Meridian Geoscience Ltd

99 Serpentine Road
Kendal
Cumbria
LA9 4PD

t/f: 01539 741 122
m: 07806 382 563
e: md@meridiangeoscience.co.uk

Woodhouse - Low Road, Whitehaven

Coal Mining Risk Assessment

Astime Properties Ltd

Registered in England and Wales
3247879

Contents

Figures

Appendices

1 Introduction

1.1 Terms of Reference

1.1.1 At the request of Astime Properties Ltd, a coal mining risk assessment has been undertaken for a proposed housing development site located adjacent to Low Road in Whitehaven.

1.1.2 The report has been prepared in accordance with planning policy guidance for development sites within referral areas. The report provides the local planning authority with information on coal mining and an assessment of its impact on land stability following the identification of shafts and shallow mineworkings associated with the extraction of coal from the Main Band coal seam.

1.1.3 The report also follows the general guidance notes issued by the Coal Authority which describe the purpose and scope of the coal mining risk assessment as follows:

- desktop review of available up to date site specific information.
- identify and assess the risks to the proposed development.
- set out a mitigation strategy.
- demonstrate to the planning authority that the site can be made safe and stable.

2 Site Description

2.1 General

2.1.1 The site forms a broadly triangular shaped plot (apex to south) of approximately 8.0 hectares. It is located on the west side of Low Road, approximately 1.8 km south of Whitehaven town centre. The site is bounded by the cemetery to the north and by Woodhouse Road to the south-west (Figure 1). The national grid reference of the site is NX 975 163, and the postcode for a nearby property on Low Road is CA28 9HU.

2.1.2 The site includes three parcels of land comprising two larger plots to the east and west and a smaller plot to the south. The eastern plot is referred to here as the Low Road site and covers an area of 3.4 hectares where there is a proposal for 114 dwellings. The western plot is referred to here as the Woodhouse Road site and is 3.67 hectares with a development plan for 110 dwellings. The southern plot is an unnamed plot of

approximately 0.8 hectares (Figure 2). These three sub plots are identified on Copeland Borough Council's Strategic Housing Land Availability Assessment as plots S007, S060 and S287.

2.1.3 Phase 1 Contaminated Land Desk Studies have previously been prepared by Meridian Geoscience Ltd for both the Low Road and Woodhouse Road sites. For the purposes of this report, the three parcels of land are together referred to as Woodhouse - Low Road.

2.2 Low Road Site

2.2.1 The Low Road site is unoccupied and supports a scrub vegetation of grasses with small trees and shrubs. There are remnants of former occupation of the site including tarmac footpaths and some small brick structures and tiled floors. The lower parts of the site were, at the time of the site visit, waterlogged with some areas of standing water. There is some minor fly-tipping on an access path at the south end of the site. Ground levels across the central and eastern parts of the site are fairly level and stand at an elevation of approximately 40 - 45 m OD, with a lower level plateau in the north-east corner at about 35 m OD. However, along the western side of the site ground levels begin to rise steeply from 45 - 52 m OD. Cutting slopes in the south-west corner of the site indicate that ground levels were locally reduced to accommodate previous developments at the site.

2.3 Woodhouse Road Site

2.3.1 The Woodhouse Road site is unoccupied and supports a scrub vegetation of grasses on the higher land to the west and small trees and shrubs on the lower ground to the east. Ground levels rise steeply from about 45 - 50 m OD on the eastern side to a maximum of approximately 85 m OD on the west side of the site.

2.4 Additional Site

2.4.1 The Additional site forms a small parcel of land at the junction of Low Road and Woodhouse Road. The site is unoccupied, but had in the recent past supported a group of six semi-detached houses, remnants of which include a 2 m high brick retaining wall and a concrete paved access road along the east side of the site parallel to Low Road. Ground levels on the east side rise gently from Low Road and form a generally level platform at about 45 m OD but further to the west the land rises steeply

to 70 m OD. Whilst the lower platform is accessible and grassed over, the steeper ground to the west is inaccessible and densely vegetated with small trees and bushes. At the north end of the access road there is steel container with some fly tipping. On the Woodhouse Road side of the site there is a small brick building which is probably associated with gas or electricity supply.

3 Site History

3.1 Historical Maps

3.1.1 Old editions of Ordnance Survey maps at 25 inch (1:2500) and six inch (1:10,560) scales have been examined to check for evidence of mining features, for example collieries, mineshafts and adits. No direct evidence of mining at the site has been identified on maps dating back to 1866.

