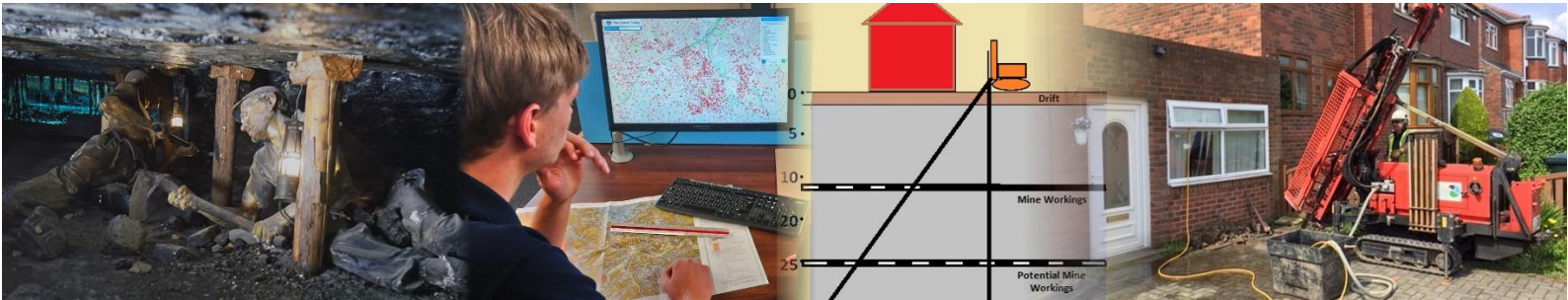




GEOLOGICAL
 GEOTECHNICAL
 GEOENVIRONMENTAL
 CONSULTANCY
 DRILLING & DATA ACQUISITION



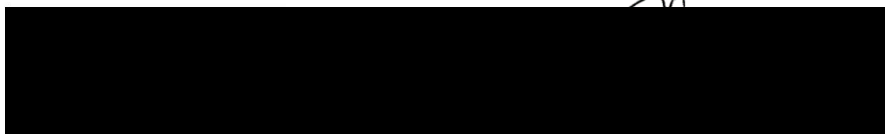
GEOINVESTIGATE LIMITED

Coal Mining Risk Assessment (CMRA)

| | |
|--------------------|--|
| LOCATION | Varley Solar Farm, Off Talbots End, Cromhall GL12 8AJ |
| ISSUE DATE | November 2022 |
| FOR | Renewable Energy Systems (RES) Limited |
| CLIENT REF. | Project ID 4886 |
| OUR REF. | G22225.rev2 |

Prepared by

Checked by



Fay Morgan MGeol (Hons) FGS
 Senior Geoenvironmental Engineer

Ross Nicolson BSc (Hons) MSc (Eng) CEng MIMMM
 Principal Geotechnical Engineer

SUMMARY FINDINGS

| | |
|--|--|
| <p style="text-align: center;">OUTCOME MITIGATION REQUIRED (Yes/ No?)</p> | <p><i>No. This CMRA has found that the entire site is underlain by either the Upper Cromwell Sandstone or unconformably by the younger Keuper Marl. The mapped Lower and Middle Coal Measures that are shown outcropping and sub cropping to the southwest and west of the site, are younger than the bedrock beneath the site and dip away from the site itself. Therefore, although the southern two thirds of the site fall within a Coal Mining Reporting Area as classified by the Coal Authority, the risk from historical coal mine workings is negligible.</i></p> <p><i>Consequently, in our opinion the site is safe with respect to coal mining legacy issues and no further mitigation is needed neither deep drilling investigation, special foundation design, mine working treatment or mine gas protection.</i></p> <p><i>However, routine shallower geotechnical/geoenvironmental site investigation will be required to enable foundation design mainly in the area of the proposed substation. Geoinvestigate would be pleased to provide a quote for this service.</i></p> |
| <p style="text-align: center;">WHAT TO DO NEXT</p> | <p><i>Nothing further required with respect to coal mining legacy issues.</i></p> <p><i>In conclusion, with respect to coal mining legacy ground stability issues we see no reason why planning permission should not be granted for the proposed development.</i></p> |

1. CMRA INTRODUCTION

Site Location and Description:

The approximate centre of the site lies at National Grid Reference E 370602, N 189907 with ground elevations ranging between 55m and 65mOD. The boundary shown in RED in the Coal Authority (CA) Consultants Report provided in Appendix A corresponds with the site plan boundary Geoinvestigate have been provided with by the client.

Google oblique aerial imagery in Appendix B shows the site is relatively flat and subdivided into separate fields by hedgerows. The fields are noted to mainly be used for pastoral farming, with only a few fields used for arable farming.

Proposed Development:

It is proposed to develop the site into a solar farm, with associated access roads and substation located within the north-eastern corner. Site location plans are provided within Appendix B.

Historical Record Review:

The OS historical map of 1885 -1900, included within Appendix C, shows the site was used for farming from at least 1885 to the present. It also shows a number of quarries within the surrounding area, presumably sandstone quarries, noting the geology beneath the site.

The OS map record provides no evidence that the site itself has been subject to sand, clay or gravel pitting, stone quarrying, or surface mining.

A brief, limited desk top inspection of buildings, roads and walls in the site vicinity using Google Street View, satellite imagery and LIDAR imagery found no obvious visible surface evidence indicative of mining subsidence. The satellite and LIDAR imagery are included within Appendix D.

Furthermore, the LIDAR imagery does not show evidence of any coal mining subsidence features or any surface evidence of mining.

