GROUNDTECH
CONSULTING

BIRKENSHAW

SUPPLEMENTARY INVESTIGATION

ORION HOMES

OCTOBER 2024

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Project Objectives 1
1.2 Proposed Development 1
1.3 Limitations 1
2.0 SITE SETTING 2
2.1 Location 2
2.2 Site Description 2
3.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REPORTS 3
3.1 Introduction 3
3.2 ARP Geotechnical Ltd Site Works 3
3.3 Ground Model 3
3.4 Groundtech Consulting Ltd CMRA 4
3.5 Geology and Coal Seams 4
3.6 Coal Authority Report 6
3.7 Conclusion and Recommendations 7
4.0 SCOPE OF INVESTIGATION AND RATIONALE 8
4.1 Project Objectives 8
4.2 Scope of Works 8
4.3 Ground Model 8
5.0 REVISED COAL MINING RISK ASSESSMENT 10
5.1 Coal Seam 10
5.2 Recorded Workings 10
6.0 RELEVANT INDUSTRY REFERENCES 11

APPENDIX 1 - Plans
APPENDIX 2 - Site Photograph
APPENDIX 3 - Exploratory Hole Logs
APPENDIX 4 - Limitations

Plans		
Plan Reference	*Revision*	*Title*
GRO-24208-P01	-	*Project Location Plan*
GRO-24208-P02	-	*Preliminary Findings and Constraints Plan*

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by Orion Homes to undertake a Supplementary Investigation to confirm the findings of the Preliminary Coal Mining Risk Assessment (CMRA) for a site at Birkenshaw.

1.2 Proposed Development

The proposed development is residential end use comprising a 18 No. residential dwellings with associated private gardens and access roads.

Proposed Development

1.3 Limitations

This Assessment is based on information obtained from a number of sources, and the information is assumed to be correct.

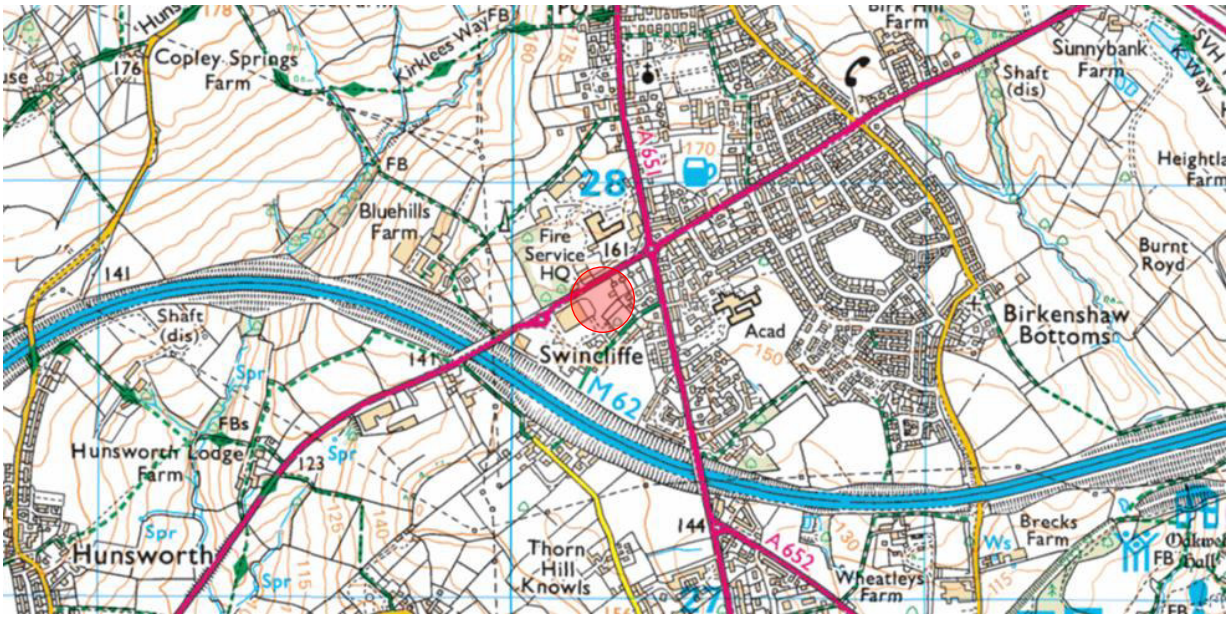
Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 4.7 miles south east of Bradford City Centre, as shown on the Project Location Plan *GRO-23390-P01* and is approximately centred on National Grid Reference *439118, 424304.*



Project Location

Access to the site is gained off Heathfield Lane to the south of the site.

2.2 Site Description

The site is almost rectangular in shape and is approximately 0.8 hectares in area. The site is level in the south and rises up slightly in the centre, sloping down towards the north.

