

## Preliminary GEO Environmental Appraisal (*GEO\_App*)

**Ref: GEO 2016-2088**

**Location: Land at Whitehaven Commercial Park**

### Introduction:

A Preliminary Geo-Environmental Appraisal (*GEO\_App*) has been undertaken for the proposed commercial/industrial redevelopment at a piece of land within Whitehaven Commercial Park, Whitehaven. This appraisal has been completed for Eskdale Environmental Services Ltd.

- Site Address: Land at Whitehaven Commercial Park, Whitehaven,
- National Grid Reference: 300000, 518800 (approximate centre of site)

It is understood that the client wishes to develop the site with commercial/industrial structures. The site currently comprises vegetative cover within a commercial/industrial park. The site is undulating with some vegetated mounds. Whilst completing this appraisal the following information has been reviewed:

- Published Geological Plans (BGS)
- Coal Authority Consultants Report and On-line Database (CA)
- Ordnance Survey Historical Plans dating between the 1860's and 1990's (OS)
- Environment Agency On-line Database (EA)

### Ground Conditions:

Published geological plans do not record made ground on site. However, some limited made ground is considered to be present associated with historical developments (former railway line) and any localised levelling/infilling that may have occurred to form current site levels. As mentioned, the site is noted to have included some railway infrastructure (i.e. sidings etc.) and these features could pose a localised risk of contamination. The former railway line is noted as a landfill site to the north or the northern site boundary. Areas of former opencast coal mine are noted around the site (now reclaimed and reinstated).

Made ground (where present) is likely to comprise of disturbed natural materials (i.e. clay, silt, sand and gravel) with some anthropogenic debris (fragments of ash, clinker, concrete, brick, etc.). There is a possibility of asbestos fibres associated with the former railway land.

The natural occurring Drift Materials across the site and immediate surrounding area is noted as Glacial Till (Boulder Clay) which typically comprises firm to stiff sandy gravelly clay deposits with potential layers and bands of sand and gravel. No historical boreholes are present within a representative distance of the site to indicate potential Drift thickness. Shallow groundwater could potentially be present, although the Drift Geological Deposits are unlikely to be considered as a significant strategic resource. Natural clay soils (where present) could potentially reduce the migration of ground gas.

The Solid Geological Deposits are noted as the Carboniferous Coal Measures, which typically comprises layers of mudstone, sandstone, siltstone, coal and seatearths. These deposits are likely to be classified as a Secondary A Minor-Aquifer. They are unlikely to be considered as a significant strategic resource.

Reference to published geological plans infers numerous structural fault-lines on or close to the site. These fault lines could pose a potential structural risk (if proposed structures are piled or founded on rockhead). In addition, the fault lines may potentially act as a conduit for the migration of ground gas emissions (i.e. mine gas from recorded mine workings and ground gas from adjacent areas of infilling).

### Coal Mining Activities:

The Coal Authority Consultants Report is summarised below (and attached to this report):

- Workings recorded at 56m depth within the Main Seam
- No probable unrecorded shallow workings
- No outcrops recorded

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**Email:** [info@geoenvironmentalengineering.com](mailto:info@geoenvironmentalengineering.com)

**Telephone:** 08456 768 895

- No faults under or close to the property
- Five mine entries (shafts) noted within close proximity
- No worked out opencast recorded
- No damage claims received

The Geological Plans conflict somewhat with the CA information, as they suggest numerous coal seams as subcropping on and close to the site. The Main Seam sub-crops to the east and dips at 20 degrees to the west, [passing beneath the site at a depth of 56m (where workings are recorded with an extraction thickness of 1.82m). Geological plans suggest the BNOK (Bannock), TNQ (Ten Quarters) and SLTY (Slaty) as potentially sub-cropping on site, or close to the site. It may be the case that these seams are therefore present at shallower depths than the Main, with thicknesses recorded of c.1.50m to c.2.00m (i.e. economically viable), therefore GEO considers that unrecorded workings could be present.

#### Risk From Landfill:

A review of Environment Agency information suggests that a former landfill site is present within an influencing distance (c.250m). However, if natural clay soils are present then they could reduce the risk of ground gas migrations.

#### Brief Historical Map Review:

Historically the site was recorded as fields/agricultural land for many years until the construction of the railway line (with cutting). During this time no obvious structures were present on site, although coal mine entries were noted around the site.

Those features were later cleared/infilled and the site was developed to its current state, with some earth mounds suggesting variations in historic ground levels. In the surrounding area, commercial/industrial development took place with offices and warehousing now present.

#### Geo Environmental Preliminary Qualitative Risk Assessment (PQRA):

The following PQRA determines the potential level of risk associated with the geotechnical and environmental properties of the site, considering any potential *geohazards* that may affect future land value or require specific consideration with respect to future redevelopment.

A risk rating of **NEGLIGIBLE**, **VERY LOW**, **LOW**, **MODERATE** or **HIGH** is allocated to each potential geohazards.

| GEO Hazard                                    | Risk Level | Impact  |
|---|------------|---|
| Made Ground:                                  | VERY LOW   | Variable made ground potentially present (railway line/cutting/"earth mounds"), but significant made ground currently considered unlikely   |
| Relic Sub Surface Structures:                 | VERY LOW   | Obstructions possible, but unlikely, associated with former railway land  |
| Stability of Excavations:                     | VERY LOW   | Pit wall collapse possible due to made ground   |
| Trapped Surface Water:                        | LOW        | Variable Drift materials may trap water   |
| Shallow Groundwater:                          | LOW        | Shallow groundwater is possible   |
| Shallow Coal Mining:                          | MODERATE   | Mining recorded at 56m below the site. Coal Seams are recorded as sub-cropping on and close to the site that could be present at a shallower depth and a risk of unrecorded workings is possible. |
| Mine Entries:                                 | MODERATE   | Mine entries are recorded off-site that pose a risk of ground gas generation and migration. Consideration should be made for unrecorded mine entries on site.                                     |
| Soil Contamination (Generic):                 | LOW        | Generic contaminants potentially present at various concentrations relating to historical on site activities (railway land) and any localised levelling/infilling that may have taken place.      |
| <b>HOT SPOT</b> (Organic) Soil Contamination: | LOW        | Localised <b>HOT SPOTS</b> possible, but considered unlikely. Historical (localised) activities may have included Asbestos Containing Materials (railway land)                                    |
| Water Contamination (Generic):                | NEGLIGIBLE | Generic contaminants possible but unlikely (see Soil)   |
| <b>HOT SPOT</b> Water Contamination:          | NEGLIGIBLE | Localised <b>HOT SPOTS</b> possible, but unlikely (see Soil)  |
| Risk To Adjacent Sites:                       | NEGLIGIBLE | Possible migration (leaching) of on-site contaminants   |
| Ground Gas:                                   | LOW        | On-site or off-site sources identified  |