3.1.2 The earliest map is the six inch scale map of 1866. This shows some collieries in the district, but there are no named mining features at the site. There is however a small wooded enclosure about 10 - 15 m square which is close to the boundary of the Woodhouse Road site and the Additional site, and is in the vicinity of two mineshaft locations that are recorded on the geological map and the Coal Authority reports (Figure 3).

3.1.3 Generally, the maps show the eastern half of the site to have been developed since the late 1800s with a workhouse and associated infirmary. This is most clearly shown on the 1:2500 map of 1925, and extract of which is included as Figure 4.

3.1.4 The six inch map of 1938 shows three pairs of semidetached houses at the south end of the Additional site, and later maps indicate that this development was supplemented with what appears to be a group of lockup garages (Figure 5). The houses are still present on the map edition of 2006, but the latest edition of 2013 shows they have been demolished.

3.2 Internet Searches

3.2.1 A report in the Whitehaven News of January 2010 states that the Workhouse had become a long-stay geriatric hospital until it was rendered unsafe in 1954 by subsidence due to old mineworkings. An emergency evacuation was undertaken, but the block for male patients was not affected. The male patients block was adapted to accommodate 31 sick people and was eventually closed in the 1960s.

4 Geology and Mining

4.1 Geological Mapping

4.1.1 The 1:50,000 scale geological map (British Geological Survey 2004) shows the site to be underlain by rocks belonging to the Middle Coal Measures of Carboniferous age. The rock strata on the eastern side of the site are overlain by glacial deposits (mapped as glacial till), but the hillside on the west side of the site is drift free. The glacial deposits form part of a sequence of channel fill deposits which have been deposited in the north-south trending valley to the east of the site. Further information on the solid geology of the site is provided on the 1:10,000 scale geological map which provides the following details.

4.1.2 The Main coal seam crops out along Low Road and dips westwards beneath the site at an angle of approximately 18°. (In terms of access for miners this makes for a very steep gradient of 1 in 3). The Bannock coal seam crops out further up the hillside through the centre of the site. The strata are heavily faulted with the faults mainly aligned north-west to south-east, but in addition, a conjugate north-east to south-west trending fault line is shown to cross the central part of the site. This fault brings younger strata to crop out on its northern side, with the Slaty and Black Metal coal seams shown to crop out along the central northern half of the site, and an unnamed coal seam is shown to crop out further west. The map identifies, in ascending order, the following coal seams cropping out at or near the site; Yard, Main, Bannock, Slaty, Black Metal and unnamed. The Main coal seam is also referred to as the Main Band coal seam. The reports that the Main and Bannock coal seams are up to 4.0 m and 2.5 m thick respectively. An extract of the geological map is shown in Figure 6.

4.1.3 The map identifies two mine shafts in the southern part of the site. Their locations match those given in the Coal Authority reports.

4.1.4 The British Geological Survey's (BGS) website has been checked for archived borehole logs, and this has identified four boreholes drilled on the western side of the site by Newdale Construction Ltd in 1980 to locate mineworkings. However, there is some uncertainty about the actual borehole locations. The website defines the locations with a six figure grid reference, but this is only accurate to 100 m. The location on the borehole logs is identified as 'Meadows View', which is the former Workhouse on the eastern side of the site (the Low Road site). Nevertheless, it is significant to note that voids were identified in one borehole and water flush was lost in two other

boreholes, thus indicating the likely presence of mineworkings. Copies of the borehole logs are included in Appendix A.

4.2 Coal Authority Reports

4.2.1 Coal Authority reports were obtained for the desk studies that were undertaken for the Low Road and Woodhouse Road sites. In order to provide complete site coverage, a further Coal Authority report was obtained for the Additional Site. Copies of the three Coal Authority reports are provided in Appendix B and their findings are summarised below.

4.2.2 All three parts of the site are within the zone of influence of one seam of coal that was last worked in 1900. The depth of workings is 'shallow' to 60 m at the Low Road site, 30 m to 70 m at the Additional Site, and 50 m to 110 m at the Woodhouse Road site. In addition, at the Woodhouse Road site and the Additional Site, there is coal at or close to the surface that may have been worked (i.e. possibility of unrecorded workings).

