completed for the development proposals, any features or issues not specifically mentioned cannot be assumed to have been covered. All relevant details and descriptions relating to the site have been summarised in the Table on the following page.

2.0 Site Details

Detail	Description
Site address	Land off New Mill Road, Brockholes, West Yorkshire, HD9 7BP
NGR	415260, 410610
Site topography	The site slopes in a westerly direction towards Lancaster Lane. There is a difference in site levels of circa 10m with the lower part of the site being adjacent to Lancaster Lane, which bounds the site to the west. The western site boundary is supported by the presence of a circa 0.5m high, stone retaining wall
Current site use	The site area comprises undeveloped land, although historically the site was once used as allotment gardens. The site is now overgrown with dense brambles and unmanaged grass
Proposed site use	It is proposed to develop the site for residential purposes, comprising the construction of nine individual residential building plots with driveways and private rear gardens
Historical site features / activities	Based on Ordnance Survey (OS) maps the site has remained undeveloped from 1854 until 1994 when the site is recorded as allotment gardens. The site is now undeveloped and is heavily overgrown with vegetation. Allotment gardens can often represent a source of Polycyclic Aromatic Hydrocarbons (PAH) contamination from the localised burning of wastes. Asbestos contamination can also be present in places, associated with roofing materials used on old sheds and the like
Adjacent historical site features / activities	Historical Landfill Sites are recorded 60m south and 180m east of the site, although these are reported to have received inert and commercial waste during the 1980's and 1990's. Two BGS Recorded Minerals Sites are recorded 115m north and 240m west of the site, although there is evidence that these have not been subjected to any landfilling. An electricity substation is located immediately adjacent to the site's northern boundary, however potential PCB contamination is not considered to pose a risk to the site
Other comments	Based on the radon data available, no radon protection measures are required for the site

3.0 Scope of Works & Ground Conditions

The intrusive ground investigation works completed over the site area by GEOL comprised the sinking of 4 no. windowless sampling boreholes (labelled BH's 01 to 04) accompanied by the installation of 3 no. ground gas & groundwater monitoring wells (BH's 01, 02 & 04) and 8 no. mechanically excavated trial pits (labelled TP's 01 to 08). Detailed descriptions of the strata encountered during the investigation works, together with the results of all insitu field testing, are presented on the borehole and trial pit record sheets copies of which can be seen in Appendix II. Due to the presence of dense vegetation over the site, some partial site clearance works were initially completed by GEOL, to allow the borehole and trial pit investigation positions to be accessed and investigated.

3.0 Scope of Works & Ground Conditions (Cont'd)

The boreholes and trial pits have been accurately surveyed on site and the coordinates relating to their position, as well as the accompanying ground levels can be seen on each borehole and trial pit record sheet. The investigation positions can be seen on the borehole & trial pit location plan, a copy of which can be seen in Appendix II. A summary of the ground conditions encountered can be seen in the Table below.

Strata	Depths Recorded	Groundwater	Description & Comments
MADE GROUND:	~	~	No made ground deposits were recorded on site
TOPSOIL:	0.00m (GL) to 0.20m to 0.60m	None	Dark brown sandy clayey TOPSOIL and occasional layers of silty sand and silty clay subsoil deposits were recorded below the initial surfacing of brambles and overgrown vegetation
SUPERFICIAL GEOLOGY:	~	~	No superficial deposits were recorded, although completely weathered sandstone and mudstone deposits were evident in places which resemble sand and clay superficial deposits
SOLID GEOLOGY: Rossendale Formation	0.20m to 0.60m to at least 5.40m	Slight seepages were noted between 1.10m and 2.00m	The bedrock deposits are initially noted to be completely weathered over the site area, displaying different grades of weathering. Clayey, silty, gravelly sand was generally noted the northern portion of the site, whereas very sandy, gravelly clay was recorded below the southern portion of the site. These deposits are representative of the natural SANDSTONE / MUDSTONE bedrock

A shallow continuous groundwater surface (water table) has not been encountered during these investigation works, although some minor seepages were noted on the southern portion of the site within TP's 07 & 08 and BH03 at depths of between 1.10m and 2.00m. There was no visual or olfactory evidence of ash, any unforeseen fuel / oil contamination or potential asbestos containing materials (ACM's – cement sheeting, tiles, and the like) or bundles of fibres encountered.

Insitu standard penetration tests (SPT's) were completed within the natural deposits to determine their strength / density. SPT's completed within the initial completely weathered deposits recorded 'N' values ranging between 6 and 11, indicating the presence of medium dense sand deposits on the northern portion of the site and the presence of soft to firm clay deposits on the northern portion of the site.