Site Features
The site has been stripped of topsoil and vegetation for the enabling works. A two storey brick built house is present in the northern parcel which has a driveway leading to Whitehall Road West to the north of site, and a back garden which is bounded by a dry stone wall.

Site Boundaries and Surrounding Area
The site is surrounded by following features/land uses:

- *North - Whitehall Road, woodland and industrial land use*
- *East - Residential dwellings and gardens*
- *South - Lockgate Rise and residential dwellings with gardens*
- *West - Commercial land use and Heathfield Lane*

Site photographs are presented in *Appendix 2*.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REPORTS

3.1 Introduction

The following Ground Investigations and reports have been undertaken for the subject site:

- *RSK conducted a Ground Investigation of the southern parcel and produced a report referenced 350520-R01 dated November 2022.*
- *ARP Geotechnical Limited undertook a Ground Investigation of the northern parcel of the site and produced a report referenced OHR/20 dated July 2023.*
- *Groundtech Consulting Limited produced a Coal Mining Risk Assessment referenced GRO-24208-5354 and dated 16 August 2024.*

Relevant information will be summarised below from both ARP Geotechnical Limited's report and Groundtech Consulting Limited's CMRA as it focuses on the northern parcel of the site.

3.2 ARP Geotechnical Ltd Site Works

ARP Geotechnical Limited undertook a Ground Investigation on the 29th June 2023 with the following scope of works.

- *8 No. mechanically excavated trial pits were advanced to depths of between 2.80m and 4.30m bgl using a JCB 3CX.*

3.3 Ground Model

The following ground model was established from the logs from *OHR/20*.

Made Ground
Possible Made Ground was encountered in TP1 between the depths of 0.2m and 0.45m begl recorded as soft to firm dark brown slightly sandy silty Clay (reworked natural ground).

Superficial Deposits
High strength stiff light brown slightly sandy silty Clay was encountered in all exploratory hole locations between the depths of 0.2m and 3.1m begl.

Medium strength firm to stiff grey slightly sandy silty Clay was encountered in TP1, TP3 to TP8 below weathered Coal seam between the depths of 1.2m and 4.1m begl.

Groundtech consider the above to be weather Coal Measures as no superficial deposits are recorded beneath the site.

Solid Geology
A band of Mudstone was encountered in TP3 between the depths of 1.0m and 1.1m begl.

Extremely weak Siltstone recovered as cobbles and gravel were encountered in TP1 to TP5 and TP7 to TP8 between the depths of 2.6m and 4.3m begl.

Extremely weak Mudstone recovered as cobbles and gravel were encountered in TP6 between the depths of 2.6m and 2.9m begl.

Coal Seams
Weathered Coal Seam was encountered in all exploratory hole locations between the depths of 0.8m and 1.2m begl and 1.8m and 3.4m begl.

Groundwater
No groundwater was encountered during the investigation.

3.4 Groundtech Consulting Ltd CMRA

Groundtech Consulting Ltd produced a CMRA and the relevant information is listed below:

Introduction
The information presented within the CMRA was obtained from a number of sources including:

- *Coal Authority Consultants Mining Report*
- *Memoir of the Huddersfield 'Sheet 77' Coalfield*
- *Geological Survey Sheet 77, Huddersfield at 1:50,000 Scale - Solid and Drift Edition*
- *Coal Authority Interactive Map*
- *RSK Site Investigation referenced 350520-R01 and dated November 2022.*
- *ARP Geotechnical Limited Ground Investigation referenced ORH/20 and dated July 2023*

3.5 Geology and Coal Seams

Superficial Deposits
No superficial deposits are indicated to underlie the site.

Solid Geology
The solid geology underlying the majority of the site is the Lepton Edge Rock which comprises Sandstone and forms part of the Pennine Lower Coal Measures. The Pennine Lower Coal Measures encroaches onto the north eastern corner of the site which characteristically comprises Mudstone, Siltstone, Sandstone and Coal seams.

Coal Seams
The underlying bedrock strata (Lepton Edge Rock) forms part of the Pennine Lower Coal Measures which is a coal bearing stratum. The Pennine Lower Coal Measures underlies the north eastern corner of the site. The Brown Metal Coals outcrops beneath the site and the second nearest seam is the Middleton Little Coal which outcrops to west and dips towards site. These seams described in more detail below.

Brown Metal Coals
Geological records indicate that the First and Second Brown Metal Coal outcrops in the *Northern Parcel.* The First and Second Brown Metal Coals are indicated to be joined together to create a single seam on geological maps. The First Brown Metal Coal is indicated to be between 0m to 1.0m thick and the Second Brown Metal Coal is indicated between 0m to 0.8 thick.