2. BGS GEOLOGICAL MAPPING

Extracts of BGS solid and drift geology map Sheet 251 Malmesbury at 1:50000 scale is presented in Appendix E.

The map indicates that superficial deposits of alluvium are present overlying the southern two third of the site. The alluvium consists of clay, silty, sand and gravel. Bedrock geology beneath the site consists of (from oldest to youngest

stratigraphically) the Upper Cromhall Sandstone in the far west of the site, with the Keuper Marl (mudstone) subcropping in the central and eastern areas of the site. The dip of the bedrock strata is between 18 - 22 degrees southwest.

There are no pertinent BGS borehole records in close proximity to the site.

The vertical geology column is shown below the BGS map in Appendix E and the tentative elevation of the site is shown relative to the geology column.

2. ASSESSMENT OF SITE-SPECIFIC COAL MINING

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.

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 | 2.1.5 |
| Outcrop | | No | 2.1.3 |
| Geological faults, fissures and breaklines | | No | 2.1.4 |
| Opencast Mines | | No | |
| Coal Mining Subsidence | | No | |
| Mine Gas | | No | 2.1.6 |
| 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

Although the site falls partially within a Coal Mining Reporting Area, see Appendix F, as defined by the Coal Authority (CA) on the Interactive Map, it doesn’t fall within a Development High Risk Area. According to the CA report in Appendix A, the site is not underlain by any historical recorded past underground mining.

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 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).

Furthermore, the BGS map for the area shows that the site is underlain by either the Upper Cromwell Sandstone or unconformably by the younger Keuper Marl. The mapped Lower and Middle Coal Measures that are shown outcropping and sub cropping to the southwest and west of the site, are younger than the bedrock beneath the site and dip away from the site itself. Therefore, there is no coal bearing strata located beneath the site.

2.1.3 Outcrop

Both the CA report and the BGS map do not identify coal outcrop within or close to the site boundary. The nearest subcropping coal seam is located within the South Wales Middle Coal Measures to the west of the site. However, this coal bearing strata is younger stratigraphically and also dips away from the site, so does not impact the site.

2.1.4 Geological faults, fissures, and breaklines

The CA report does not identify any linear features present on the site. The nearest major fault, according to the BGS, is located 700m to the west of the site. Therefore, due to its distance, this fault is very unlikely to affect the ground stability of the site.

2.1.5 Mine Entries

There are no mine entries located within 100m of the site boundary.

2.1.6 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. Given the negligible risk from potential coal mine working beneath the site and the absence of any coal bearing strata, the risk from mine gas is deemed to be Low.

8. SUMMARY AND OUTCOME

This CMRA has shown the proposed development is unlikely to be impacted by coal mining hazards, underground mine working, surface working/opencast, mine entries, coal outcrops or mine gas.

Therefore, the site is safe with respect to coal mining legacy issues and no further mitigation is required neither deep drilling investigation, special foundation design, mine working treatment or mine gas protection.

However, routine shallower geotechnical site investigation will be required to enable foundation design, particularly in the location of the proposed substation.

Appendices:

- A. Coal Authority Consultants Report (no. 51003136308001), issued on 30 May 2022
- B. Site Plans & Proposed Development Plans
- C. Historical OS Map of 1885 – 1900
- D. Satellite Imagery/LIDAR Imagery
- E. BGS Geological Mapping (Sheet 251 – Malmesbury) and Generalised Vertical Section
- F. Coal Authority Interactive Map Data

APPENDIX A
COAL AUTHORITY CONSULTANTS REPORT



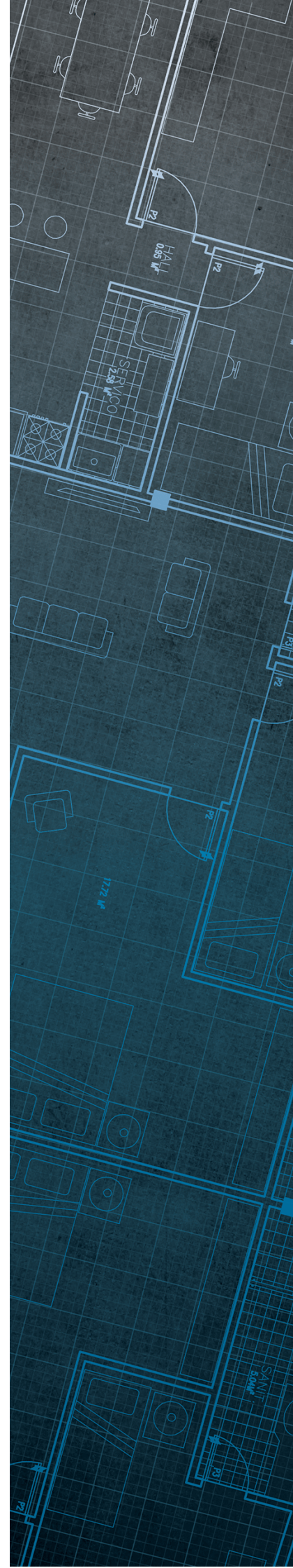
The Coal
Authority

Consultants Coal Mining Report

Proposed Solar Farm At Varley Farm
Talbots End
Cromhall
South Gloucestershire
GL12 8AJ

Date of enquiry: 30 May 2022
Date enquiry received: 30 May 2022
Issue date: 30 May 2022

Our reference: 51003136308001
Your reference: G22225



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

Proposed Solar Farm At Varley Farm
Talbots End
Cromhall
South Gloucestershire
GL12 8AJ

