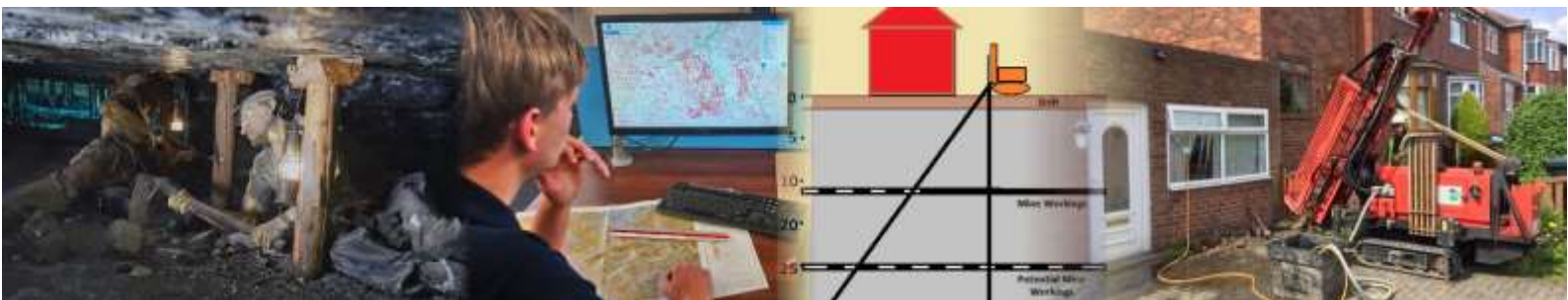




GEOLOGICAL
GEOTECHNICAL
GEOENVIRONMENTAL
CONSULTANCY
DRILLING & DATA ACQUISITION



GEOINVESTIGATE LIMITED

Coal Mining Risk Assessment (CMRA)

LOCATION	Round Close Park, Whitehaven CA28 8UH
ISSUE DATE	24 February 2022
FOR	SRE Associates
CLIENT REF.	
OUR REF.	G22050

Prepared by

Checked by

Thomas Goldring MGeol(Hons) FGS
Geo-environmental Engineer

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Principal Geotechnical Engineer

SUMMARY FINDINGS

OUTCOME MITIGATION REQUIRED (YES/NO?)

YES. In Geoinvestigate's opinion the client should purchase opencast abandonment plans (if available) from the CA to confirm whether the proposed development area and the adjacent land has been subject to coal opencast activity.

In Geoinvestigate's opinion the site is unlikely to have been opencasted though part of the site to the north has been quarried and infilled. The nature and depth of this infilling is unknown.

In our opinion the current information on the coal mining situation at the site indicates that deep coal and underground mine working probing/drilling is not required in this instance.

The presence of a former potentially infilled/buried quarry within the site and perhaps deep opencast infill requires further careful geotechnical and geoenvironmental appraisal and intrusive site investigation.

In this instance extended term gas monitoring in specially installed gas wells is likely to be required.

On the basis of the CMRA work to date, we are of the opinion that the coal mining/opencast stability risks posed by the strata beneath this site from mining legacy can be mitigated by routinely adopted measures and should not preclude planning permission being registered with regard to coal mining legacy issues.

In conclusion, we see no reason why Planning Permission should not be granted in the interim with respect to coal mining legacy issues and that these works form a condition on the planning approval to be carried out at a later date but discharged before construction begins.

WHAT TO DO NEXT

Obtain quotes for the intrusive site investigation works. The cost of the SI works should be a "lump sum" fixed price. Geoinvestigate can provide advice and assistance with helping you find suitable site investigation & drilling contractors. Call us on 01642 713779 or email enquiries@geoinvestigate.co.uk.

1. CMRA INTRODUCTION

Site Location and Description:

The approximate centre of this site is at National Grid Reference E 299439, N 519056 with elevation between 150m to 153m AOD. The boundary is shown RED on the Coal Authority (CA) report provided in Appendix A corresponds with the planning application area.

Site images are presented in Appendix B.

Google Satellite and Street View imagery shows the site currently comprises unoccupied gently sloping agricultural land/hillside rising southwest to a ridge and an existing recent housing development at Round Close Park.

It is proposed to erect 8 detached new homes within the site with a short length of new road connecting the development to Round Close Park Road. Site location and development plans are provided in Appendix C.

The OS map record dating from 1867 shows the site comprising farmland with Roundclose Quarry occupying the northern half of the proposed new housing development. A 1938 OS map overlay is provided in Appendix D. The map shows an 'Old Air Shaft' lying to the east of the site near a dismantled railway. The earliest maps show Roundclose Farmstead nearby to the southwest of the site.

Recent Lidar and Satellite imagery is provided in Appendix D also. The Lidar image may show the feint outline/depression of the former quarry while the satellite image of the field to the east of the site shows 'dismantled railway' perhaps the Old Air Shaft and a feint track leading to the quarry.

The CA report identifies unlicensed opencast site within the locations of the quarry, old track, old air shaft, dismantled railway, and the field between these features.