Previous investigation undertaken by RSK have recorded the Coal seam at a shallower level in TP6 and deepest in TP8, this indicates the outcrop of the 2nd Brown Metal Coal is further to the south west than the published records indicate. The RSK investigation has recorded the weathered coal as between 0.2m and 0.4m thick in the *Northern Parcel.* Furthermore, the RSK investigation has not encountered two different Coal seams in this location indicating the seam encountered onsite was the 2nd Brown Metal and the 1st

Brown Metal is further north east as indicated on the maps. The investigation did not record any workings in the Brown Metal Coal on the site with competent bedrock being present between 2.6m and 4.0m begl.

The Brown Metal Coals outcrops to the north of the *Southern Parcel* and dips away from this section of the site and is therefore not influencing this parcel. Sandstone is recorded at very shallow depths beneath the *Southern Parcel* directly beneath the topsoil.

Middleton Little Coal

The Middleton Little Coal Seam is indicated to be the next Coal seam in the geological sequence which outcrops 400m west of the *Northern Parcel* of the site and 800m west of the *Southern Parcel* of the site. The angle of dip is not recorded on geological maps or the Coal Authority (CA) records, likely due to its insignificance and poor quality. At its thickest, this seam is indicated to be approximately 0.2m to 0.9m thick. At Drighlington, immediately east of the site, the seam is indicated to be approximately 0.3m thick.

The published geological memoir indicates that the Middleton Little Coal is of no value in the western part of its northern outcrop, however thickens eastwards towards site. In the north, the seam is indicated to be approximately 15m to 18m beneath than the Brown Metal Coals.

The thickness of the Middleton Little Coal around the Birkenshaw area is unknown and has never been worked in this location. No sections of Birkenshaw or Hunsworth Lodge Collieries or of the old sinkings to the Middleton Bed here having been kept.

The Middleton Lower Coal has never been worked in the Birkenshaw area and is evidently thin, as in the neighbouring localities of Gomersal and Drighlington.

Additional Seams

The Middleton Main Coal is the next in the geological sequence and lies circa 15m below the Middleton Little Coal. The Middleton Main is indicated to contain dirt partings, however is recorded to have been worked on a small scale around the area of Gomersal which is located south of the site. There are no recorded workings in the Middleton Main Coal beneath the site.

CA information indicated that the Blocking Coal is the shallowest worked Coal seam at circa 91m begl followed by the Shirtcliffe Coal at circa 130m begl.

A summary of identified coal seams is provided in the table below:

Seam	Approximate Thickness (m)	Est Depth below top of bedrock (m)
1st Brown Metal	*0.0 - 1.0*	*Immediate*
2nd Brown Metal	*0.0 - 0.8*	*Immediate*
Middleton Little	*0.2 - 0.9*	*13.0 to 15.0*
Middleton Main	*1.0*	*30.0*

Geological Faults

An unnamed fault runs through the site in a south west to north east orientation, indicated to downthrow on the north western side of the fault.

3.6 Coal Authority Report

Underground Mining

The Silkstone (Blocking Coal) is indicated to be present beneath the site at 100m, dipping to the north east with a dip angle of 2° and extraction thickness of 70cm. The Silkstone is recorded to have been last worked in 1928.

The Whinmoor (Shirtcliffe Coal) Coal is indicated to be present 148m beneath the site dipping to the north at an angle of 1.2°, last worked in 1969.