3.0 Scope of Works & Ground Conditions (Cont'd)

Within the less weathered silty mudstone and sandstone deposits, SPT tests recorded 'N' values ranging between 17 and 38, and blow counts of 50 for limited penetration, indicating medium dense (stiff) and dense strata becoming very dense (very stiff) / hard strata with depth.

4.0 Ground Gas Risk Assessment

Combined ground gas & water monitoring standpipes were installed within three boreholes (BH01, BH02 & BH04), to confirm the ground gas regime below the site associated with nearby recorded Landfill Sites, albeit a low risk, as well as to monitor groundwater levels within the underlying deposits.

The monitoring installations have been constructed using 50mm diameter HDPE standpipe, comprising 1.00m of solid pipe within a bentonite seal and a response zone using slotted pipe to the terminal depths of the boreholes. The ground gas and water levels were allowed to reach equilibrium prior to the first monitoring visit. The design of the ground gas risk assessment for this site has been undertaken in general accordance with the CIRIA Report C665 (November 2007), BS8576:2013 – Guidance on investigations for ground gas and BS8485:2015 + A1:2019 – Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, and is based on the following criteria.

- ▼ The proposed residential development has been classified as a high sensitivity
- ▼ The risk associated with the generation potential of a source has been assessed as very low
- ▼ Therefore, in accordance with Tables 5.5a and 5.5b in CIRIA C665, the typical / idealised period of monitoring for this site has been determined as 6 no. recorded readings undertaken over a minimum period of 3 months
- ▼ Monitoring visits are undertaken to target and correlate with the worst-case conditions for ground gas emissions to occur, comprising falling atmospheric pressure trends and low atmospheric pressures. Monitoring of the weather conditions and predicted atmospheric pressures were carried out up to 72 hours in advance of the monitoring visits, in order that a reasonable period of data is obtained to determine atmospheric trends, and to target the worst-case scenario

Monitoring was undertaken using a Gas Data GFM436 soil gas analyser with integral flow meter, and a Geotechnical Instruments electronic dip-meter. To date, only 1 no. visit has been undertaken, and a summary of the gas monitoring results obtained can be seen in the Table on the following page.

4.0 Ground Gas Risk Assessment (Cont'd)

No detectable concentrations of methane have been recorded to date. Concentrations of carbon dioxide have currently been recorded ranging between 1.6% v/v and 1.7% v/v at the monitoring wells, with some depleted Oxygen concentrations also being recorded (min 18.4% v/v). Negligible / low flow rates were recorded on the first monitoring visit undertaken (0.1l/hr).

Borehole Position	Date of visit	Atmospheric Pressure (mbar)	Water level (m)	Max CH ₄ (%v/v)	Max CO ₂ (%v/v)	Min O ₂ (%v/v)	Flow Rate (l/hr)
BH01	19/03/2020	1008-1009	2.22	0.0	1.6	19.0	0.1
BH02		(Rising trend	1.40	0.0	1.7	18.5	0.1
BH04		1003-1027)	1.13	0.0	1.7	18.4	0.1

Atmospheric pressure trend shown in brackets taken from www.weatheronline.co.uk for Leeds-Bradford Airport

For the purposes of assessing the proposed development in accordance with Tables 8.5 & 8.7 in CIRIA C665 and Table 2 in BS8485:2015 + A1:2019, the site is characterised based on the limiting borehole hazardous gas flow rate (Q_{hg}) for methane and Carbon Dioxide, known as the Gas Screening Value (GSV), and the calculation can be seen below. The GSV equates to a Characteristic Situation classification which in turn determines the level of gas protection required in accordance with Table 4 in BS8485:2015 + A1:2019.

- Due to the lack of Methane recorded, a GSV cannot be calculated.
- Multiply the maximum Carbon Dioxide concentration (taken as 1.7% (0.017)) by the maximum flow rate (0.1l/hr), which gives a GSV value of 0.0017l/hr.

Based on the results obtained to date, the GSV calculated indicates that the presence of hazardous ground gases does not exceed the GSV assessment value of 0.07 l/hr (Characteristic Situation 1) or 0.16 l/hr. for methane and 0.78l/hr. for Carbon Dioxide (Green Classification for Situation B – Low rise housing with a ventilated underfloor void, NHBC Traffic Light System). At this stage, neither the maximum concentration for methane or Carbon Dioxide exceeds the action trigger level of 1% v/v or 5% v/v respectively, indicating that gas protection measures would not be required for the proposed residential development.