Recommendations:

Based on the PQRA potential “Geohazards” have been identified and the following is recommended:

- Phase 2: Ground Investigation Works and Reporting comprising the following:
  - Mini percussion boreholes with ground gas monitoring wells
  - Trial pits to check for possible made ground
  - Rotary boreholes within proposed building footprints to check for potential unrecorded mine workings
  - Ground gas monitoring
  - Soil contamination testing (should made ground with anthropogenic debris or visual/olfactory evidence of fuel/oil type contamination be noted)

GEO\_App Prepared by:

.....  
Curtis R. Evans *B.Sc (Hons) FGS*  
Director

[www.geoenvironmentalengineering.com](http://www.geoenvironmentalengineering.com)

[info@geoenvironmentalengineering.com](mailto:info@geoenvironmentalengineering.com)

Tel: 08456 768 895, Mob: 07883 440 186

Limitations of Use: The information, risk assessments, conclusions and recommendations presented within this free appraisal are solely based on, and are limited to, the boundaries of site, the immediate area around the site, and the historical use(s) identified from the brief historical plan appraisal. This report has been completed utilising information relating to the environmental and industrial setting of the site to determine (where possible) potential geohazards that may negatively affect the future redevelopment or purchase of this land. Any comments, opinions or diagrams contained within the report and/or any composition of the findings is conjectural/speculative and given for guidance only. It is recommended that confirmation of the anticipated ground conditions should be considered before development or acquisition proceeds. The information presented is not exhaustive and is for guidance only. This Appraisal remains the sole property of Geo Environmental Engineering and is not to be distributed without prior written consent.



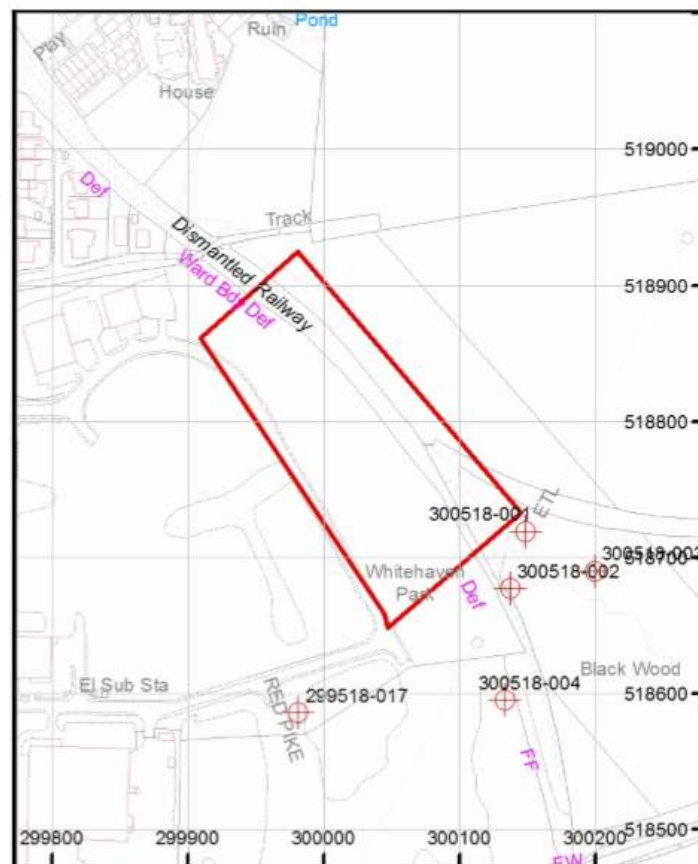
## Site Location Plan



Approximate position of property



## Enquiry Boundary (Approximate)







**Aerial Photograph Extract (Courtesy of Google)**



**Street View Images (Courtesy of Google – from North to South)**







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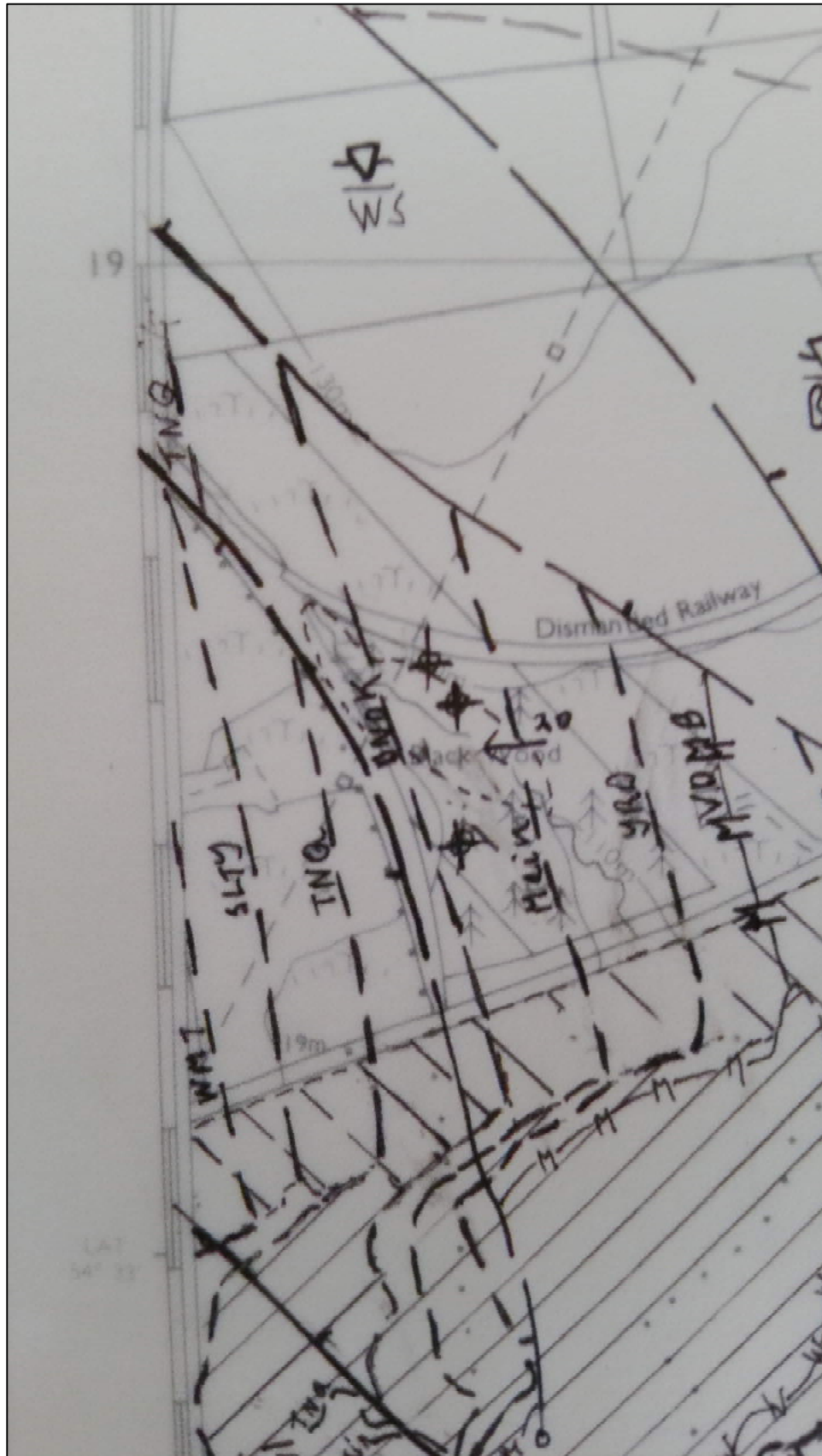
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**Geological Plan Extracts**