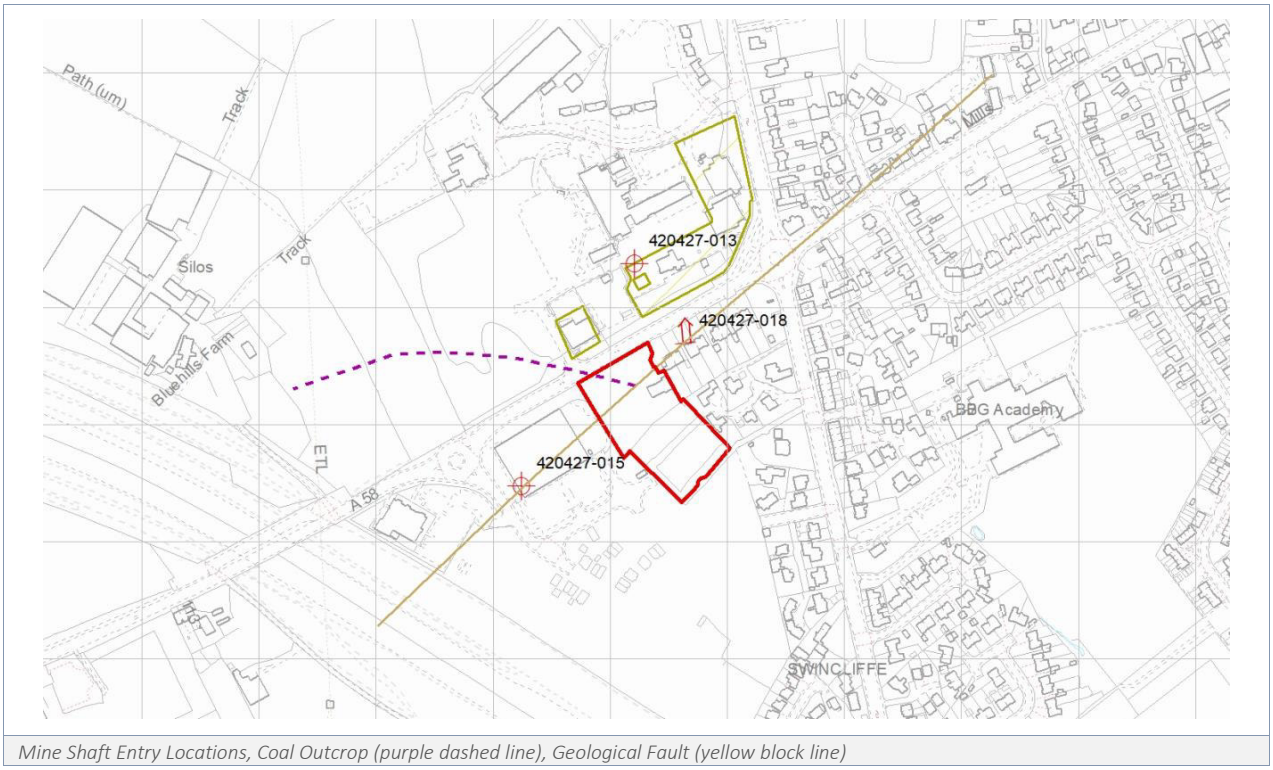
Mine Entries

Two mine entries and an adit have been identified by the Coal Authority close to the site.

Mine Entry No.	Shaft / Adit	Grid Reference	Treatment Description
420427-013	*Shaft*	*420221 427837*	*Not given*
420427-015	*Shaft*	*420125 427647*	*Not given*
420427-018	*Adit*	*420264 427771*	*Not given*

The adit is indicated at an angle of 355° heading away from site. It is likely that the adit is targeting the First Brown Metal seam away from site.

The positions of the shafts are highlighted on the plan below:



Mine Shaft Entry Locations, Coal Outcrop (purple dashed line), Geological Fault (yellow block line)

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
The Coal Authority has no record of a mine gas emission requiring action.

Hazards relating to coal mining
The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures. There are no remediated sites within 50m.

Withdrawal of support
The property is in an area where a notices to withdraw support were given in 1951 and 1954.

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.

3.7 Conclusion and Recommendations

Further investigation was recommended in the north eastern extent of the site to confirm if workings are present associated with the 1st Brown Metal Coal Seam.

Combustibility testing of the coal should be undertaken to record the calorific value and assess the combustibility of the coal if excavated during the enabling works.

A watching brief is recommended during the ground works as a precaution for unrecorded mine entries.

Foundations for the proposed buildings on the site should be reinforced to the structural engineers specification due to the residual risk and fault.

4.0 SCOPE OF INVESTIGATION AND RATIONALE

4.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site
Identify and assess Coal seams encountered in trenching

4.2 Scope of Works

The following scope of works was completed on 26th September 2024:

- *4 No. Trial Trenches (TT101 to TT104) were mechanically excavated to depths of between 2.3m and 5.75m begl using a 20 tonne tracked excavator*

The exploratory hole locations are presented on Groundtech Plan *GRO-24208-P03* and the exploratory hole logs are in *Appendix 3*.

The exploratory holes were positioned to establish the stratification beneath the site and target any areas of concern as summarised in the table below:

Location	Target Rationale
TT101 yo TT104	*Assess Brown Coal seams*

The exploratory holes were logged by a suitably experienced geo-environmental engineer in general accordance with the following current guidance:

- *BS 5930 'Code of Practice for Site Investigations' 2020*
- *BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil'*
- *BS EN ISO 14689:2002 "Geotechnical investigation and testing – Identification and classification of rock"*

4.3 Ground Model

Made Ground
One main Made Ground population was encountered during the investigation and comprised firm brown sandy gravelly clay with minor constituents of subangular to subrounded fine to coarse brick and sandstone encountered from ground level to a maximum depth of 0.45m begl in all exploratory hole locations (TT101 to TT104).

Exploratory Hole Locations

Bedrock

Firm light brown silty Clay was encountered in all exploratory hole locations from depths of between 0.15m and 0.4m begl to a maximum depth of 2.95m begl. This is considered to be residually weathered Coal Measures.