However, the presence or traces of these features today suggest that while opencast site and boundary is shown here, the ground was never excavated. If so, only infilled quarry exists beneath the northern end of the proposed development area while the southern end is undisturbed. However further assessment is required to confirm this.

If the quarry has been infilled the question is what is the nature and depth of the material infilling it?

Roundclose Quarry is no longer shown on the OS map of 1948 and has either been infilled and buried or subjected to open cast workings and restored by this date or subsequently.

The limited OS map record reviewed for this CMRA provides evidence that the northern half of the site has been subject to sandstone quarrying and infilling and perhaps subsequently coal open casting, filling, and restoration though the evidence perhaps suggests that only part of the site been quarried and never opencasted.

Historical mining activity has occurred in the surrounding area.

In Geoinvestigate's opinion the client should purchase opencast abandonment plans (if available) from the CA to confirm whether the proposed development area and the adjacent land has been subject to opencast activity.

A brief, limited desk top inspection of buildings, roads and walls in the site vicinity using Google Street View found no obvious visible surface evidence indicative of mining subsidence.

Description & Layout of Proposed Development: It is proposed to erect 8 detached new homes within the site with a short length of new road connecting the development to Round Close Park Road. Site location and development plans are provided in Appendix C.

Risk Methodology Applied: This document and the risk assessment methodology adopted herein is based on CA publication RISK BASED APPROACH TO DEVELOPMENT MANAGEMENT - GUIDANCE FOR DEVELOPERS Version 3, 2014 and Version 4 - 2017. The template contained therein is adopted with minor amendments made by Geoinvestigate Limited.

2. ASSESSMENT OF SITE SPECIFIC COAL MINING ISSUES

The table below summarises the potential risks associated with coal mining legacy for the proposed development site, identified from list sources of information.

Coal Mining Issues	Yes	No	Risk Assessment/Remarks
Past underground coal mining		No	2.1.1 (refer below)
Probable unrecorded shallow workings		No	2.1.2
Spine roadways at shallow depth		No	
Mine entries		No	2.1.3
Outcrop		No	
Geological faults, fissures and breaklines		No	
Opencast Mines	Yes		2.1.4
Coal Mining Subsidence		No	
Mine Gas		No	2.1.5
Site investigations		No	

Note: For those coal mining issues above identified as "Yes" or highlighted "YELLOW" a more detailed discussion and assessment are made of the risks to the application site and the proposed development.

2.1 DETAILED DISCUSSION & ASSESSMENT RESPONSE

2.1.1 Past Underground Mining

According to the Coal Authority report in Appendix A the site is not located within an area with recorded/documentated past mining beneath it. However, deeper underground mine working (>115m depth) is identified around it. These workings dip 8.2, 9.9 & 19.9 degs west and southwest.

This does not mean that shallower unrecorded mine working does not exist beneath the site that the CA have no records of. Mine maps and other documents can get lost or destroyed over the years and if mining was very old there may be no records about it whatsoever and memories fade quickly.

2.1.2 Probable Unrecorded Shallow Workings

According to the CA report, **the site does not fall within an area of probable unrecorded shallow workings**. The following assessment of the geological and mining data presented by Geoinvestigate agrees with this outcome.

The CA define Probable Unrecorded Shallow Workings as *“Areas where the Coal Authority believes there to be unrecorded coal working that exist at or close to the surface”* (i.e., less than 30m)”

The location of the site is shown on the extract of BGS solid geology map presented in Appendix E. The tentative elevation of the site relative to the vertical geology column is shown below the map. The drift/soil horizon above the solid geology bedrock is not shown on the column.

The BGS geology map and column indicate that bedrock lies near surface at the northern end of the site with an unknown thickness (but possibly thin) of Glacial Till (Diamicton) drift deposit in the south, both areas in turn underlain by Whitehaven Sandstone (WS) Formation - Sandstone. Pennine Middle Coal Measures Formation - Mudstone, Siltstone, Sandstone and interbedded coal horizons is present to the northeast and southeast of the property.

The site is located on a downfaulted block/graben of Whitehaven Sandstone with geological faults trending NW – SW on either side of it. The vertical downward displacement of this block is unknown but is probably appreciable. Outcrop of the Brassy Coal (BRSY) and Black Metal Coal (BMT) occur to the southeast of the site and the unconformity at the base of the WS.

Because of this faulting and the expected presence of an appreciable thickness of non-coal bearing Whitehaven Sandstone beneath the site it is Geoinvestigate’s opinion that coal seam and mine working is unlikely to occur within shallow depth below the proposed development area.

The geology records suggest that Whitehaven Sandstone was probably extracted from Roundclose Quarry.

The log of nearby BGS borehole NX91NE/459 apparently located on outcrop of Coal Measure Formation and not Whitehaven Sandstone and located some 130m to the SW of the site at an elevation of 151m (similar to site level) is provided in Appendix F. This log records drift/bedrock depth of 8m, thick ‘hard grey sandstone with shale bands’ between 8m and 39.6m with ‘grey shale and coal’ recorded between 61.8m and 67m.

In Geoinvestigate’s opinion the available geological and coal mining geology information suggests that coal seam and mine working is unlikely to occur within shallow depth below the proposed development area.