However, as there are 5 no. outstanding monitoring visits to be completed, this risk assessment and characterisation will need to be reassessed with the results issued as an addendum to this technical report.

5.0 Laboratory Testing

5.1 Determination of Liquid & Plastic Limits

Four representative samples of the natural mudstone deposits recovered at the trial pit locations have been tested to determine their moisture content and liquid & plastic limits, to ascertain their volume change potential (i.e. shrinkage or swelling), to help assist with future foundation design. The results of the tests are contained in the Ian Farmer Associates Test Report (reference 2280139 / 1), a copy of which can be seen attached in Appendix III. The natural deposits tested fall within the low and intermediate plasticity range, and when considering the amount passing the 425um sieve, the mudstone deposits display a negligible volume change (shrinkage or swelling) potential. As such these deposits tested are unlikely to undergo significant changes in volume if large changes in their natural moisture content were to occur due to seasonal variations or the like, and therefore if new foundations were to be based within these clays, they could be placed at a minimum depth of 0.75m below finished ground levels.

5.2 Determination of Particle Size Distribution

Two representative samples of the natural weathered bedrock deposits encountered at the locations of TP06 and TP07 have been tested to determine the particle size distribution (PSD). The results of the tests are contained in the Ian Farmer Associates Test Report (reference; 2280139 / 1), a copy of which can be seen attached in Appendix III. The results have identified well graded variable deposits comprising silty, sandy, gravelly clay and slightly clayey, silty, gravelly sand.

5.3 Determination of Chemical Attack on Buried Concrete

Ten representative samples of the topsoil and underlying natural bedrock deposits recovered at the trial pits locations have been tested by Derwentside Environmental Testing Services Limited (DETS) to determine their pH value and soluble sulphate (sulphate aqueous extract SO_4) levels, so these materials can be classified in accordance with the guidance BRE Special Digest 1:2005, Concrete in Aggressive Ground. The results of the tests are contained in the DETS Certificate of Analysis Report (reference; 20-05972), a copy of which can be found in Appendix III. The laboratory test results have recorded soluble sulphate concentrations ranging between 12mg/l to 54mg/l, and pH values ranging between 5.2 and 8.3. For this site and where future foundations and buried concrete are to be constructed the made ground deposits should be classified as Design Sulphate Class of DS-1. The Aggressive Chemical Environment for Concrete (ACEC) class for the deposits present can be assessed as AC-2z, due to the presence of acidic ground conditions.

5.0 Laboratory Testing (Cont'd)

5.4 Contamination Screening / Screening Strategy

When considering the findings of these investigation works, whilst there was no evidence of any made ground, representative samples of the topsoil and initial natural bedrock deposits encountered across the site have been screened for a range of chemical analytes to determine the levels of contamination and to allow an assessment of any risk these materials may pose to construction workers and future end-users where these materials are intended to be reused. In addition, the results have been used for the purposes of completing a preliminary off-site disposal assessment. Ground contamination laboratory testing was completed by DETS of Consett, Co. Durham (UKAS & MCERTS accredited), and the suite of chemical analysis carried out is summarised below. The laboratory results are contained within the DETS Certificate of Analysis Test Report (reference 20-05972), a copy of which can be found in Appendix IV, and a summary of the contamination results can be seen in the Table below and on the following page.

- ▼ 10 no. soil samples tested for Arsenic, Cadmium, Chromium (III & VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Cyanide (free) and Total Organic Carbon (TOC) / Soil Organic Matter (SOM)
- ▼ 10 no. soil samples screened for Speciated Polycyclic Aromatic Hydrocarbons (PAH's) – based on the current USEPA 16 PAH's
- ▼ 4 no. soil samples screened for Total Petroleum Hydrocarbons (TPH's), C5-C10 & C10-C40
- ▼ 10 no. soil samples tested for Asbestos (presence)

Analyte	Critical concentration (mg/kg)	No. of samples screened	Max. concentration recorded (mg/kg)
Arsenic	37 ⁽¹⁾	10	18
Cadmium	11 ⁽¹⁾	10	0.4
Chromium III	910 ⁽¹⁾	10	29
Chromium VI	6 ⁽¹⁾	10	<1.0
Copper	2400 ⁽¹⁾	10	58
Lead	200 ⁽³⁾	10	74
Mercury	40 ⁽¹⁾	10	0.48
Nickel	130 ⁽¹⁾	10	26
Selenium	250 ⁽¹⁾	10	2.3
Zinc	3700 ⁽¹⁾	10	110