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NG18 4RG

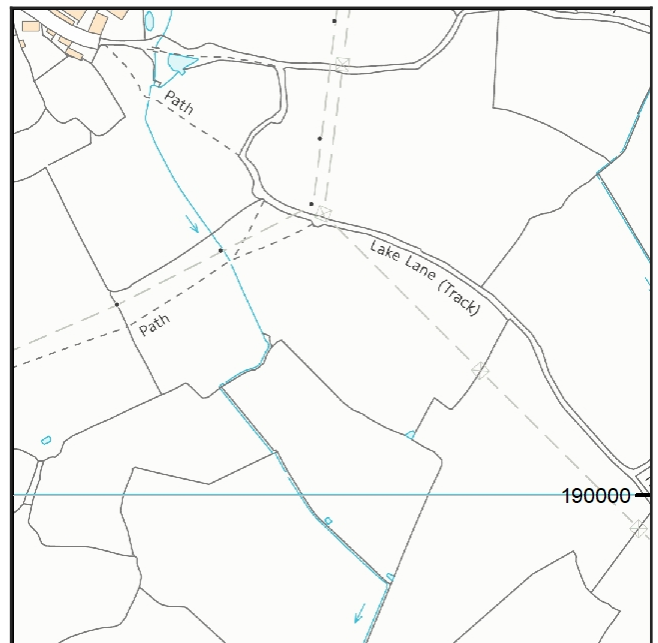
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



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

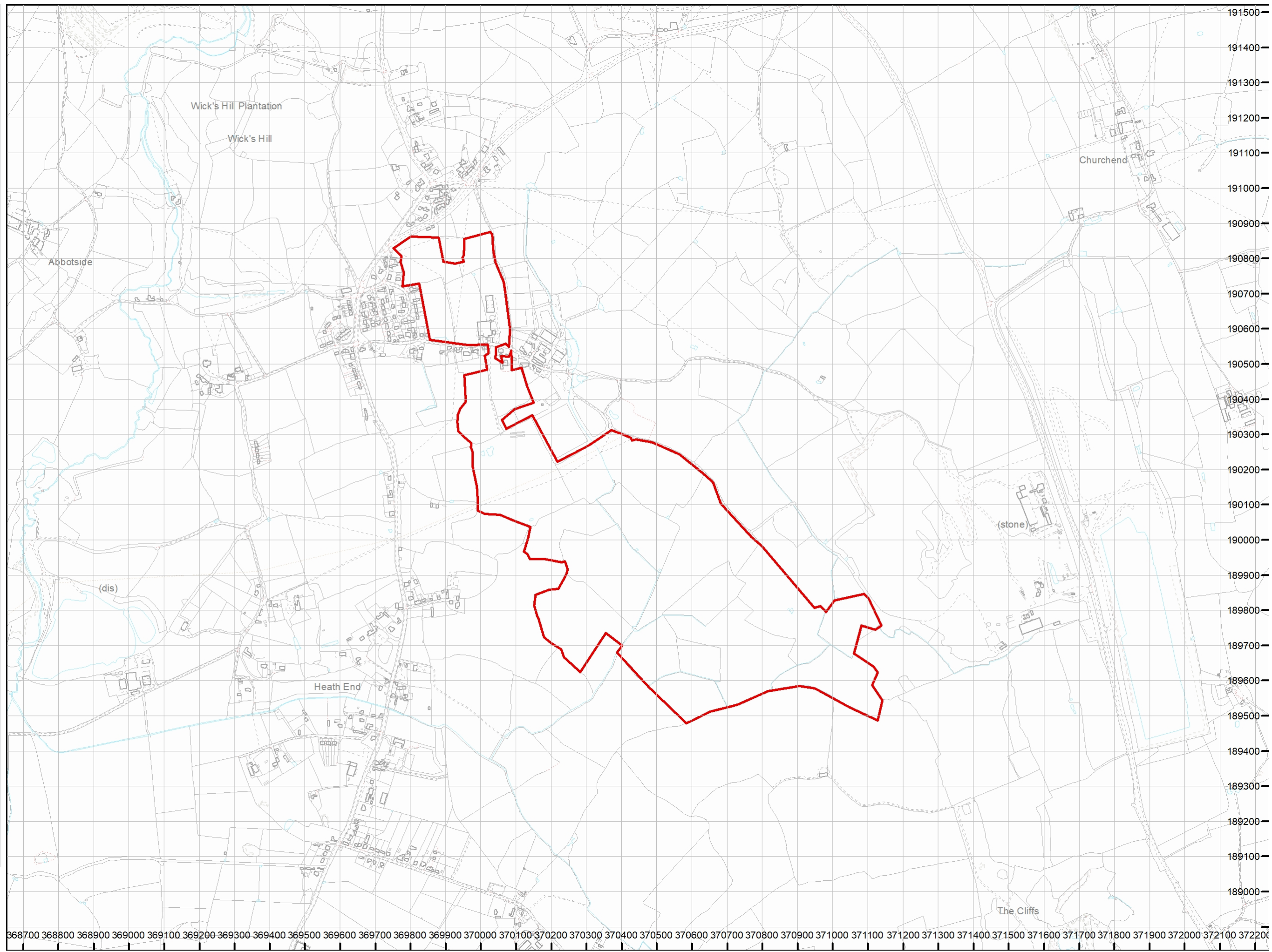
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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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APPENDIX B
SITE PLANS & PROPOSED DEVELOPMENT PLANS