Extremely weak orange brown turning light grey Siltstone residually weathered recovered as firm to stiff silty Clay was encountered in all exploratory hole locations at depths of between 1.8m and 4.4m begl.

Weak to medium strong light grey Siltstone slightly weathered recovered as angular fine to coarse Gravel and Cobbles was encountered within TT101A between the depths of 4.4m and 5.57m bgl.

Coal Seams

Black anthracite Coal with bituminous inclusions was encountered within all the trial trenches between the depths of 1.9m and 3.0m begl to a maximum depth of 3.2m begl.

Groundwater

Perched groundwater was encountered in the Made Ground at a depth of 0.15m begl.

Watching Brief

No visual or olfactory evidence was noted during the Ground Investigation.

Excavation Stability

Pit collapse or spalling was not noted during the excavations of the Trial Trenches.

Excavation Progress

Slow progress was noted while excavating TT101A between the depths of 4.0m and 5.75m begl due to the competent Siltstone bedrock encountered.

5.0 REVISED COAL MINING RISK ASSESSMENT

5.1 Coal Seam

Black anthracite Coal with bituminous inclusions was encountered within all the Trial Trenches between the depths of 1.9m and 3.0m begl to a maximum depth of 3.2m begl. The coal seam ranged between 0.2m and 0.25m in thickness and generally stayed level with a minimal dip.

The Coal seam encountered continued from the north east of the site (TT101A to TT103) to the centre of the site (TT104). The Coal seam encountered is likely to be the 1st and 2nd Brown Metal Coal Seam which has been merged. No evidence of two separate coal seams have been encountered during the Ground Investigation. The adit is recorded offsite to the north east and the direction also confirms the workings are away from the site. The Coal may have been thicker and more economically workable to the north east.

If the Brown Coals are split, the 1st Brown Coal is offsite as suggested by the adit as discussed above.

The Anthracite coal recovered is of high quality and has no dirt partings as described in the memoir. However, the coal is thin. If any coal mining had taken place on the site it would have likely been mass extraction from the surface. No evidence of this was observed and the Coal was intact. Also no evidence of colliery spoil has been observed in any of the phases of investigation

The north eastern corner of the site that was targeted by the investigation is proposed to be estate roads and soft landscaping - no structures are proposed in this area.

Where the Coal is encountered in foundation excavations, foundations should be progressed through the seam to seal it off from oxygen introduction. The coal seams should also be isolated from potential ignition sources for the duration of the lifetime of the development, the coal was encountered at 2.1m begl at its shallowest and no further cover is considered necessary in garden areas.

5.2 Recorded Workings

A low risk was identified by the Preliminary Coal Mining Risk Assessment and no further action is required.

Foundations should be rein forced due to the fault recorded beneath the site, the reinforcement will be detailed by the structural engineer.

6.0 RELEVANT INDUSTRY REFERENCES

British Standards Institution. *Investigation of Potentially Contaminated sites - code of practice*. BS 10175:2017.

British Standards Institution '*Code of Practice for Site Investigations*' BS 5930:2020.

British Standards Institution "*Geotechnical investigation and testing – Identification and classification of soil*" BS EN ISO 14688:2002.