⁽¹⁾ = The LQM/CIEH Suitable 4 Use Levels (Residential with homegrown produce), ⁽²⁾ = ATRISK^{SOIL} SSV (2015), ⁽³⁾ = CL:AIRE C4SLs (Residential with homegrown produce)

5.0 Laboratory Testing (Cont'd)

5.4 Contamination Screening / Screening Strategy (Cont'd)

Analyte	Critical concentration (mg/kg)	No. of samples screened	Max. concentration recorded (mg/kg)
Cyanide	34 ⁽²⁾	10	0.4
Asbestos	Presence	10	No asbestos detected
Analyte (TPH's)			
C5-C10	~	4	<0.1
C10-C40	~	4	<10
Analyte (PAH's)			
Acenaphthene	1,100 ⁽¹⁾	10	0.2
Acenaphthylene	920 ⁽¹⁾	10	1.1
Anthracene	11,000 ⁽¹⁾	10	1.7
Benzo(a)anthracene	13 ⁽¹⁾	10	5.4
Benzo(a)pyrene	3.0 ⁽¹⁾	10	7.1 (TP04)
Benzo(b)fluoranthene	3.7 ⁽¹⁾	10	5.3 (TP04)
Benzo(ghi)perylene	350 ⁽¹⁾	10	4.7
Benzo(k)fluoranthene	100 ⁽¹⁾	10	3.3
Chrysene	27 ⁽¹⁾	10	6.8
Dibenz(ah)anthracene	0.3 ⁽¹⁾	10	1.5 (TP04)
Fluoranthene	890 ⁽¹⁾	10	13
Fluorene	860 ⁽¹⁾	10	0.5
Indeno(123cd)pyrene	41 ⁽¹⁾	10	5.1
Naphthalene	13 ⁽¹⁾	10	0.1
Phenanthrene	440 ⁽¹⁾	10	4.5
Pyrene	2,000 ⁽¹⁾	10	12

⁽¹⁾ = The LQM/CIEH Suitable 4 Use Levels (Residential with homegrown produce – for organic contaminants 6% SOM has been adopted)

Generally, none of the maximum concentration values for most of the contaminants listed in the Tables exceed the critical concentration values adopted for this site, based on an end-use of residential with homegrown produce. The results of the asbestos screening have also identified that none of the samples screened were found to contain the presence of asbestos. However, the only exception to the above is that some marginal exceedances of Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(ah)anthracene have been recorded within the initial topsoil layer at the location of TP04 only.

5.0 Laboratory Testing (Cont'd)

5.4 Contamination Screening / Screening Strategy (Cont'd)

Analysis of the origin of the PAH's using the double ratio plot indicates that the elevated levels are potentially derived from a coal source, suggesting that the PAH's could be attributable to the presence of coal or residues from the burning of coal (i.e. ash). When considering the results of all the samples screened, it is felt that this location should be treated as a 'hot spot'. The 'hot spot' lies at coordinates; 415282.28, 410640.78.

Generally, it is felt that the topsoil deposits over most of the site, away from the location of TP04, can remain on site without representing a risk towards future end-users. The localised 'hot spot' identified at the location of TP04 will require delineation works and further risk assessments. However, this approach should be agreed with the Local Planning Authority (LPA) prior to completing the works.

5.5 Waste Disposal Assessment

An assessment of any excavated materials which could be generated from the creation of foundations, services, and the like and may need to be discarded off site as a waste, have been assessed and classified in accordance with the Environment Agency's Technical Guidance WM3: Waste Classification - Guidance on the classification and assessment of waste (1st Edition v1.1, June 2018).

Where any materials are being removed from site they should be disposed of at a suitably licensed and appropriate Landfill based on their classification, with a duty of care system in place and maintained throughout the disposal operation. Excavated materials should be segregated into different waste streams (i.e. made ground and natural strata) so that the materials can be appropriately assessed, classified and sent to the correct waste facility. It should be noted that prior to offsite disposal of any soils from this site, that additional sampling, analysis and screening may be required once the waste stream has been identified and volumes of material requiring disposal have been determined.

The materials present on this site have been assessed using the WM3 technical guidance in conjunction with the on-line classification software tool HazWasteOnline™. The soil screening results for each sample have been assessed individually to determine if the materials can be considered as a single waste stream or whether different areas of the site represent separate waste streams. Based on the physical (visual and olfactory) appearance of the materials / samples tested, the materials have been assessed from the WM3 List of Waste (LoW) codes as either 17 05 03 (waste and stones containing hazardous substances) or 17 05 04 (waste and stones other than those mentioned in 17 05 03).