- KEY:**
- DEVELOPMENT BOUNDARY
(OUTSIDE EDGE OF LINE DENOTES BOUNDARY)
 - NEW ACCESS TRACK
 - EXISTING ACCESS TRACK
 - PUBLIC RIGHTS OF WAY (PROW)
 - INDICATIVE SOLAR PV ARRAY
 - INVERTER
 - INVERTER HARDSTAND
 - SUBSTATION COMPOUND
 - SPARES CONTAINERS
 - TEMPORARY CONSTRUCTION COMPOUND
 - FENCE LINE
 - GATE (FENCE)
 - WATERCOURSE CROSSING
 - CCTV
 - SHEEP PEN
 - SURFACE WATER ATTENUATION
 - EXISTING PV SOLAR ARRAY



SITE LOCATION - NOT TO SCALE

| | | | | | |
|-------|-------|------|------|------------|----------------|
| 2 | FG | VM | BD | 2022-11-04 | Minor update |
| 1 | FG | VM | BD | 2022-11-03 | First Issue |
| ISSUE | DRAWN | CHKD | APPD | DATE | REVISION NOTES |

| | | | |
|----------------|-------------|-------------|-----------|
| PURPOSE | PERMITTING | PROJECTION | OSGB 1936 |
| SCALE | 1:5,000 @A3 | DATUM | N/A |
| LAYOUT DRAWING | N/A | T-LAYOUT NO | N/A |

PROJECT TITLE
VARLEY FARM SOLAR

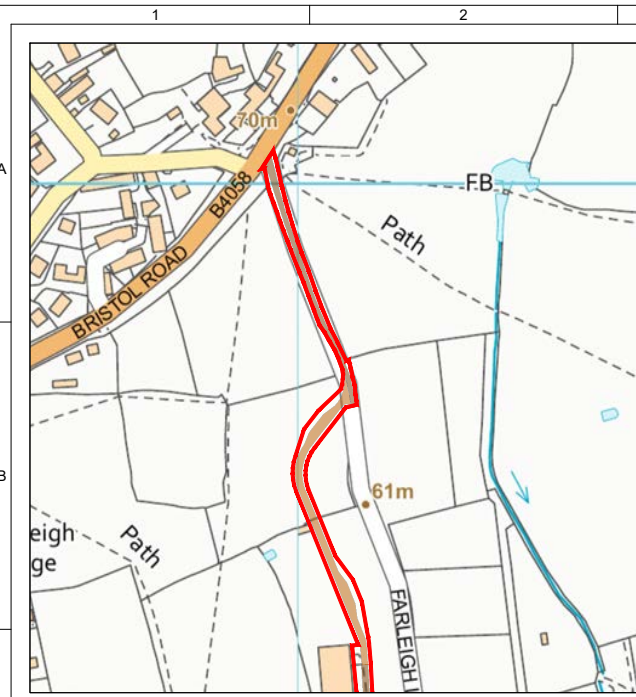
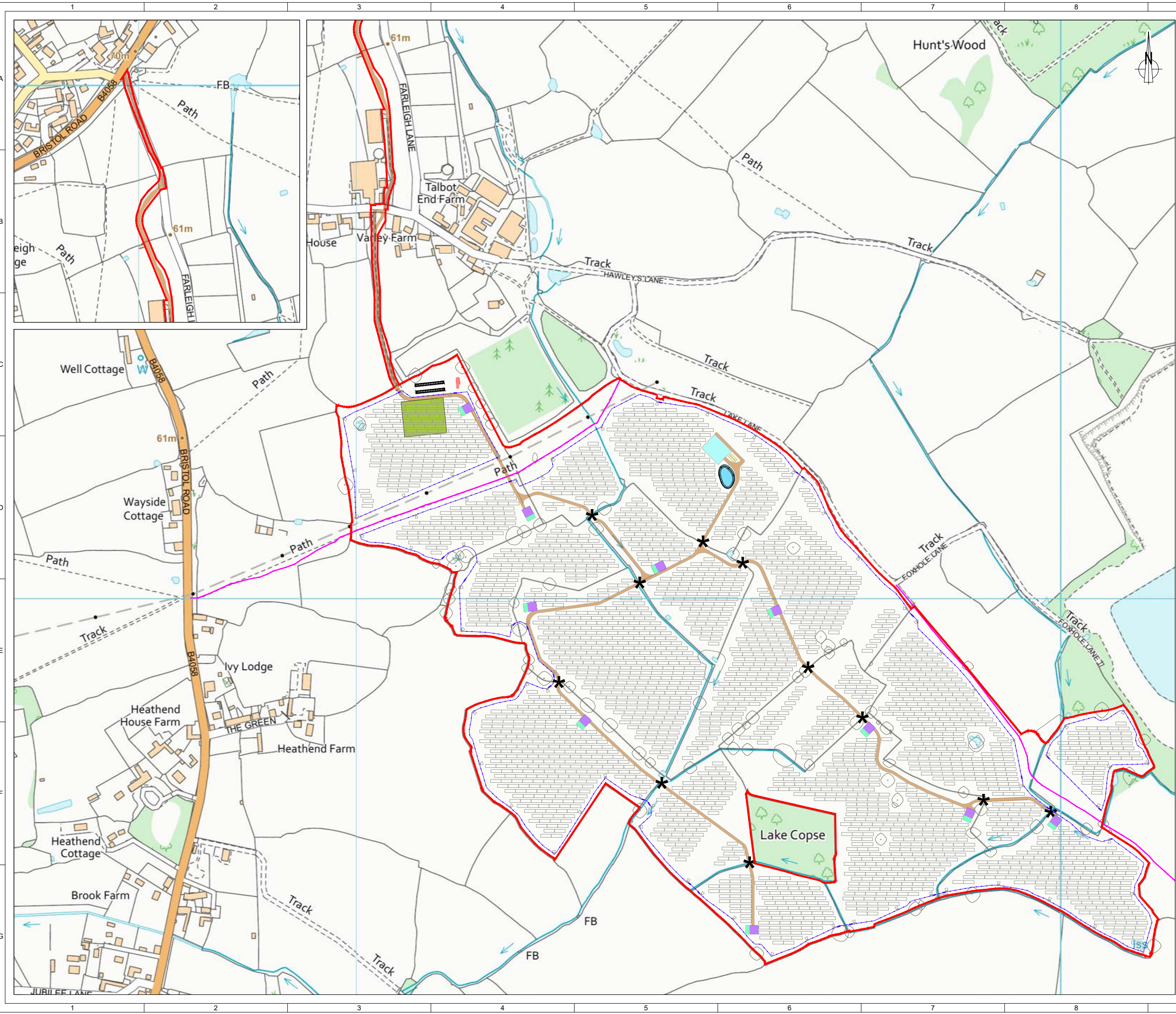
DRAWING TITLE
**FIGURE 4
INFRASTRUCTURE LAYOUT**