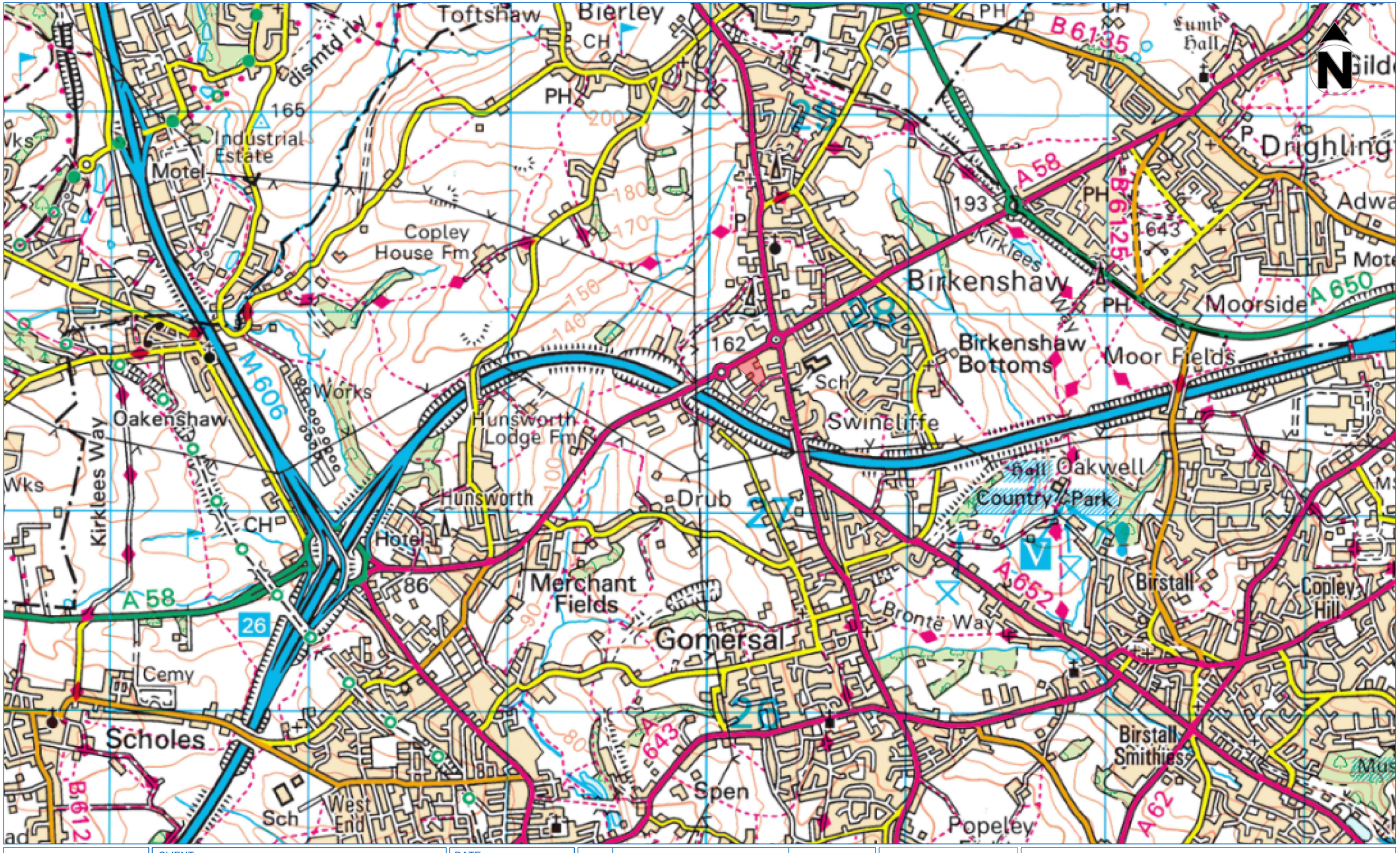
British Standards Institution "*Geotechnical investigation and testing – Identification and classification of rock*" BS EN ISO 14689:2002.

BRE Special Digest 1: "*Concrete in Aggressive Ground*" 3rd Ed 2005.

CIRIA C758 "Abandoned Mine Workings"