In our opinion if this locality has been subject to opencast activity, it would perhaps have been deep removing coal seams below the Whitehaven Sandstone to an appreciable depth subsequently replacing the ground with perhaps reasonably compact thick crushed shale, mudstone and sandstone made ground which now potentially lies below the currently proposed building area.

However, it is Geoinvestigate’s opinion that the locality may not have been subject to coal opencasting only quarrying. Whether it has or not, it is our opinion that underground mine working is unlikely to pose significant ground stability hazard to this development while former infilled opencast site can be routinely engineered to make it suitable for building over it.

In Geoinvestigate's opinion the client should purchase opencast abandonment plans (if available) from the CA to confirm whether the proposed development area and the adjacent land has been subject to opencast activity.

The presence of a former potentially infilled/buried quarry within the site requires further careful geotechnical and geoenvironmental appraisal.

2.1.3 Mine Entry

The CA report identifies no mine entries within or close to the property.

2.1.4 Mine Gas

No mine gas incident or remediation is recorded within 500m of the proposed development and typically in the UK mine gas is Low risk. However, in this instance given the possible presence of restored/infilled opencast site and an infilled quarry the ground gas risk should perhaps be raised from MODERATE to perhaps high in this instance.

In this instance longer term gas monitoring in specially installed gas wells is likely to be required

3. SUMMARY AND OUTCOME

In Geoinvestigate's opinion the available geological and coal mining information suggests that coal seam and mine working is unlikely to occur within shallow depth below the proposed development area.

However, the site may have been subject to deep opencast excavation and infilling.

In our opinion if this locality has been subject to opencast activity, it would perhaps have been deep removing coal seams below the Whitehaven Sandstone to an appreciable depth subsequently replacing the ground with perhaps reasonably compact deep crushed shale, mudstone and sandstone made ground which may now exist below the currently proposed building area.

However, it is Geoinvestigate's opinion that the locality may not have been subject to coal opencast working. Whether it has or not, it is our opinion that underground mine working or opencast activity is unlikely to pose significant ground stability hazard to this development precluding development over it.

In Geoinvestigate's opinion the client should purchase opencast abandonment plans (if available) from the CA to confirm whether the proposed development area and the adjacent land has been subject to opencast activity.

In our opinion the current information indicates that deep coal and mine working probing/drilling is not required in this instance.

However, the presence of a former potentially infilled/buried quarry within the site and possibly deep opencast infill requires further careful geotechnical and geoenvironmental appraisal and intrusive site investigation.

In this instance extended term gas monitoring in specially installed gas wells is likely to be required.

4. MITIGATION STRATEGY PROPOSED AND CONCLUSION

In our opinion, the current information on the coal mining situation at the site indicates that deep coal and underground mine working probing/drilling is not required in this instance.

In Geoinvestigate's opinion the client should purchase opencast abandonment plans (if available) from the CA to confirm whether the proposed development area and the adjacent land has been subject to coal opencast activity. In Geoinvestigate's opinion, the site is unlikely to have experienced opencast workings, though part of the site to the north has been subject to historical sandstone quarrying and infilling. The nature and depth of this infilling is unknown.

The presence of a former potentially infilled/buried quarry within the site and possibly deep opencast infill requires further careful geotechnical and geoenvironmental appraisal and intrusive site investigation.

In this instance extended term gas monitoring in specially installed gas wells is likely to be required.

On the basis of the CMRA work to date, we are of the opinion that the coal mining/opencast stability risks posed by the strata beneath this site from mining legacy can be mitigated by routinely adopted measures and should not preclude planning permission being registered with regard to coal mining legacy issues.

In conclusion, we see no reason why Planning Permission should not be granted in the interim with respect to coal mining legacy issues and that these works form a condition on the planning approval to be discharged before construction begins.

Appendices:

- A. CA Consultant's Coal Mining Report issued 1 February 2022 ref 51002963947001.
- B. Site images
- C. Site location & development plan.
- D. 1938 OS map overlay, Lidar & Satellite images
- E. Extracts of BGS Geology Map, Sheet 28 - Whitehaven at 1:50000 scale.
- F. BGS borehole log.