| | | | |
|--------------------|-------------------------|-----|---|
| RES DRAWING NUMBER | 04886-RES-LAY-DR-PT-003 | REV | 2 |
|--------------------|-------------------------|-----|---|

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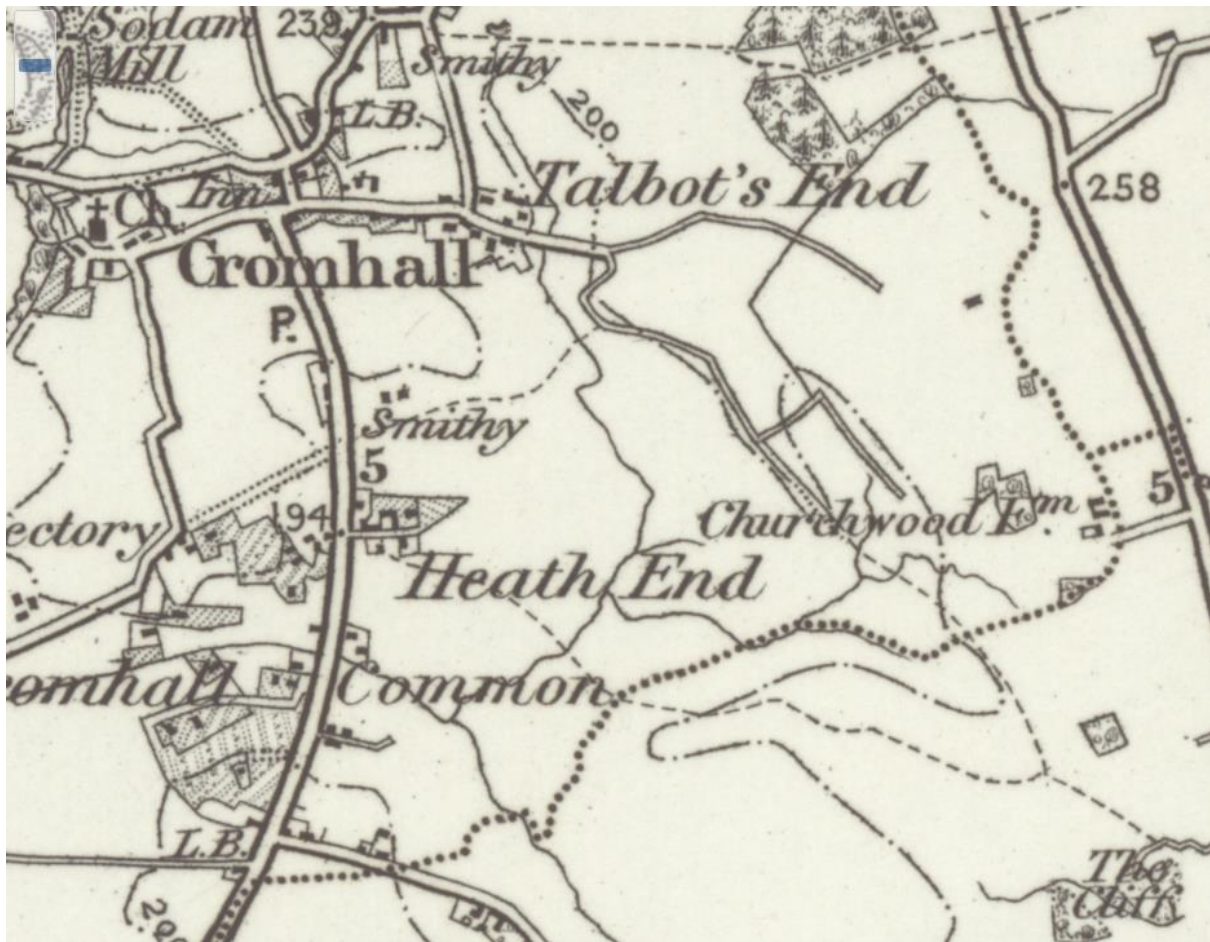