The National Planning Policy Framework (NPPF) March 2012

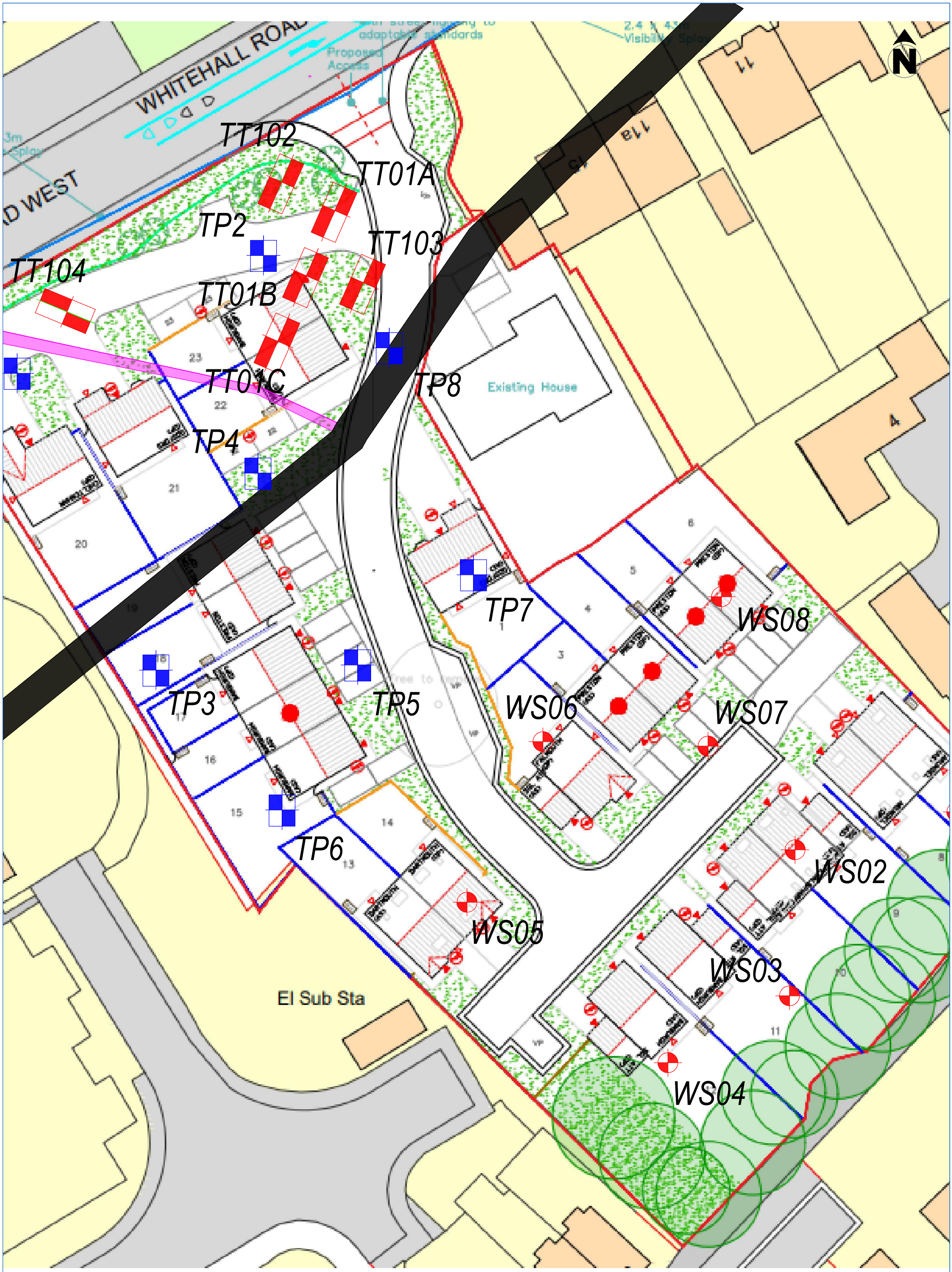
APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT: ORION HOMES	DATE: AUGUST 2024				Status:
	PROJECT TITLE: BIRKENSHAW	SCALE: NTS				Preliminary:
	PLAN TITLE: PROJECT LOCATION PLAN	PLAN NUMBER: GRO-24208-P01				Draft:
						Issued: ●
						For Comment:
			Rev.	Details	Date	Approved:

Notes

Site Location



GROUNDTECH CONSULTING	CLIENT: ORION HOMES	DATE: NOVEMBER 2024			Status	Notes
	PROJECT TITLE: BIRKENSHAW	SCALE: NTS			Preliminary	Approximate position of Brown Metal Coal Outcrop
	PLAN TITLE: EXPLORATORY HOLE LOCATION PLAN	PLAN NUMBER: GRO-24208-P03			Draft	Approximate position of Fault
					Issued	Approximate position of ARP Trial Pits
					For Comment	Approximate position of RSK Windowless Sample Boreholes
			Rev.	Details / Date	Approved	Approximate position of Groundtech Consulting Trial Trenches

APPENDIX 2 - Site Photographs

Photograph 1 – TT101

Photograph 2 – TT101A/B/C

Photograph 3 – TT102

Photograph 4 – TT103

Photograph 5 – TT103

Photograph 6 – TT104

Photograph 7 – TT104

Photograph 8 – Existing residential dwelling with driveway

APPENDIX 3 - Exploratory Hole Logs

Trial Pit Log

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Trialpit No **TT101A** Sheet 1 of 2

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 5.75 — 20 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼							MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
				0.40			Firm light brown silty CLAY.
				2.95			Extremely weak orange brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				3.00			Black anthracite COAL with bituminous inclusions.
				3.20			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				4.40			Very weak light grey SILTSTONE distinctly weathered recovered as angular fine to coarse gravel and cobbles.
							Continued on next sheet

1 2 3 4 5

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.15m bgl. 3. Pit terminated at 5.75m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

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Trial Pit Log

Trialpit No
TT101A
Sheet 2 of 2

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 5.75 — 20 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				5.75			End of pit at 5.75 m

6
7
8
9
10

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.15m bgl. 3. Pit terminated at 5.75m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

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Trial Pit Log

Trialpit No
TT101B
Sheet 1 of 1

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 2.60 — 20 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼				0.15			MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
							Firm light brown silty CLAY.
				1.80			Extremeley weak reddish brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				2.10			Black anthracite COAL with bituminous inclusions.
				2.30			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				2.60			End of pit at 2.60 m

1
2
3
4
5

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.20m bgl. 3. Pit terminated at 2.60m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