5.0 Laboratory Testing (Cont'd)

5.5 Waste Disposal Assessment (Cont'd)

In order to determine the correct waste code to assign to each sample tested, the contamination screening results have been assessed by the HazWasteOnline™ software and the results can be seen in the Table below, and the full Classification Report can be seen in Appendix IV.

Position	Sample Depth	Strata	Waste Code	WM3 Waste Classification
TP01	0.00-0.20	TS	17 05 04	Non-Hazardous
TP01	1.80	NAT	17 05 04	Non-Hazardous
TP02	0.00-0.40	TS	17 05 04	Non-Hazardous
TP03	0.20-0.55	NAT	17 05 04	Non-Hazardous
TP04	0.00-0.40	TS	17 05 04	Non-Hazardous
TP05	0.00-0.35	TS	17 05 04	Non-Hazardous
TP05	1.10-2.00	NAT	17 05 04	Non-Hazardous
TP07	0.00-0.25	TS	17 05 04	Non-Hazardous
TP08	0.00-0.20	TS	17 05 04	Non-Hazardous
TP08	1.25-1.95	NAT	17 05 04	Non-Hazardous

TS – Topsoil, NAT – Natural deposits

The results of the classification have identified that the materials present on this site can be considered as Non-Hazardous Waste, and as such no further assessment or testing is required for disposal of these materials to a Non-Hazardous Landfill. Based on the TOC values recorded (between 5.3% up to 8%) it is unlikely that these materials would be suitable for disposal at an Inert Landfill as some of the TOC values recorded exceed the Inert Waste acceptance criteria value of 3%.

Where the natural strata (excluding the topsoil) is to be disposed of as a waste it is likely that subject to the completion of WAC testing, that these materials should meet the criteria for disposal at an Inert Waste Landfill. The number of samples to be screened would be dependent on the volume requiring disposal.

Excavated materials (i.e. natural strata) can be reused on this site as a general fill providing this material meets any geotechnical requirements for its intended end-use, however, these materials should be inspected to determine if any unforeseen potential contamination not previously identified requires an assessment. It may be necessary for confirmatory contamination screening to be carried out to confirm the suitability of these materials.

6.0 New Building Foundations

Based on the nature of the initial natural sandstone and mudstone bedrock deposits recorded at the borehole and trial pit locations, where varying degrees of weathering, strength and density have been noted, it is felt that shallow strip or pad foundations can be used for the proposed residential properties. However, it is felt that the maximum allowable bearing pressure should be restricted to 100kN/m² to take into consideration the varying degree of weathering identified. Foundations should be based at a minimum depth of 0.75m below finished ground levels.

Due to the variable nature of the natural bedrock deposits encountered below the site, it would be prudent to make an allowance for all foundation excavations to be inspected by a suitably qualified Engineer during the construction phase of works, to verify the correct founding materials and depths have been achieved.

When considering the design of roads, pavements and areas of hardstanding based on site observations, it is felt that an estimated design CBR value of 3% can be adopted for design purposes where the initial natural weathered sandstone and mudstone deposits are to be used as an undisturbed subgrade.

7.0 General Observations

Generally, no significant water ingresses were experienced within the investigation positions put down across the site, except for some minor seepages recorded within TP's 07 & 08 and BH03. As such and when considering future excavation works and reductions in site levels, it would be considered prudent to allow for the introduction of appropriate and temporary groundwater control measures to manage any potential water ingresses which may occur within construction related excavations. During the creation of deep excavations, potential instability issues may be encountered where excavations are left open for a long period of time. Therefore, temporary lateral trench support may be required for construction related excavations to prevent trench wall collapse and over-excavation, as well as providing a safe working environment for any operatives who may require access to deep excavations, those in excess of 1.20m deep.

During the ground preparation works and the development of the site, should the ground conditions appear to differ from those already identified as part of these investigation works, then advice should be sought from a suitably qualified Engineer to determine if a reassessment of the ground conditions and recommendations are required before the development progresses further.