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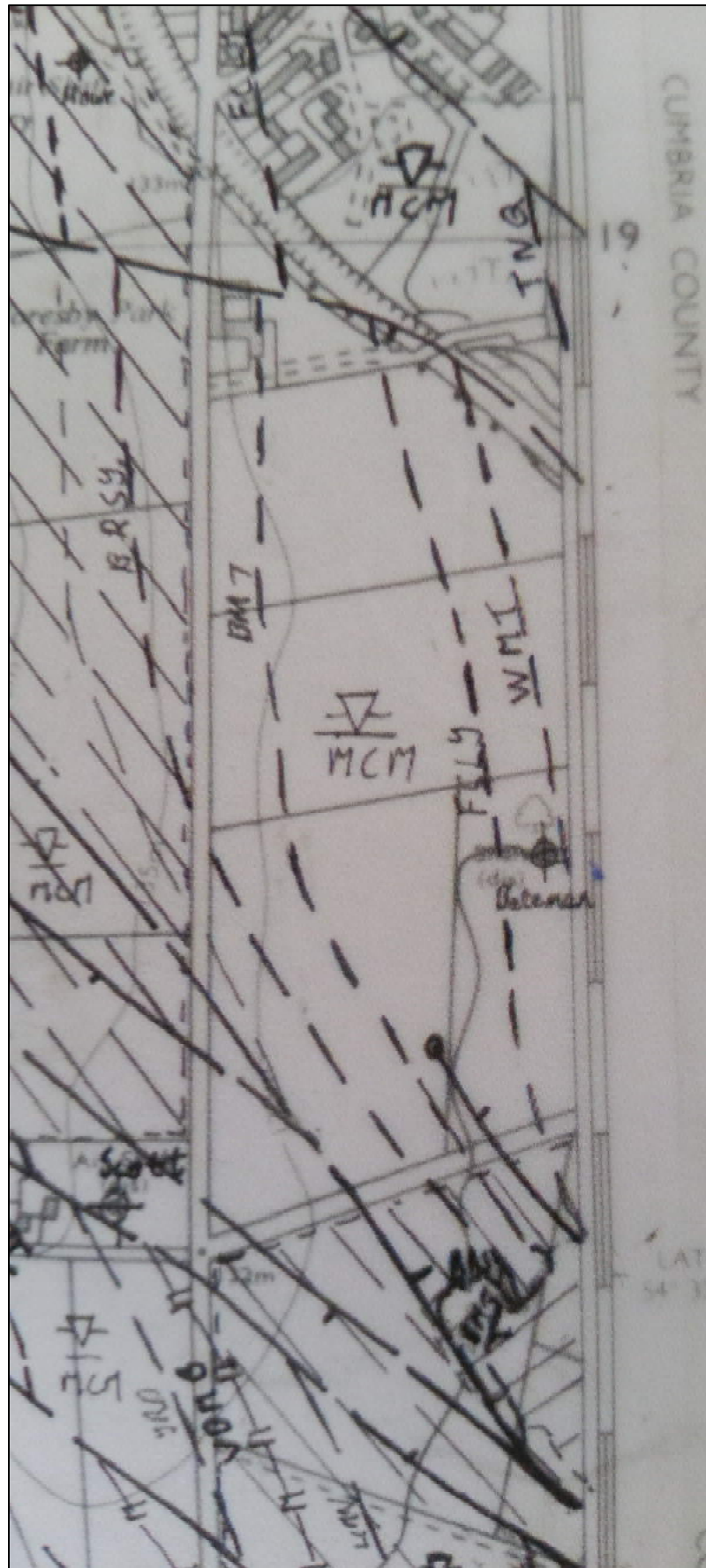
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Telephone: 08456 768 895



## Coal Authority Consultants Report Extracts



**Issued by:**

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG  
Website: [www.groundstability.com](http://www.groundstability.com) Phone: 0345 762 6848

**ESKDALE ENVIRONMENTAL  
SERVICES LTD  
METAL BRIDGE  
ROAD LEADING TO METAL BRIDGE  
FROM FLORISTON RIGG  
BLACKFORD  
CARLISLE  
CA6 4HG**

Our reference: 51001181728001  
Your reference: ESKDALE / PJ  
Date of your enquiry: 10 June 2016  
Date we received your enquiry: 10 June 2016  
Date of issue: 10 June 2016  
Grid Reference: 299980 518640

This report is for the property described in the address below and the attached plan.

### Non-Residential Coal Mining Consultants Report

**WHITEHAVEN COMMERCIAL PARK, WHITEHAVEN, WHITEHAVEN, CUMBRIA**

This report is based on and limited to the records held by the Coal Authority, at the time we answer the search.

#### Past underground mining

| COLLIERY | SEAM | MINERAL | PANEL | DEPTH (m) | DIRECTION TO WORKING | DISPOSITION | EXTRACTION THICKNESS (cm) | YEAR |
|----------|------|---------|-------|-----------|----------------------|-------------|---------------------------|------|
| unnamed  | MAIN | Coal    | 006M  | 56        | Beneath Property     | 0.0         | 182                       | 1961 |

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Non-Residential Coal Mining Consultants Report - 51001181728001

Page 1 of 5

| COLLIERY | SEAM         | MINERAL | PANEL | DEPTH (m) | DIRECTION TO WORKING | DISPOSITION | EXTRACTION THICKNESS (cm) | YEAR |
|----------|--------------|---------|-------|-----------|----------------------|-------------|---------------------------|------|
| unnamed  | SIX QUARTERS | Coal    | 009M  | 122       | Beneath Property     | 0.0         | 137                       | 1950 |
| unnamed  | SIX QUARTERS | Coal    | 009L  | 133       | SE                   | 0.1         | 137                       | 1950 |

#### Probable unrecorded shallow workings

None.