APPENDIX A
COAL AUTHORITY REPORT



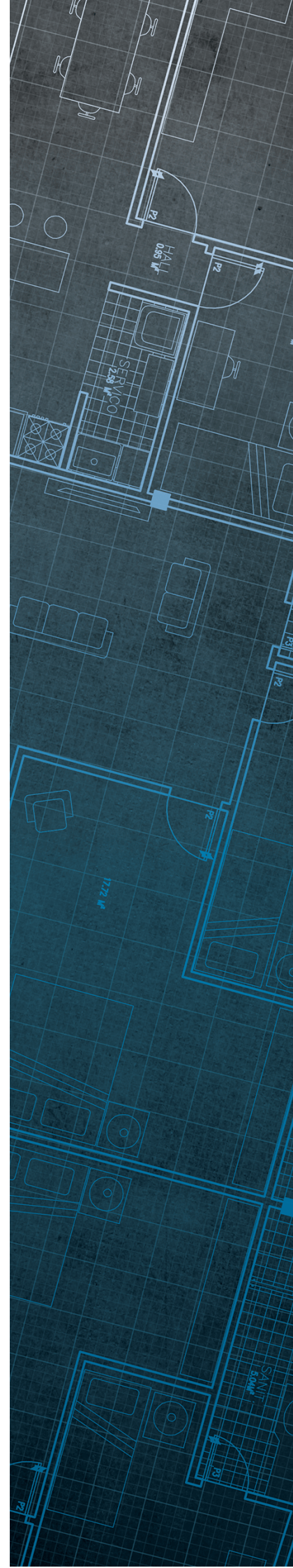
The Coal
Authority

Consultants Coal Mining Report

Land Adj. Round Close Park
Whitehaven
Cumbria
CA28 8UH

Date of enquiry:	1 February 2022
Date enquiry received:	1 February 2022
Issue date:	1 February 2022

Our reference:	51002963947001
Your reference:	G22050



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

GEOINVESTIGATE

Enquiry address

Land Adj. Round Close Park
Whitehaven
Cumbria
CA28 8UH

How to contact us

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

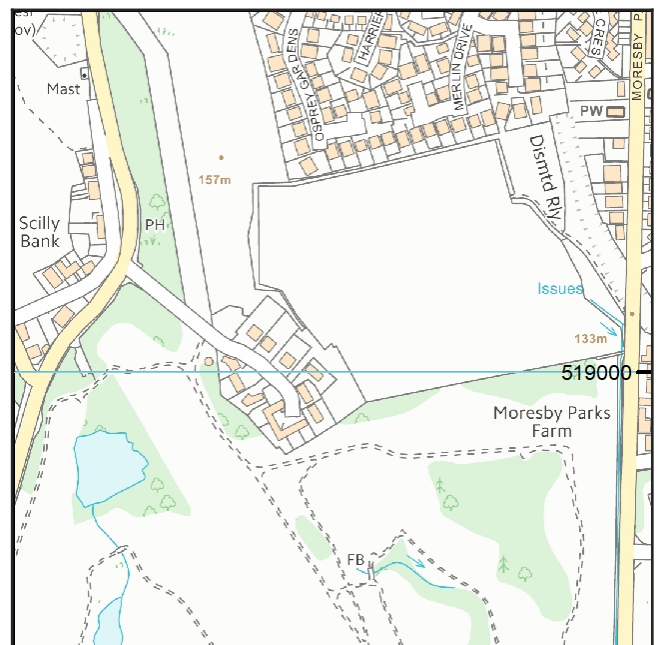
www.groundstability.com

 @coalauthority

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Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
WHITEHAVEN	MAIN	Coal	006N	117	West	8.2	West	182	1961
unnamed	MAIN	Coal	006M	145	North-East	19.9	South-West	182	1961
unnamed	SIX QUARTERS	Coal	009M	191	East	9.9	West	137	1950

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

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

17388	NW1454	NW1378
NC471	NC176	NC472
NW1390	PO0	NW1376

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

Please refer to the "Summary of findings" map (on separate sheet) for details of any opencast areas 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 in an area where a notice to withdraw support was given in 1946.

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

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

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.