End of Report

APPENDIX I

SITE LOCATION PLAN & PROPOSED DEVELOPMENT LAYOUT PLAN



3 Gladstone Terrace
Gateshead
Tyne & Wear
NE8 4DY

Tel: 0191 477 2020

Email: enquiries@geolconsultants.co.uk



 SITE LOCATION PLAN

Report Type: Phase II Ground Investigation Report

Site Address: Land off New Mill Road, Brockholes, West Yorkshire, HD9 7BP

Project No.: GEOL20-9775

Project No.: GEOL20-9775

APPENDIX II

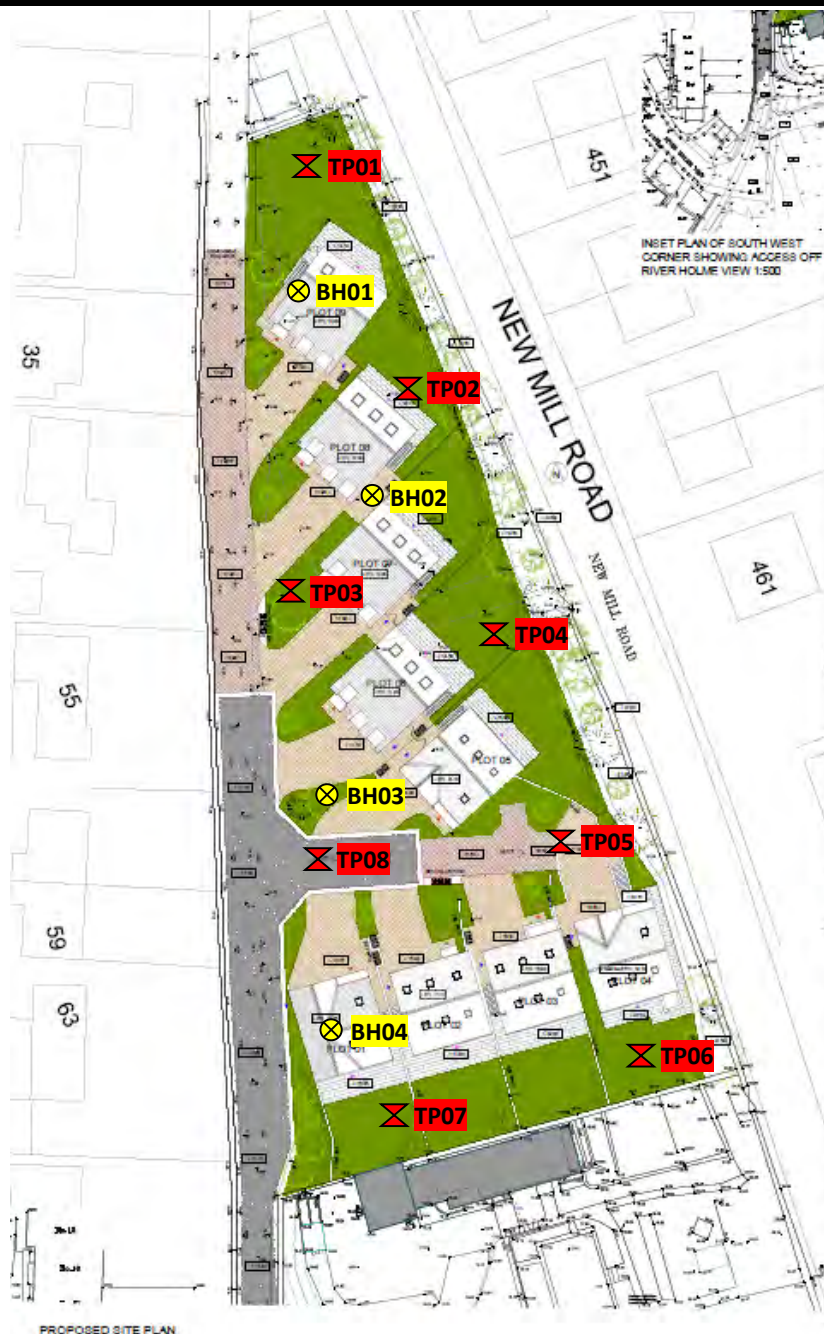
BOREHOLE & TRIAL PIT LOCATION PLAN & BOREHOLE & TRIAL PIT RECORD SHEETS



3 Gladstone Terrace
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Tyne & Wear
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Email: enquiries@geolconsultants.co.uk



PLANNING

Plan D
Plot 1 and plot 2 marked to reflect local authority
27/05/12

Plan E
Plot 1 marked, Plot 2 marked, Plot 3 marked
27/05/12

Plan F
Approved house plan for plot 1 (10) shown on plan
27/05/12

Plan G
Approved house plan for plot 2 (10) shown on plan
27/05/12

acumen
designers & architects

CLIENT:
PETRIAN CONSTRUCTION LTD.