#### Outcrops

No outcrops recorded.

#### Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

#### Future underground mining

No future mining recorded.

#### Licence details (AOR)

No AOR recorded.

#### Section 46 notices

No current notification.



## Geology

Faults under or close to the property recorded.

## Mine entries

| ENTRY TYPE | REFERENCE | GRID<br>REFERENCE | TREATMENT DESCRIPTION | MINERAL | CONVEYANCE DETAILS |
|------------|-----------|-------------------|-----------------------|---------|--------------------|
|------------|-----------|-------------------|-----------------------|---------|--------------------|

| ENTRY TYPE | REFERENCE  | GRID<br>REFERENCE | TREATMENT DESCRIPTION   | MINERAL | CONVEYANCE DETAILS |
|------------|------------|-------------------|---|---------|--------------------|
| Shaft      | 299518-017 | 299982 518586     | The shaft was treated by Bingham Yates and Partners Consulting Engineers in 1992 on behalf of the developers. The previous shaft fill was totally grouted and a reinforced concrete cap was formed some 4.0m below ground level. The cap consists of a 5.6m <sup>2</sup> x 450mm thick slab with top and bottom T20 reinforcement bars in both directions at 200mm centres. | Coal    |                    |
| Shaft      | 300518-001 | 300149 518719     | Shaft filled to an unknown specification during 1957.   | Coal    |                    |
| Shaft      | 300518-003 | 300200 518690     | Shaft filled to an unknown specification prior to 1957.   | Coal    |                    |
| Shaft      | 300518-004 | 300134 518595     |   | Coal    |                    |
| Shaft      | 300518-002 | 300138 518677     | Shaft filled to an unknown specification prior to 1957.   | Coal    |                    |

## Court orders

No court orders recorded.

## Worked out opencast sites

No worked out opencast site recorded.

## Coal mining related hazards

No coal mining related hazard recorded.

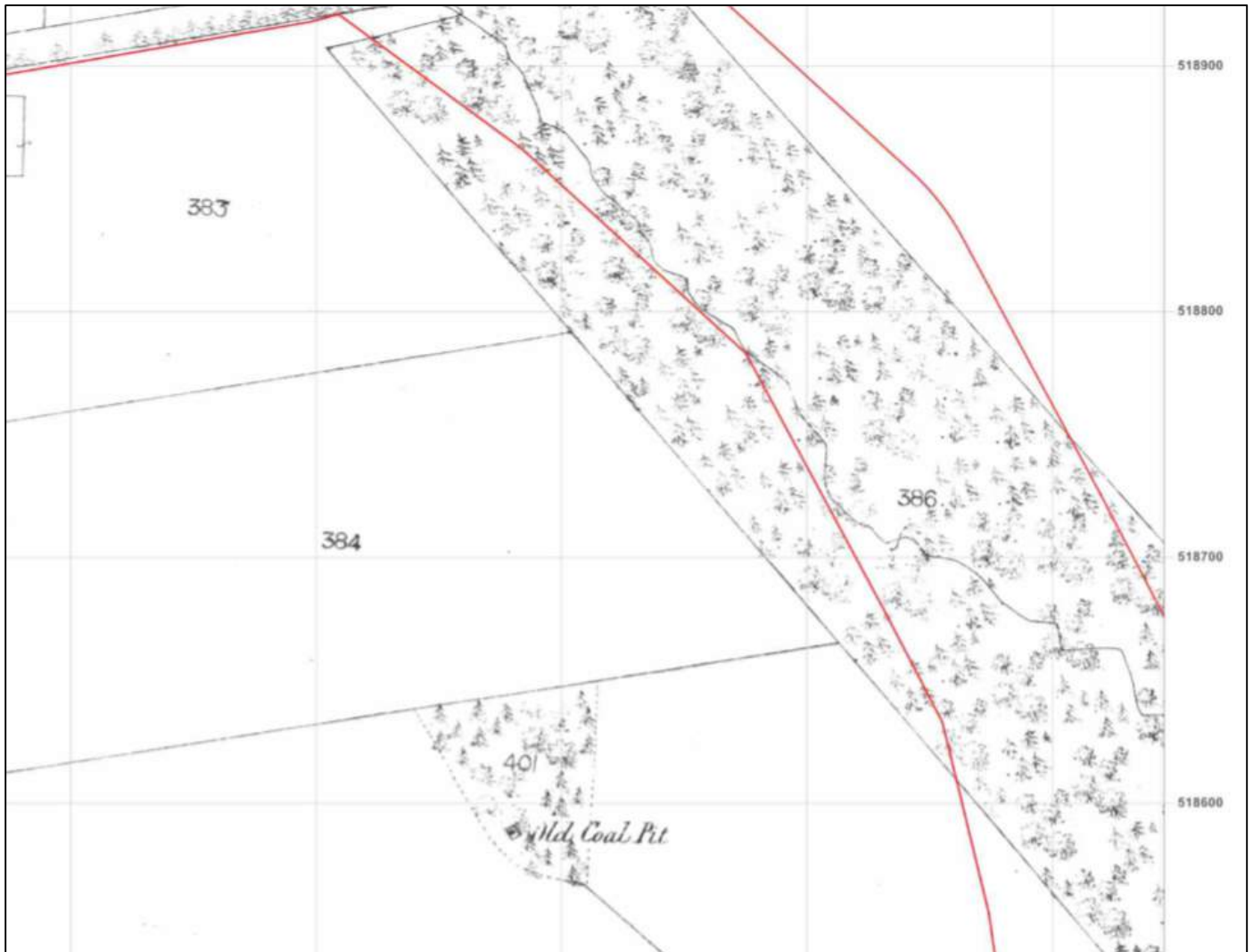
## Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st 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.