GROUNDTECH CONSULTING

Trial Pit Log

Trialpit No
TT101C
Sheet 1 of 1

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 2.60 — 20 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼				0.15			MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
							Firm light brown silty CLAY.
				1.85			Extremely weak orange brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				2.10			Black anthracite COAL with bituminous inclusions.
				2.30			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				2.60			End of pit at 2.60 m

1
2
3
4
5

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.10m bgl. 3. Pit terminated at 2.60m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

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Trial Pit Log

Trialpit No
TT102
Sheet 1 of 1

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 3.80 — 4 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼							MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
				0.40			Firm light brown silty CLAY.
				2.90			Extremely weak orange brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				3.00			Black anthracite COAL with bituminous inclusions.
				3.20			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				3.80			End of pit at 3.80 m

1 2 3 4 5

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.20m bgl. 3. Pit terminated at 3.80m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

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Trial Pit Log

Trialpit No
TT103
Sheet 1 of 1

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 3.20 — 4 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼							MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
				0.45			Firm light brown silty CLAY.
				2.20			Extremely weak orange brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				2.40			Black anthracite COAL with bituminous inclusions.
				2.60			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				3.20			End of pit at 3.20 m

1 2 3 4 5

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.15m bgl. 3. Pit terminated at 3.20m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

GROUNDTECH CONSULTING

Trial Pit Log

Trialpit No
TT104
Sheet 1 of 1

Project Name: BIRKENSHAW	Project No. GRO-24208	Co-ords: - Level:	Date 26/09/2024
Location: WEST YORKSHIRE		Dimensions (m): Depth 2.30 — 4 × 1.6	Scale 1:25
Client: ORION HOMES			Logged JOD

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼				0.25			MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone. Sand is fine to coarse.
							Firm light brown silty CLAY.
				1.90			Extremely weak orange brown SILTSTONE residually weathered recovered as stiff gravelly clay. Gravel is subrounded to rounded fine to coarse of ironstone and siltstone.
				1.95			Black anthracite COAL with bituminous inclusions.
				2.20			Extremely weak light grey SILTSTONE residually weathered recovered as firm to stiff silty clay.
				2.30			End of pit at 2.30 m

Remarks: 1. Location cleared of services using hand held CAT scanner. 2. Perched groundwater encountered at 0.20m bgl. 3. Pit terminated at 2.30m bgl. 4. Pit backfilled with arisings.

Stability: Stable.

APPENDIX 4 - Limitations

Limitations

This report (Report) forms part of the Services and if applicable Additional Services undertaken by Groundtech Consulting Ltd pursuant to a written contract (Agreement) which contains detailed provisions including express limitations of the liability of Groundtech Consulting Ltd.

This Report was prepared using reasonable skill and care as stated in the Agreement for the purpose including intended end use stated by the Client (Purpose) and the liability of Groundtech Consulting Ltd in respect of the form and content of this Report is no greater than its liability under the Agreement. All records, measurements notes, or any other data (Data) obtained by or for the benefit of the Consultant were obtained at a specific point in time and it may not be assumed by the Client or any person relying on this Report that the Data will remain unaffected by the passage of time, the seasons, weather conditions, changes in the water table or the carrying out and completion of works at the Site.

Unless otherwise agreed this Report has been prepared exclusively for the use and reliance of the Client and may not be relied upon, by any other party except as provided for in the Agreement. A third party who relies on this Report, does so at their own and sole risk and Groundtech Consulting Ltd has no liability to such parties.

Groundtech Consulting Ltd that this Report is to be used for the Purpose. The Purpose was instrumental in determining the scope and of the Services provided. If the Purpose should change, the Client may not be able to rely on the Report without the separate agreement of Groundtech Consulting Ltd.

Since the Report was written, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change (see below) and should be investigated if there is any significant delay in acting on the findings of this Report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions in this Report should not be relied upon in the future without written confirmation from Groundtech Consulting Ltd that it is safe to do so.

The observations and conclusions outlined in this Report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting Ltd.

Groundtech Consulting Ltd is not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The Report is based upon Groundtech Consulting Ltd's observations of existing physical conditions at the Site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the Site. The findings and recommendations contained in this Report are based in part upon information provided by third parties, and Groundtech Consulting Ltd have relied upon such information assuming it to be correct.

Groundtech Consulting Ltd accepts no responsibility for errors or inaccuracies in third party information presented in this Report. Groundtech Consulting Ltd was not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services or Additional Services. Groundtech Consulting Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting Ltd and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions may also vary due to the ground's heterogeneous properties and because investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this Report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. If so stipulated in the Agreement, geo-environmental testing was carried out for a limited number of parameters based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

Any groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and groundwater levels may occur at other times of the year which are higher than were recorded during this investigation.

Any site drawings provided in this Report are preliminary and used to present the general relative locations of features on, and surrounding, the Site.