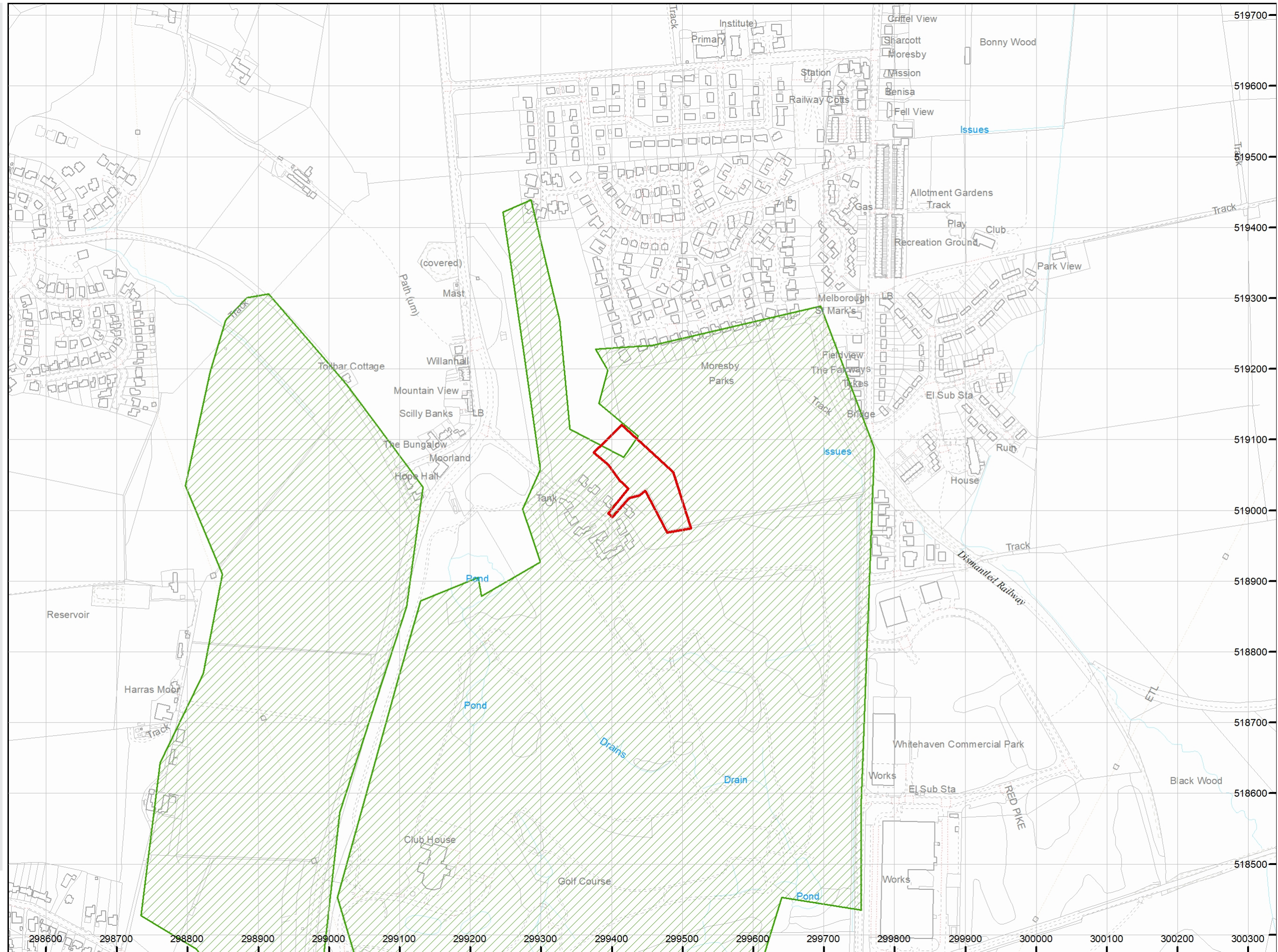
Withdrawal of support notices

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.