BEAUFORT COURT,
EGG FARM LANE,
KINGS LANGLEY,
HERTS WD4 8LR, UK
TEL +44 (0) 1923 299200
WWW.RES-GROUP.COM



APPENDIX C
HISTORICAL OS MAP

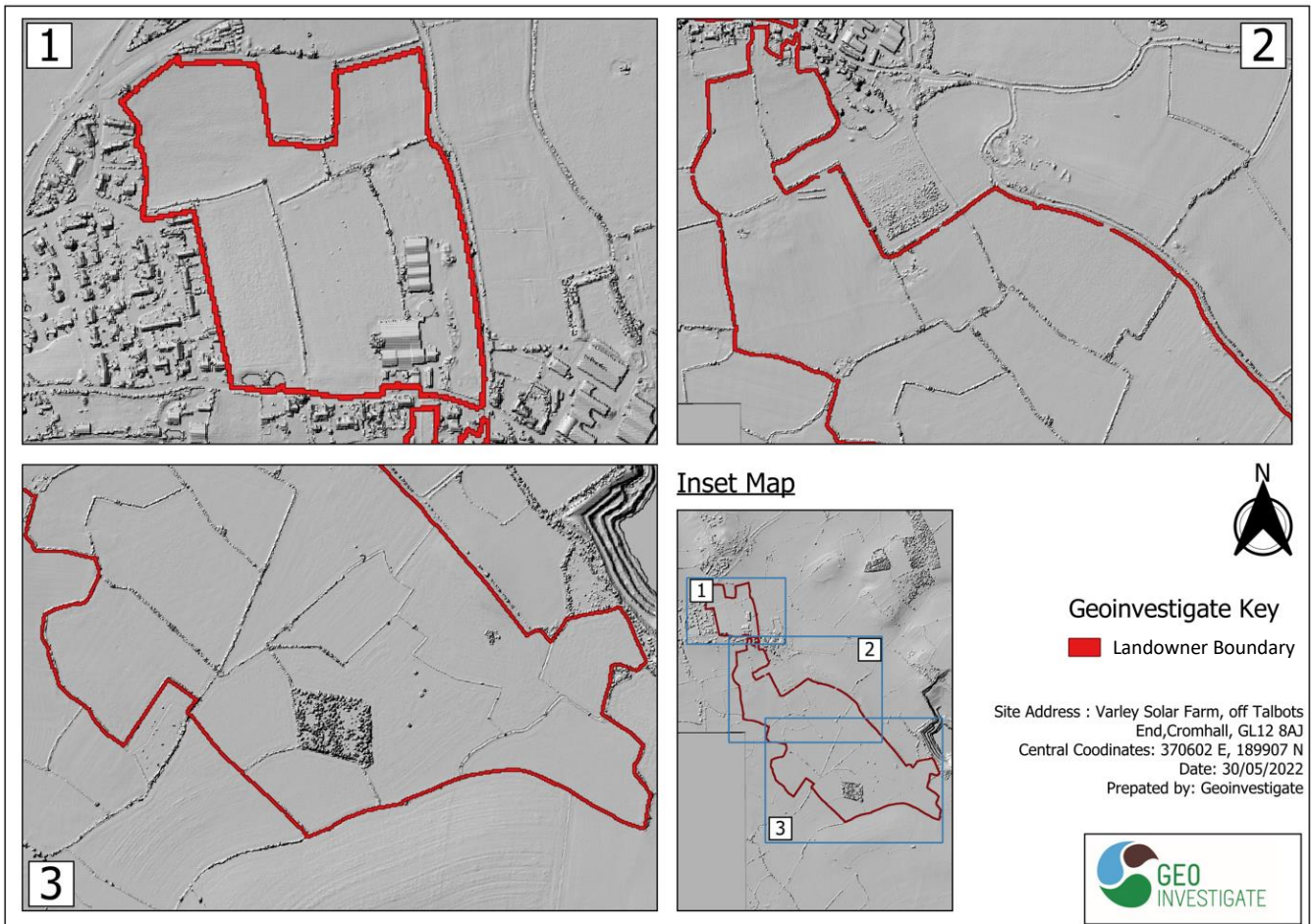
1885 – 1900



Source - <https://maps.nls.uk/geo/explore/side-by-side/#zoom=15&lat=51.61012&lon=-2.43379&layers=6&right=ESRIWorld>