ASR TITLE:
LAND OFF NEW MILL ROAD,
BROCKHOLES
WILMINGTON

DRAWING TITLE:
PROPOSED SITE PLAN

DRAWN	3P	DATX	AUG10
CHECKED	3C	SCALE	1:200 @ A3
DRAWING NUMBER	2510 - 030		



BOREHOLE & TRIAL PIT LOCATION PLAN



Report Type: Phase II Ground Investigation Report

Site Address: Land off New Mill Road, Brockholes, West Yorkshire, HD9 7BP

Project No.: GEOL20-9775



Windowless Sampling

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 17/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415258.45 N410678.28	
Project No. : GEOL20-9775		Crew Name: RS		Drilling Equipment: Competitor Dart Rig	
Borehole Number BH01	Hole Type WS	Level 119.92m AoD	Logged By RS	Scale 1:30	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES					Dark brown sandy clayey TOPSOIL.	
		0.30 - 0.60	B		0.30	119.62		Light brown very gravelly SAND with sandstone cobbles (completely weathered sandstone).	
		0.60 - 1.00	B		0.60	119.32		Medium dense light brown clayey gravelly SAND with sandstone fragments (completely weathered sandstone).	
		1.00 - 2.00 1.00	B SPT	N=11 (4,3/2,2,3,4)					1
		2.00 - 2.20 2.00	B SPT	N=21 (4,4/5,4,5,7)					2
		2.20 - 3.00	B		2.20	117.72		Stiff dark brown weathered silty MUDSTONE (ROSSENDALE FORMATION).	
		3.00	SPT	N=27 (5,7/9,7,5,6)					3
					3.45	116.47		End of Borehole at 3.45m	
									4
									5
									6

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
3.45	101	1.00	115								

Remarks





Windowless Sampling

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 17/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415271.39 N410655.42	
Project No. : GEOL20-9775		Crew Name: RS		Drilling Equipment: Competitor Dart Rig	
Borehole Number BH02	Hole Type WS	Level 122.50m AoD	Logged By RS	Scale 1:30	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.20	ES		0.20	122.30		Dark brown sandy clayey TOPSOIL.	
		0.20 - 0.80	B					Dark brown very clayey gravelly SAND (completely weathered sandstone).	
		0.80 - 1.00	B		0.80	121.70		Medium dense light brown and medium brown clayey gravelly SAND (completely weathered sandstone).	1
		1.00 - 1.50	B						
		1.00	SPT	N=10 (1,2/2,2,3,3)					
		1.50 - 2.00	B		2.50	120.00		Stiff medium brown and grey weathered silty MUDSTONE (ROSSENDALE FORMATION).	2
		2.00 - 2.50	B						
		2.00	SPT	N=30 (5,5/7,8,8,7)					
		2.50 - 3.00	B		3.00	119.50		Dense medium brown weathered SANDSTONE (ROSSENDALE FORMATION).	3
		3.00 - 3.60	B						
		3.00	SPT	N=36 (6,5/7,8,12,9)					
		3.60 - 4.00	B		3.60	118.90		Stiff becoming hard dark brown weathered silty MUDSTONE (ROSSENDALE FORMATION).	4
		4.00 - 5.00	B						
		4.00	SPT	N=23 (4,4/5,6,6,6)					
		5.00	SPT	75 blows for 400mm	5.40	117.00		End of Borehole at 5.40m	5
									6

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
5.40	101	1.00	115								

Remarks





Windowless Sampling

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 17/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415263.50 N410624.06	
Project No. : GEOL20-9775		Crew Name: RS		Drilling Equipment: Competitor Dart Rig	
Borehole Number BH03	Hole Type WS	Level 119.65m AoD	Logged By RS	Scale 1:30	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.30	ES		0.30	119.35		Dark brown sandy clayey TOPSOIL.	1
		0.30 - 1.00	B					Firm becoming hard light brown becoming medium brown silty sandy gravelly CLAY (completely weathered mudstone).	
		1.00 - 2.00 1.00	B SPT	N=8 (1,1/2,2,2,2)					
		2.00 - 3.00 2.00	B SPT	N=19 (3,3/5,5,5,4)					
		3.00 - 3.60 3.00	B SPT	N=17 (4,5/4,4,4,5)					
		3.60 - 4.00	B						
		4.00	SPT	75 blows for 310mm	4.31	115.34		End of Borehole at 4.31m	4
									5
									6