**Historical Map Extracts**

1862





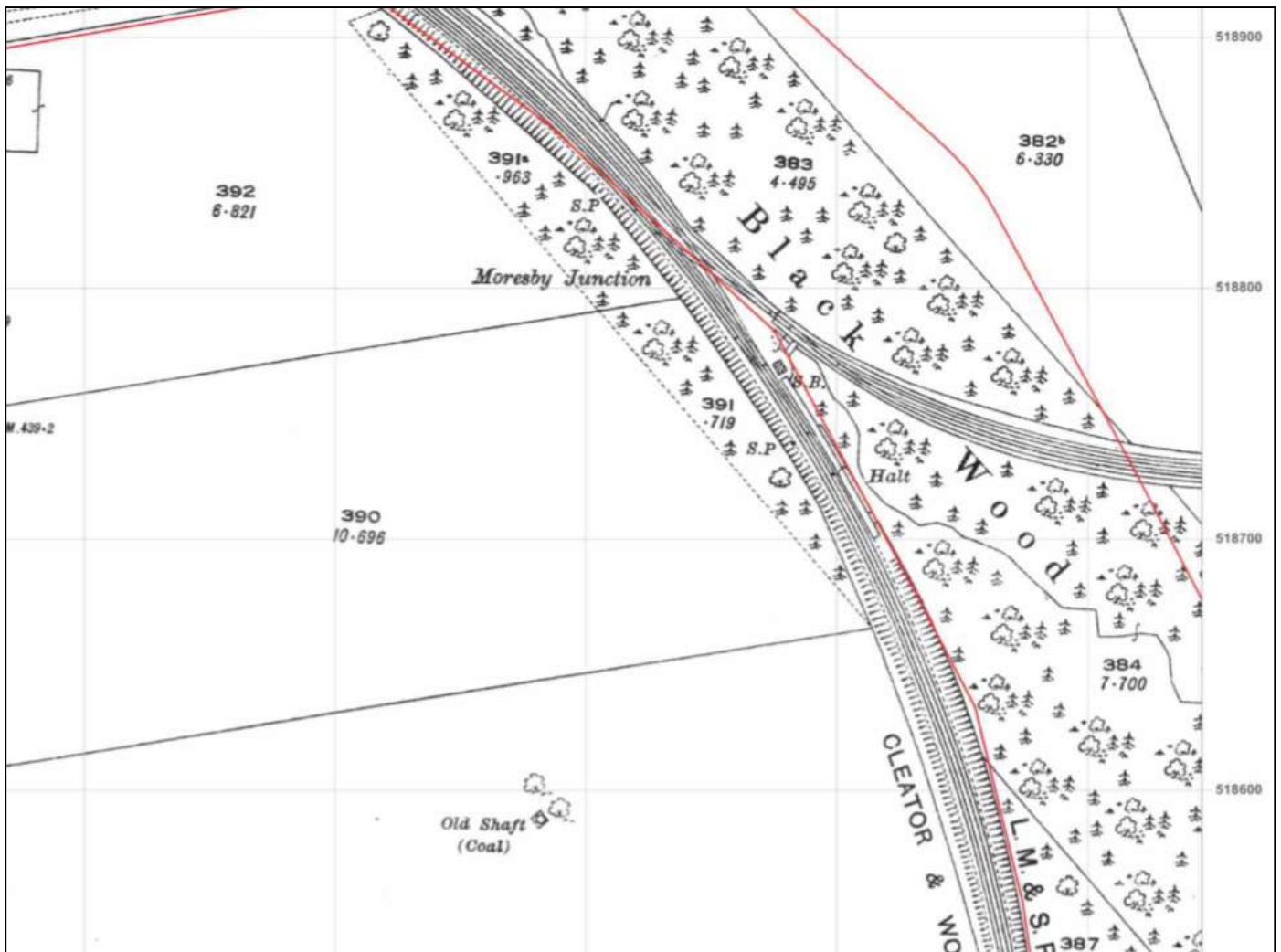


1899



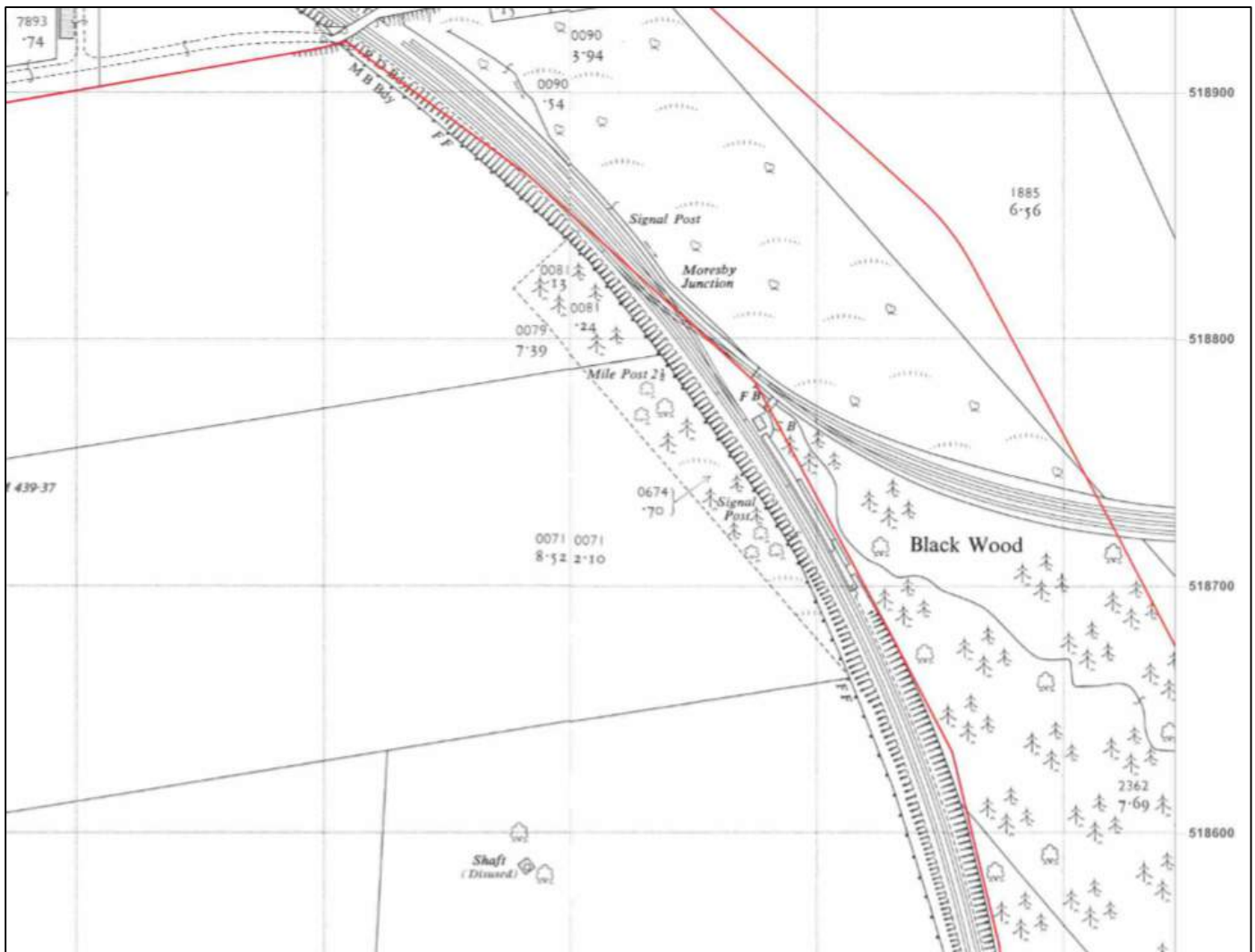


1925





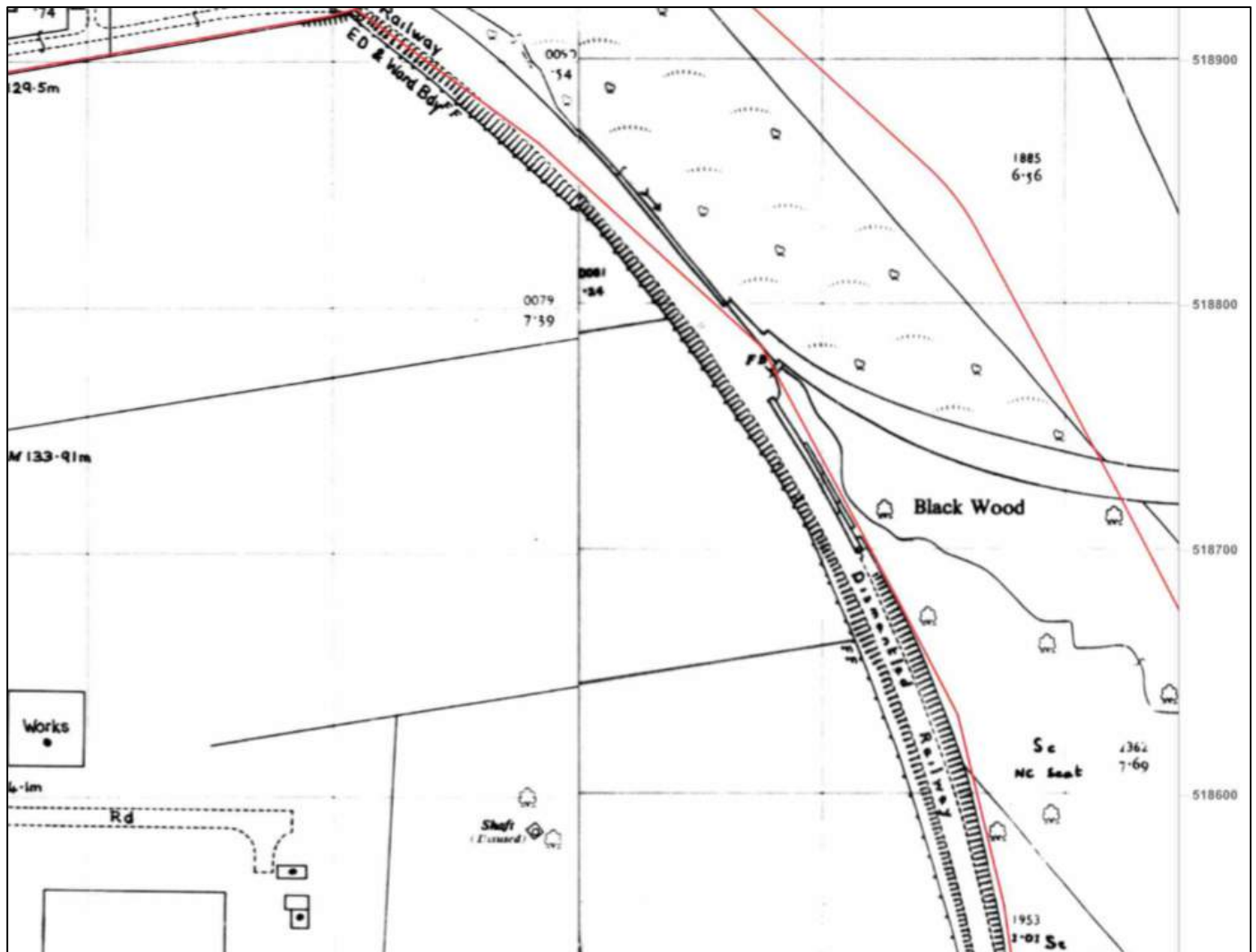
1960





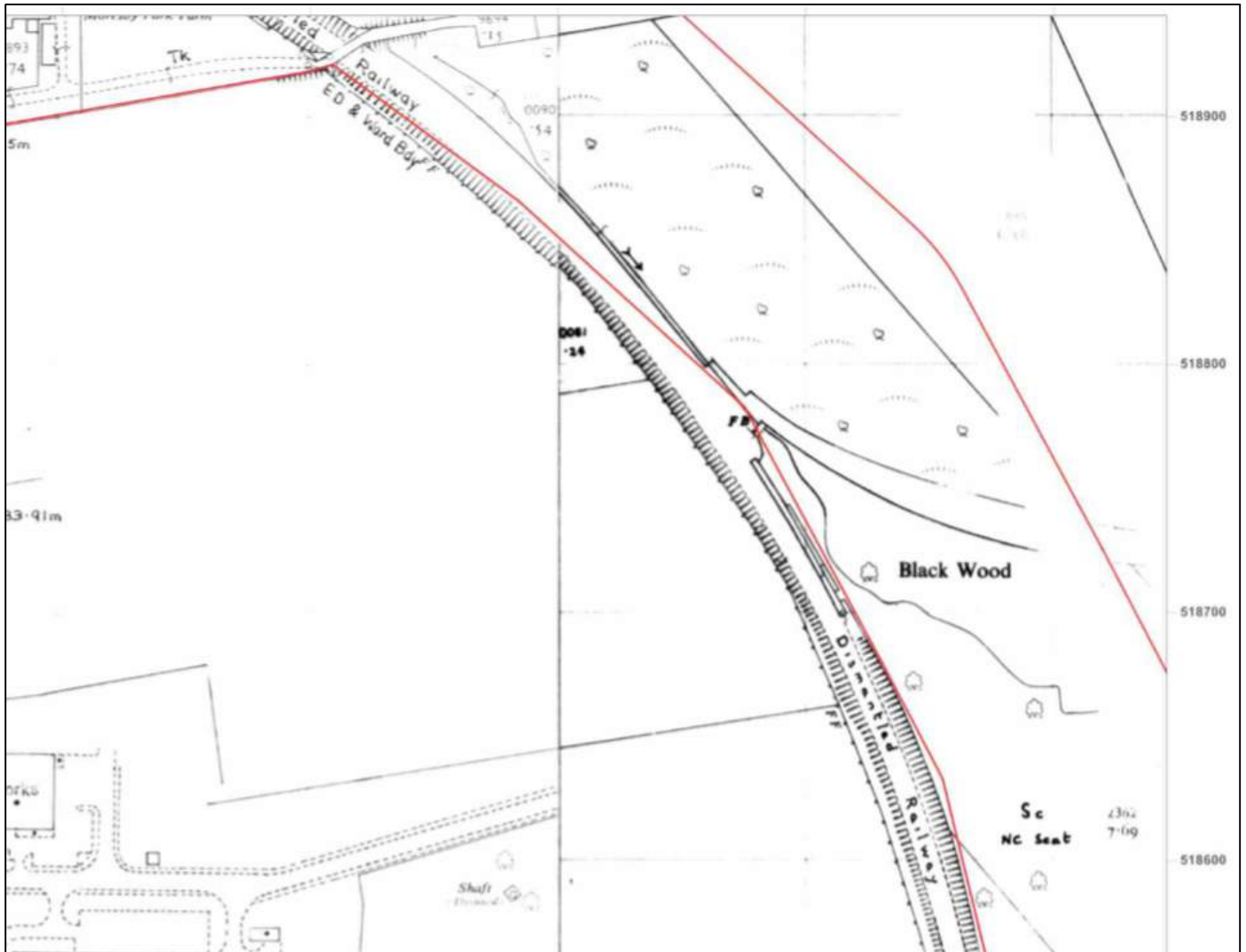


1985



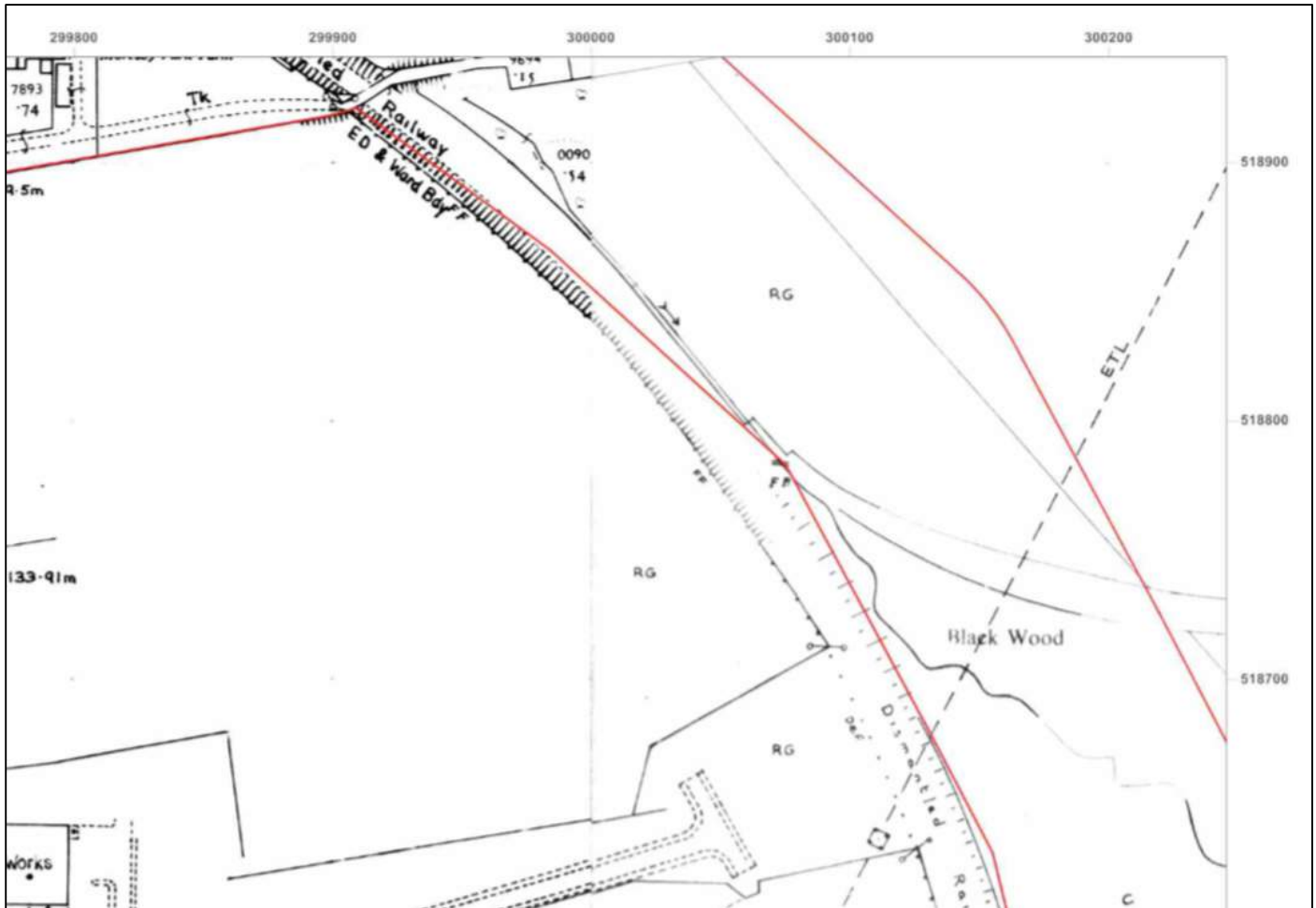


1989



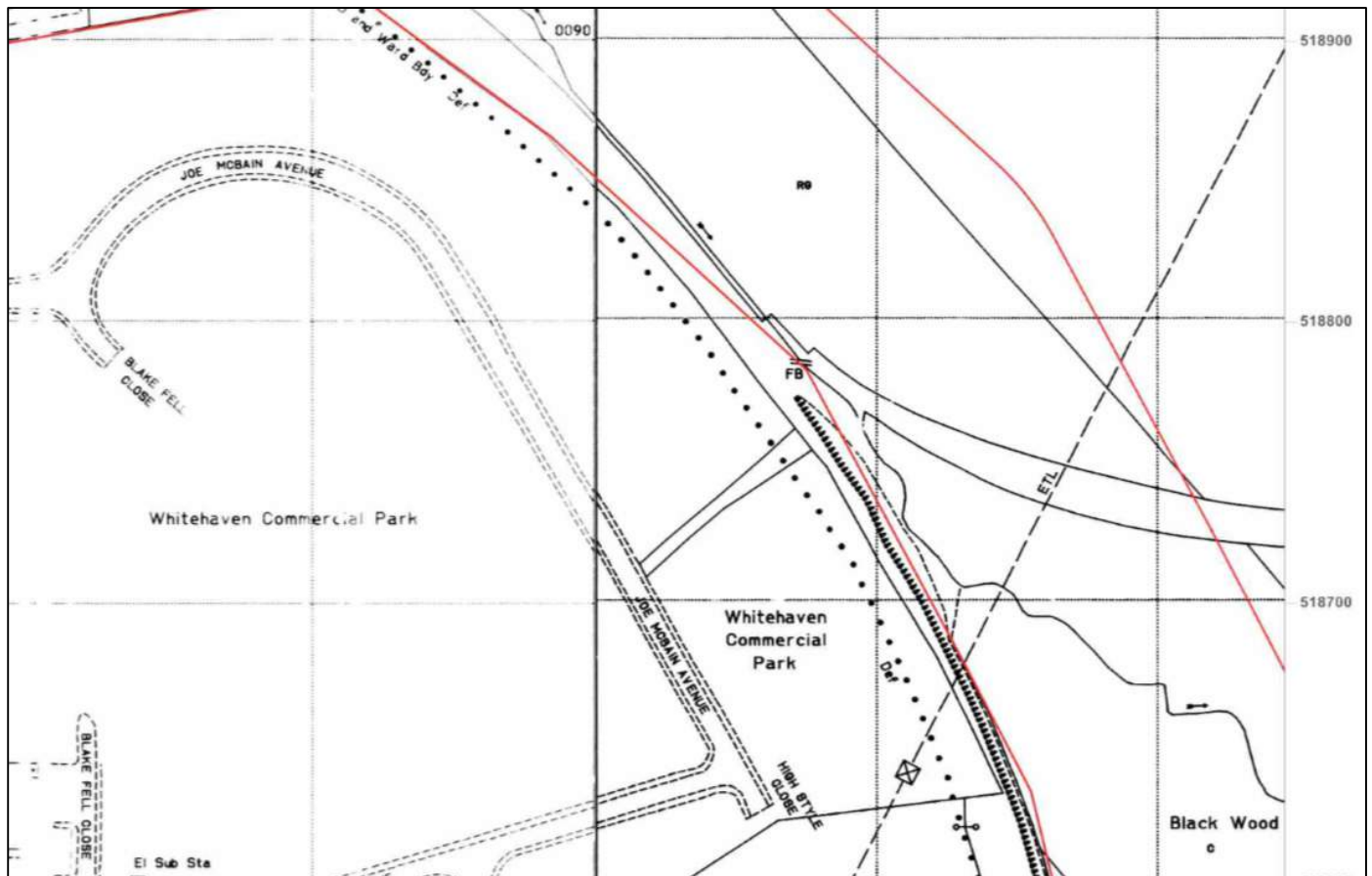


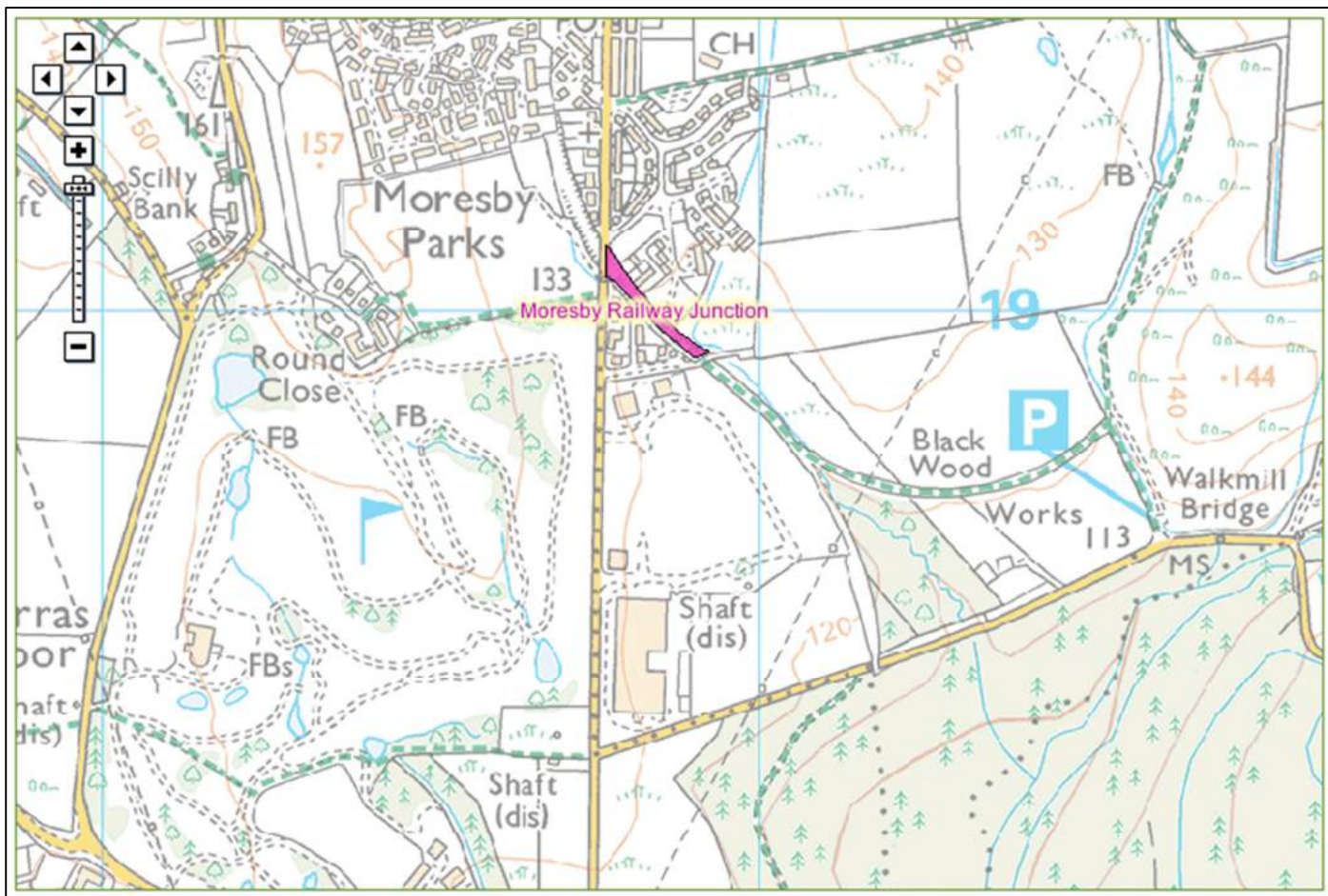
1991





1994



**GEO****Environmental Engineering****Environment Agency Landfill Information****Site details**

|               |                           |
|---------------|---------------------------|
| Site name     | Moresby Railway Junction  |
| Site address  | Moresby Parks, Whitehaven |
| Site operator | Thomas Milburn Limited    |
| Licence no.   | 0                         |

**Types of waste buried:**

A 'Yes' is shown in the right hand box where there is evidence that the type of waste may have been buried. If there is no evidence or no data currently available, then the box is left blank.

**Inert:**

Waste which remains largely unaltered once buried such as glass, concrete, bricks, tiles, soil and stones.

Yes

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Email: [info@geoenvironmentalengineering.com](mailto:info@geoenvironmentalengineering.com)

Telephone: 08456 768 895



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**End of Report**

**Website:** [www.geoenvironmentalengineering.com](http://www.geoenvironmentalengineering.com)

**Email:** [info@geoenvironmentalengineering.com](mailto:info@geoenvironmentalengineering.com)

**Telephone:** 08456 768 895