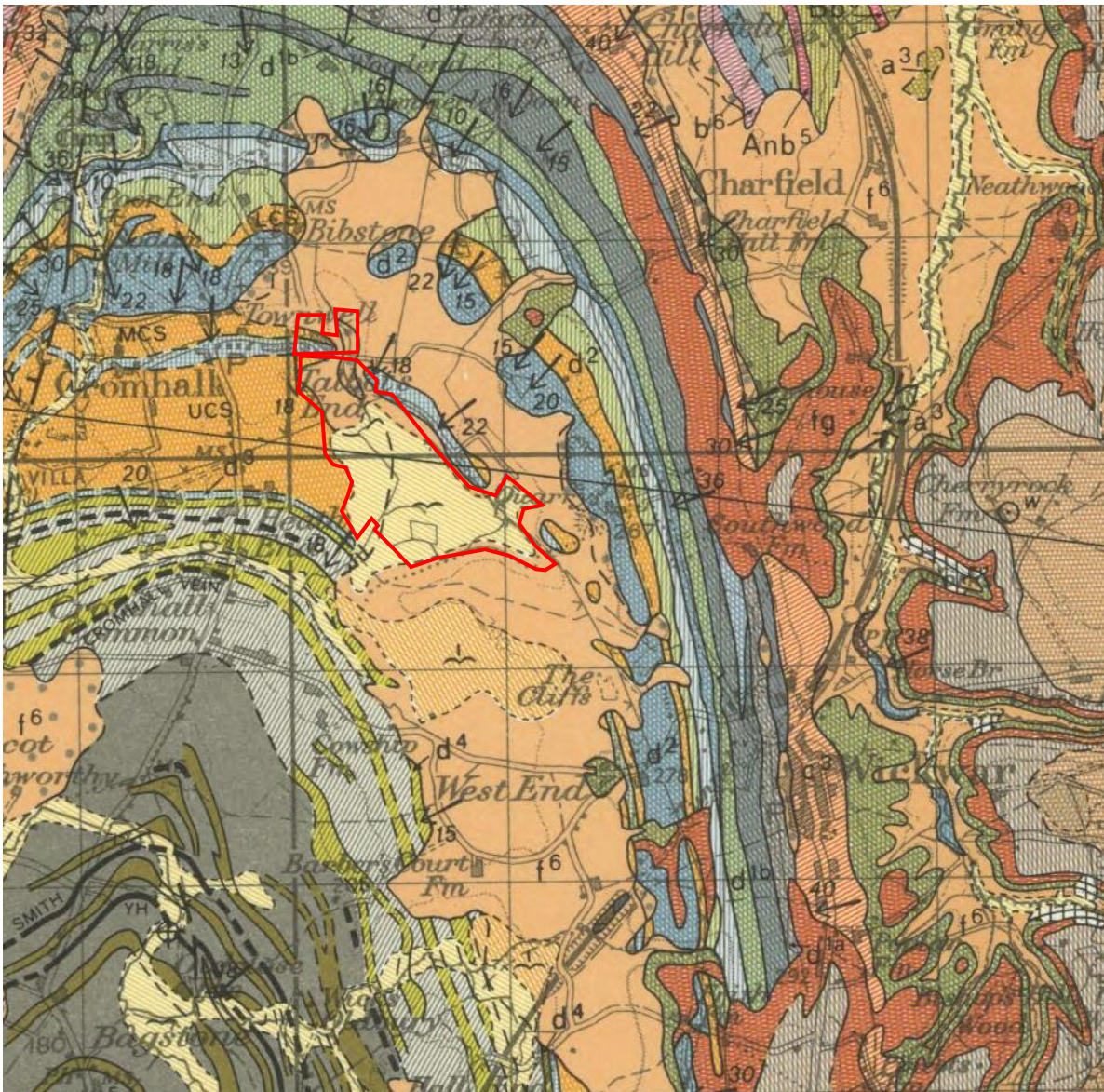
APPENDIX D

SATELLITE IMAGERY/LIDAR IMAGERY

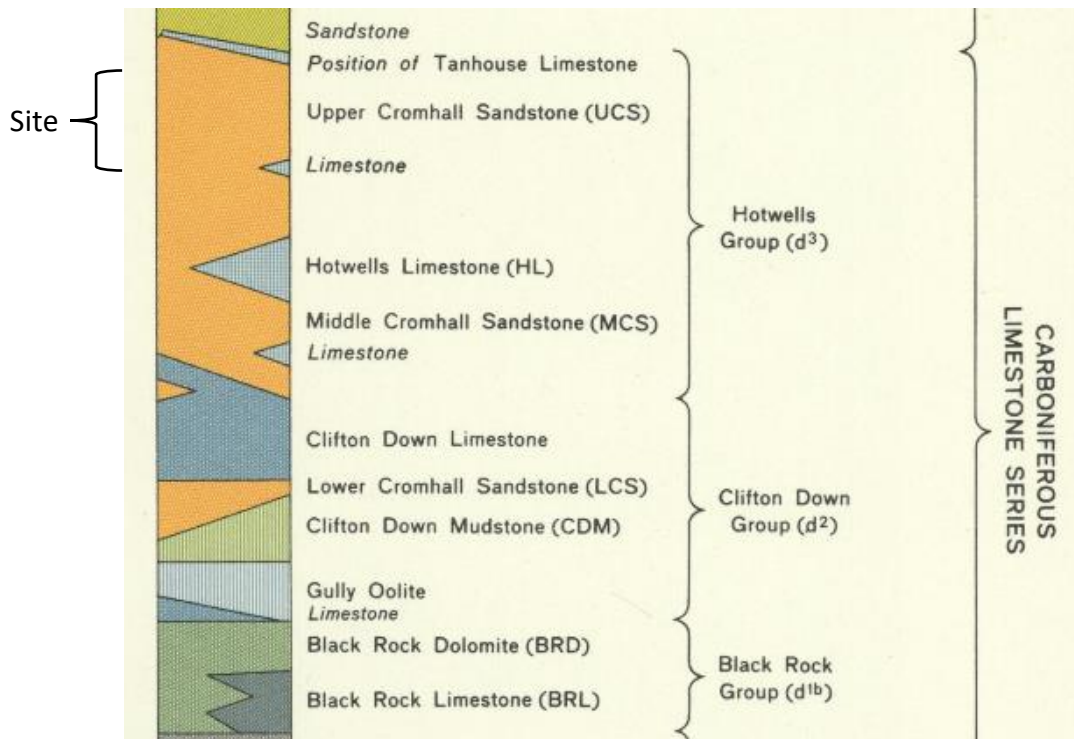


APPENDIX E

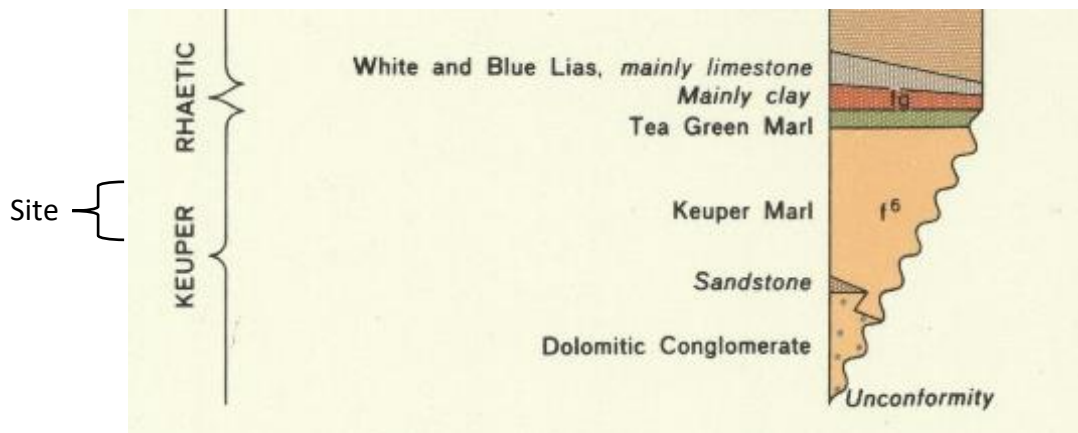
GEOLOGICAL MAPPING & VERTICAL GEOLOGY SECTION



Source – British Geological Survey (BGS) 1:50,000 scale geological map Sheet 251 – Malmesbury – Solid and Drift (1970)



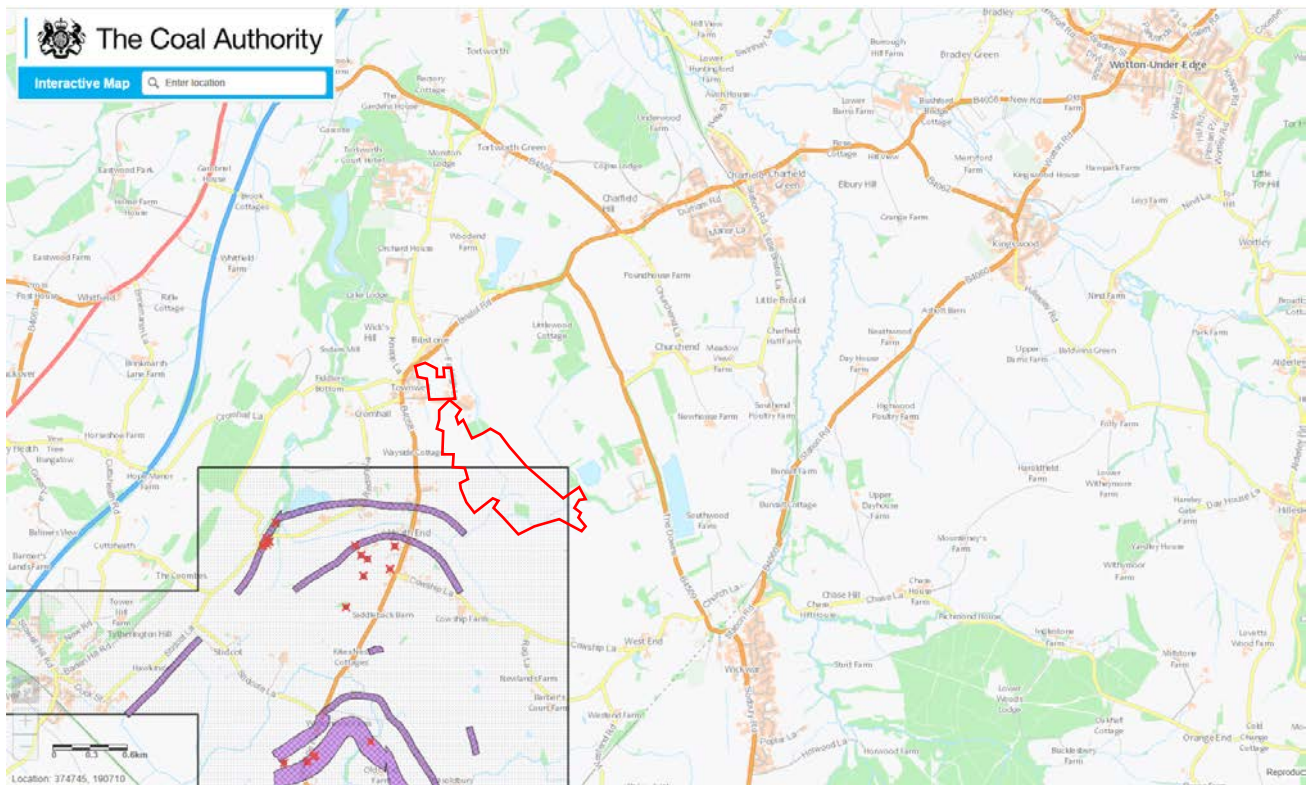
Source – British Geological Survey (BGS) 1:50,000 scale geological map Sheet 251 – Malmesbury – Solid and Drift (1970)



Source – British Geological Survey (BGS) 1:50,000 scale geological map Sheet 251 – Malmesbury – Solid and Drift (1970)

APPENDIX F

COAL AUTHORITY INTERACTIVE MAP DATA



Source - <https://mapapps2.bgs.ac.uk/coalauthority/home.html>