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
4.31	101	1.00	115								

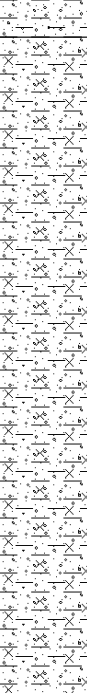
Remarks





Windowless Sampling

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 17/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415266.87 N410599.15	
Project No. : GEOL20-9775		Crew Name: RS		Drilling Equipment: Competitor Dart Rig	
Borehole Number BH04	Hole Type WS	Level 119.59m AoD	Logged By RS	Scale 1:30	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.00 - 0.30	ES	N=11 (4,4/3,2,3,3)	0.30	119.29		Dark brown sandy clayey TOPSOIL.	1		
	0.30 - 0.70	B					Firm light brown very sandy gravelly CLAY (completely weathered mudstone).				
	0.70 - 1.00	B					Firm becoming very stiff / hard light brown becoming medium brown silty sandy gravelly CLAY (completely weathered mudstone).				
	1.00 - 2.00	B SPT									
	1.00										
	2.00 - 3.00	B SPT	N=38 (3,4/20,9,5,4)	0.70	118.89			2			
	2.00										
	3.00	SPT	75 blows for 310mm	3.31	116.28			3			
							End of Borehole at 3.31m		4		
									5		
									6		
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
3.31	101	1.00	115								
Remarks											









Trial Pit Log

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 16/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415282.28 N410640.78	
Project No. : GEOL20-9775		Crew Name: RS		Equipment: Mechanical excavator	
Location Number TP04	Location Type TP	Level 123.98m AoD	Logged By RS	Scale 1:15	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.40	ES					Brambles underlain by dark brown sandy clayey TOPSOIL.	
					0.40	123.98		Dark grey silty SAND (completely weathered sandstone).	
					0.60	123.58		Orange and light brown clayey gravelly SAND (completely weathered sandstone).	
					0.80	123.38		Firm and stiff medium brown and grey weathered silty MUDSTONE (ROSSENDALE FORMATION).	1
					1.90	123.18		End of Excavation at 1.90m	2
									3

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



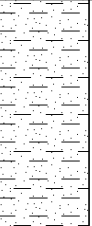
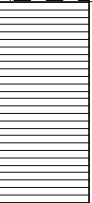
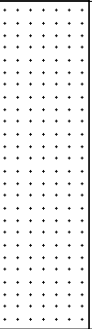






Trial Pit Log

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 16/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415274.50 N410589.25	
Project No. : GEOL20-9775		Crew Name: RS		Equipment: Mechanical excavator	
Location Number TP07	Location Type TP	Level 120.38m AoD	Logged By RS	Scale 1:15	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.25	ES					Brambles underlain by dark brown sandy clayey TOPSOIL.	
		0.25 - 0.70	B		0.25	120.38		Firm light brown very sandy gravelly CLAY with cobble size pieces of mudstone and sandstone (completely weathered mudstone).	
					0.70	120.13		Firm and stiff medium brown and grey weathered silty MUDSTONE (ROSSENDALE FORMATION).	1
		1.10 - 1.75	B		1.10	119.68		Medium brown weathered silty SANDSTONE (ROSSENDALE FORMATION).	
					1.75	119.28		End of Excavation at 1.75m	2
									3

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks Minor ingress of water recorded at base of trial pit (1.75m).	
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Trial Pit Log

Project Name: Land off New Mill Road		Client: Petrian Construction Limited		Date: 16/03/2020	
Location: Brockholes, West Yorkshire, HD9 7BP		Contractor: Geol Consultants Limited		Co-ords: E415260.89 N410616.18	
Project No. : GEOL20-9775		Crew Name: RS		Equipment: Mechanical excavator	
Location Number TP08	Location Type TP	Level 119.24m AoD	Logged By RS	Scale 1:15	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.20	ES					Brambles underlain by dark brown sandy clayey TOPSOIL.	
					0.20	119.24		Firm dark grey silty sandy CLAY.	
					0.30	119.04		Firm light brown silty sandy gravelly CLAY with cobble size pieces of mudstone and sandstone (completely weathered mudstone).	
					1.00	118.94		Firm medium brown and grey weathered silty MUDSTONE (ROSSENDALE FORMATION).	1
		1.25 - 1.95	B		1.25	118.24		Medium brown weathered silty SANDSTONE (ROSSENDALE FORMATION).	
					1.95	118.00		End of Excavation at 1.95m	2
									3

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks:
Minor ingress of water recorded at a depth of 1.10m.