How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

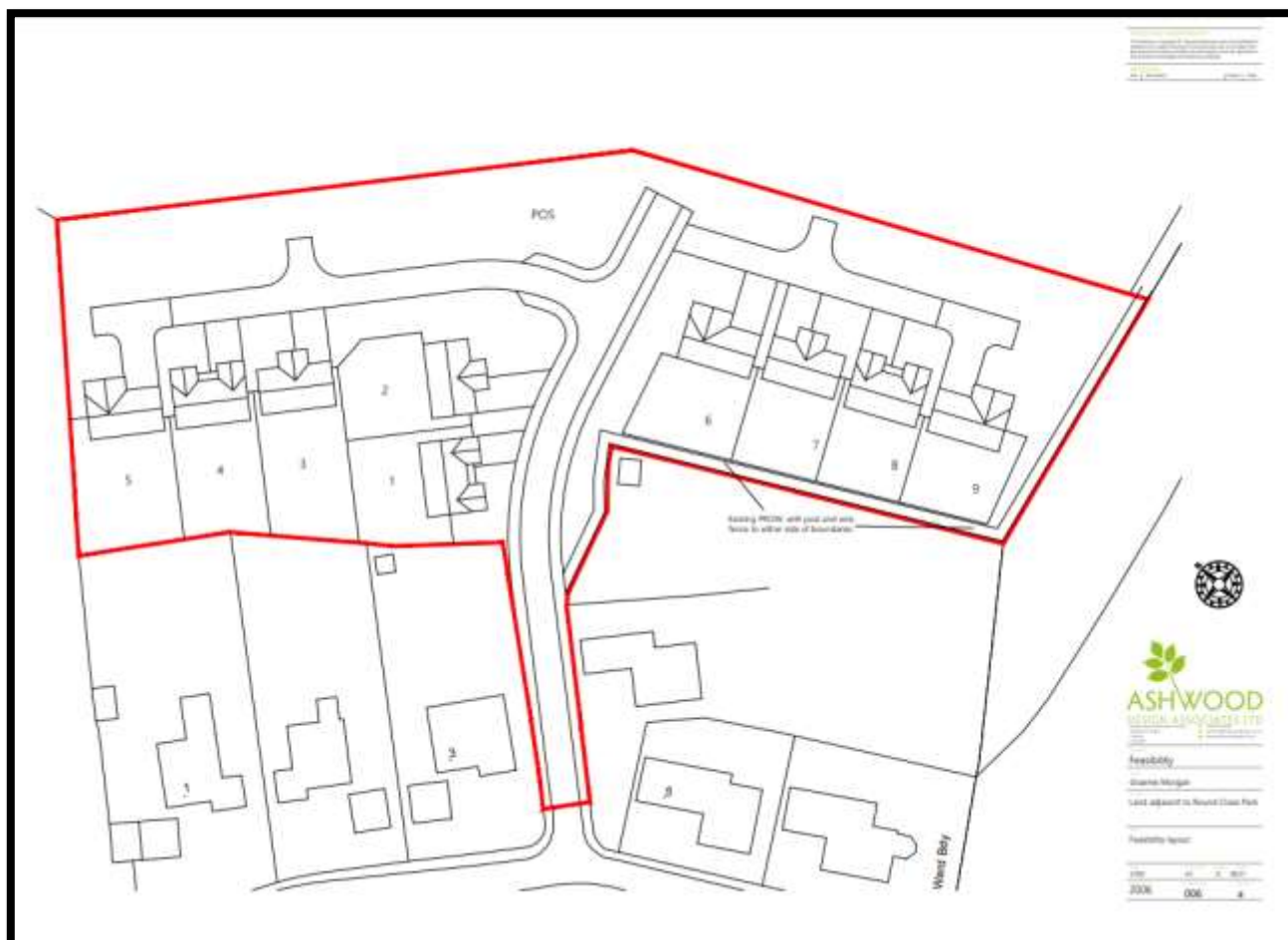
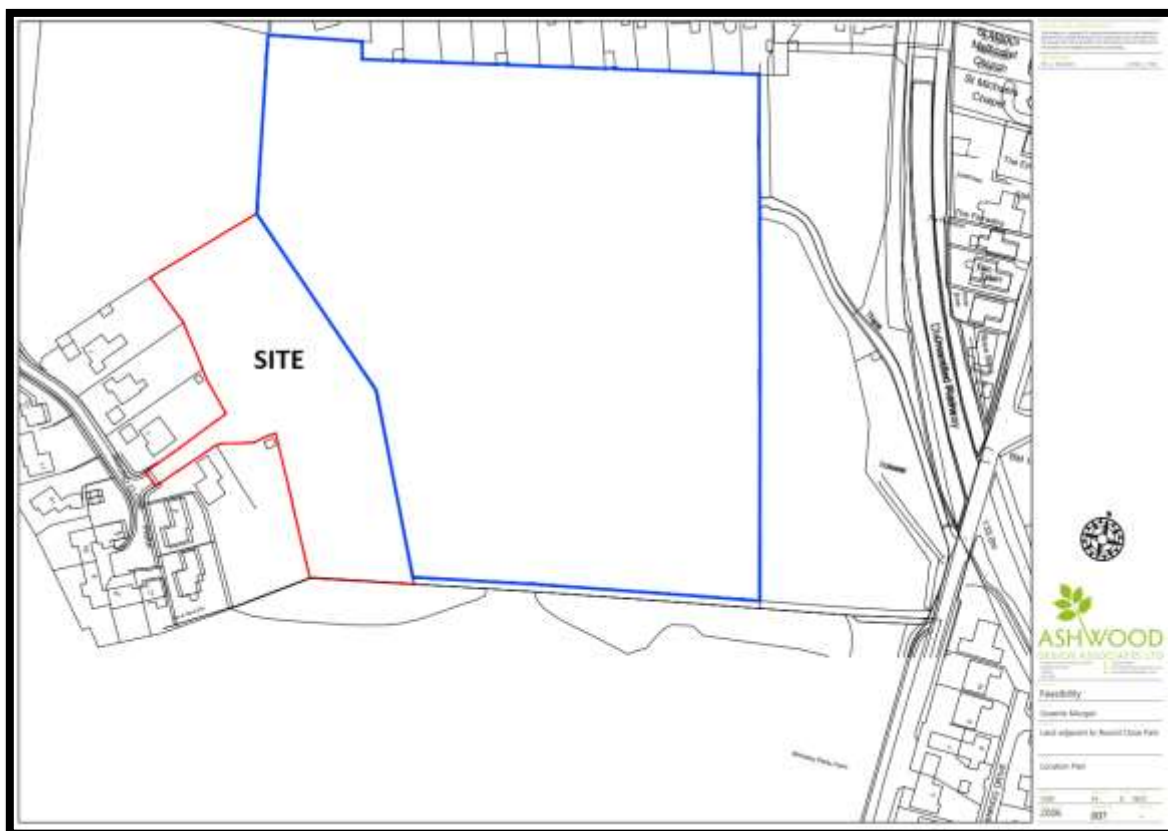


APPENDIX B SITE IMAGES



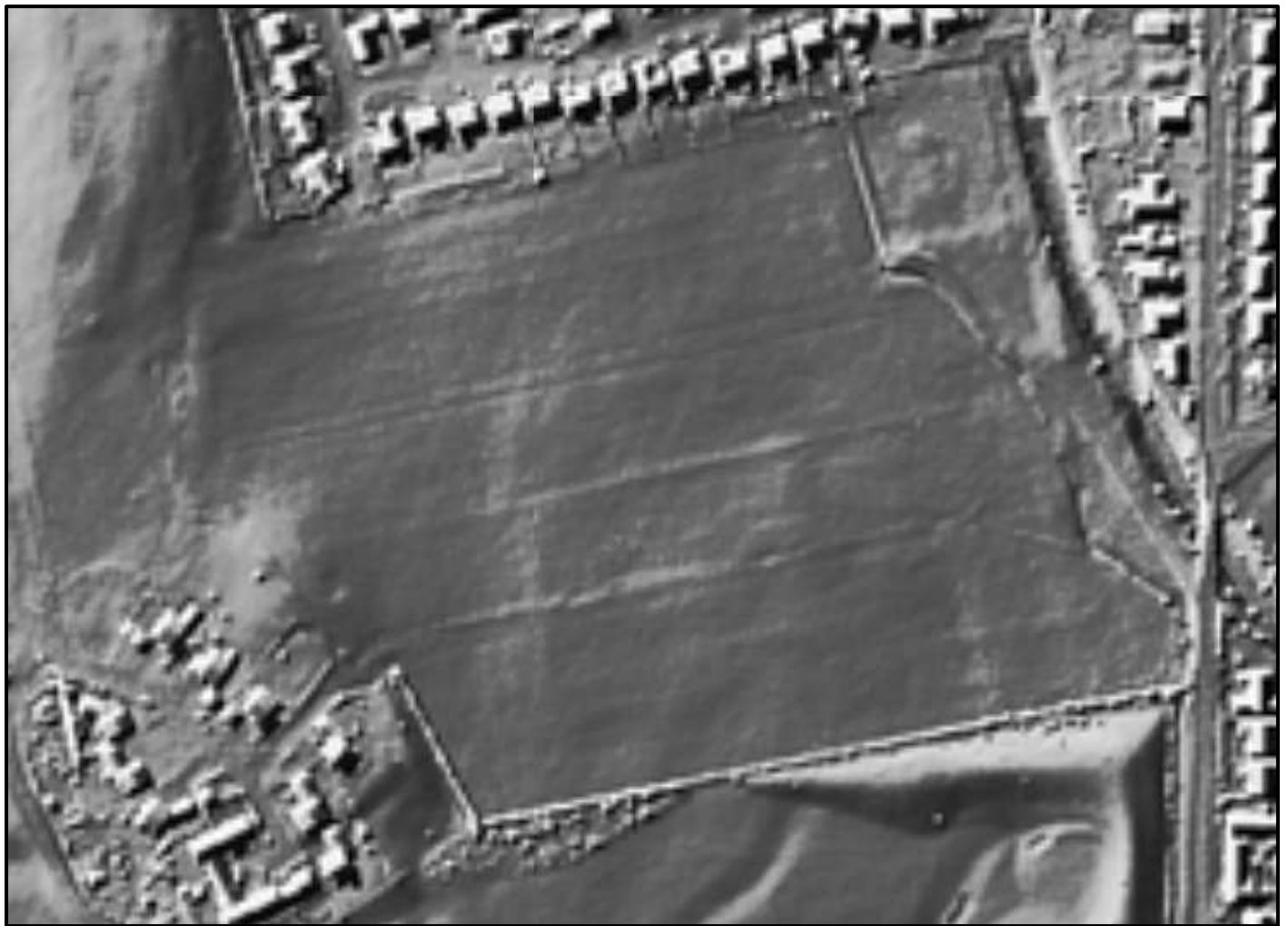
APPENDIX C

SITE LOCATION & DEVELOPMENT PLAN



APPENDIX D
1938 OS MAP OVERLAY SHOWING QUARRY
RECENT LIDAR & SATELLITE IMAGERY

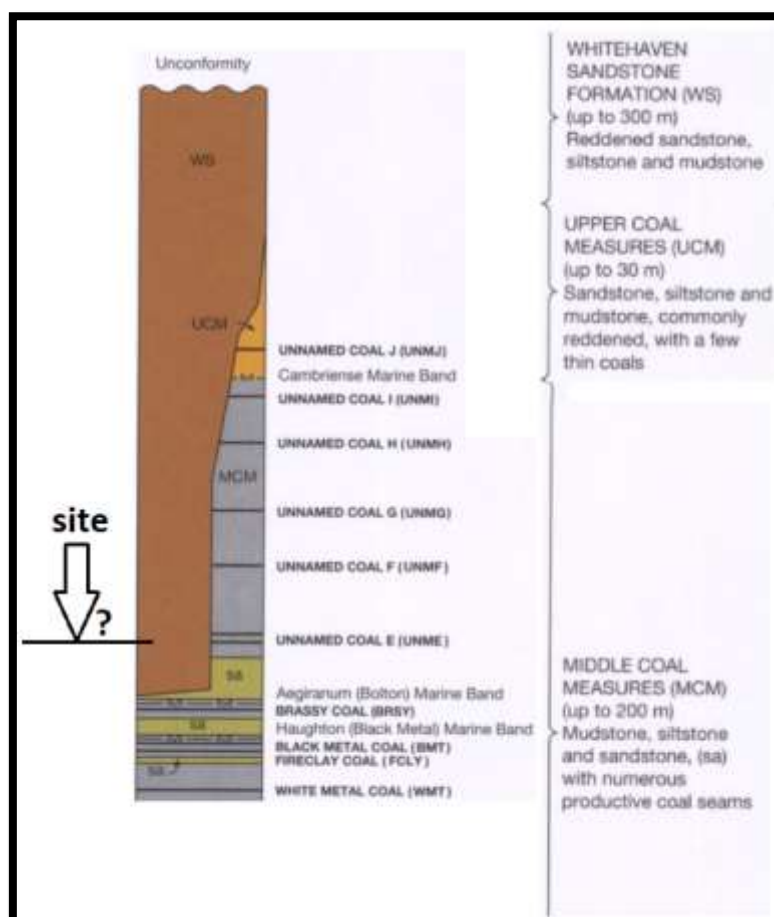
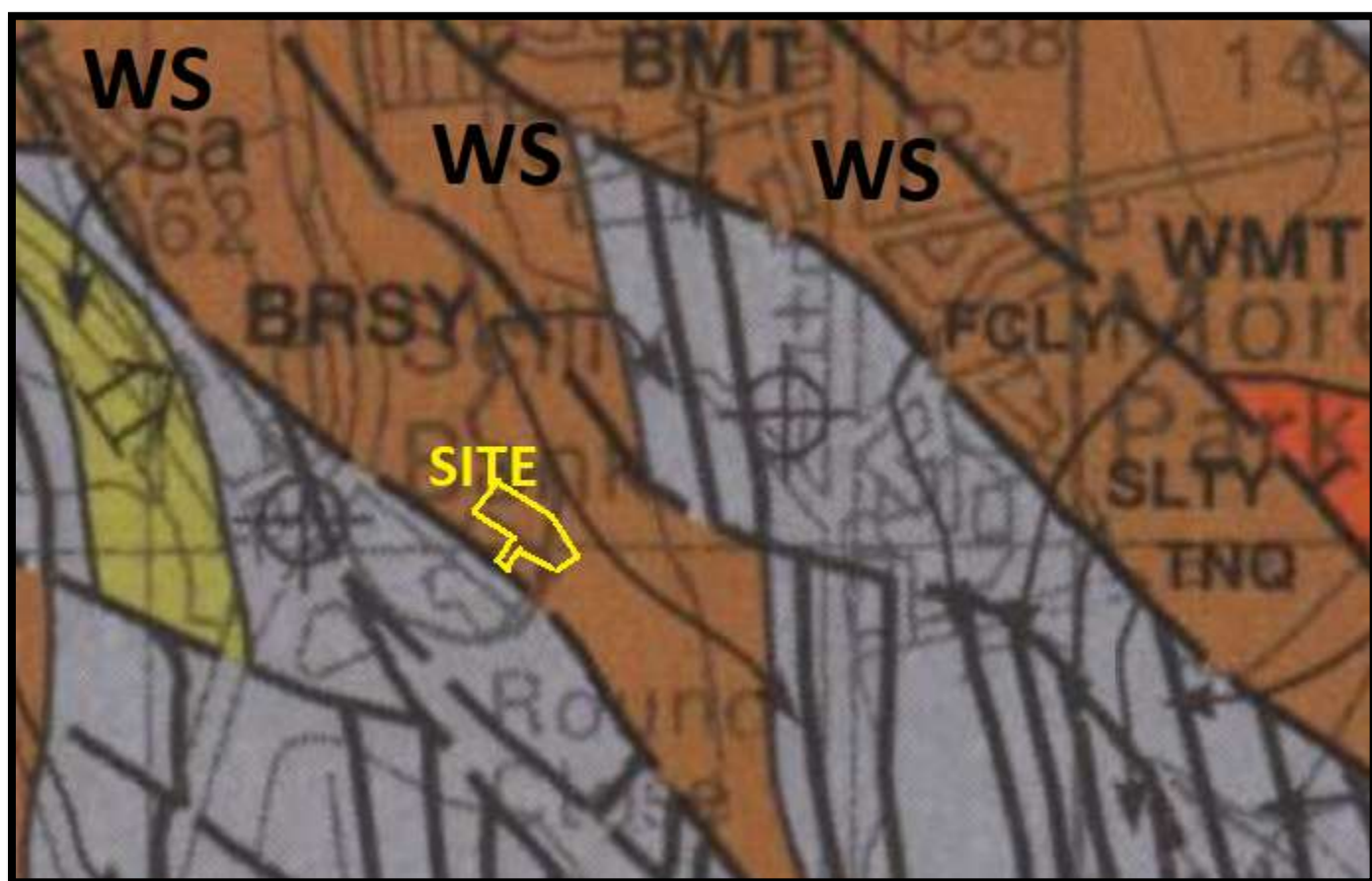






APPENDIX E

EXTRACTS OF BGS GEOLOGY MAP



APPENDIX F

BGS LOG

NX91NE/459

**Whitehaven Golf Club
Production Borehole**

NRA No.

British Geological Survey

British Geological Survey

Description of Strata

Thickness Depth

Top Soil (sandy)	0.5	0.5
Brown Clay	7.5	8
Hard Grey Sandstone plus Black Shale Bands	31.6	39.6
Very Hard Grey Sandstone	2.8	42.4
Black Shale with occasional Sandstone band	19.4	61.8
Grey Shale and Coal Seam	5.2	67
Black & Grey Shale	6.3	73.3
Grey Shale and Mudstone Bands	6.7	80
Grey Sandstone	3	83
Grey Shales	31	114
Shale with Sandstone Bands	12.5	126.5
Grey Sandstone	2.5	129

British Geological Survey

British Geological Survey