4.2.3 The Coal Authority reports make reference to two mine shafts located in the south of the site close to the junction of the three site sub areas. These are the same shaft locations that are shown on the geological map (Figure 6). The national grid references for the mineshafts, measured from the Coal Authority reports, are as follows:

shaft ref 297516-023, 297522E, 516176N

shaft ref 297516-022, 297466E, 516139N

4.3 Abandonment Plans

4.2.1 The mining records office at Mansfield has been visited and a number of mine abandonment plans inspected.

4.2.2 Workings in the Main coal seam are shown on an undated plan of the Whitehaven Colliery under the ownership of the Earl of Lonsdale (catalogue number NW1393 sheet 5 of 5). Although the plan is undated, it is noted that the Earl of Lonsdale's ownership of the mine spanned the period from the 1860s to the 1900s, after which the mine was owned by the Whitehaven Colliery Company. This end date is compatible with the information on the Coal Authority reports which refer to a seam of coal last worked in 1900. It is therefore inferred that the abandonment plan dates from the early 1900s and that the seam of coal referred to in the Coal Authority reports is the Main coal seam.

4.2.3 The plan shows the Main coal seam to have been worked throughout most of the site using the pillar and stall coal extraction method. The extent of the workings is shown on Figure 7. Only a small part of the Low Road site was unworked, and this corresponds quite closely to the lower lying area of ground in the north east corner of the Low Road site. Two shafts are shown on the plan and these may correspond to the shafts shown on the geological map and the Coal Authority reports.

4.2.4. Pillar and stall working is a term used to describe an extraction technique where pillars of coal were left in place to support the roof. The technique is described as follows by Healy and Head (1984) and illustrated on Figure 8:

> 'The pillar and stall method of extraction was an early mining technique which itself replaced bell pit workings. Access to the workings was either through shafts or adits with associated roadways. Unworked pillars were left to support the overburden. This enabled larger quantities of mineral to be extracted through single or pairs of shafts. Initially the pillars were haphazard in size and arrangement, and the rooms were generally quite small. However, more systematic methods developed and intersecting roadways driven in the seams formed pillars of a more uniform size'. After the initial phase of mining it was quite common to partially or totally 'rob' the pillars as a retreating operation to extract more coal.

4.2.5 The abandonment plan indicates that the pillars of coal left in place to support the roof are quite large, and are typically 10 m square. Any exploratory drilling should therefore avoid drilling on a regular grid pattern so as to avoid only intersecting pillars and concluding that no voids are present.

5 Hazard Summary

5.1 Introduction

5.1.1 The four hazards associated with shallow mineworkings are subsidence, roof collapse (leading to crown hole formation), abandoned shafts, and mine gas.

5.1.2 Subsidence in the West Cumberland coal field that is related to the early methods of mining, e.g. pillar and stall, should by now have taken place. Modern mining by long wall working causes subsidence to take place virtually contemporaneously with the extraction of the coal and movement is generally considered to

have ceased a few years after working. However, in this case, subsidence may still be a cause for concern. The former workhouse building was demolished in the 1950s due to subsidence, and this may also have been the reason for demolishing the houses that had been built on the Additional site next to Low Road. In addition, it is noted that the statement normally included about past underground mining on Coal Authority reports that 'any ground movement from these coal workings should have stopped by now' has not been included on the report for the Low Road site.

5.1.3 Roof collapse is the primary closure mechanism applicable to shallow mine workings. The strata overlying the workings may continue to collapse for many years after mining has ceased. The roof often continues to fail until one of three conditions is met: (i) bulking of the collapsed material fills the voids. (ii) a stratum is reached which is strong enough to span the void. (iii) the void reaches ground surface and forms a crown hole. Collapse at the surface can be sudden. As a rule of thumb, further investigation to assess the risks due to shallow mineworkings would normally be required if the workings were within 30 m of the surface.

5.1.4 Mine shafts are present throughout the district. The sites of all *known* shafts and adits are shown on the geological maps and are sometimes recorded on the historical maps. The positions of many old shafts are inadequately documented and as they were commonly only capped at surface levels, they may remain open below, and still present a hazard. Unrecorded shafts may also exist.

5.1.5 Within the West Cumberland Coalfield there are known hazards relating to mine gas. Although no mine gas related deaths have been reported in the area, there have been near misses and associated health problems, particularly in Great Broughton, and the Victoria Road and Frostoms area of Workington. The Coal Authority website identifies four mine gas sites approximately 1 km north of the site. (A mine gas site is a site or property that has either been subject to investigation or remedial works by the Coal Authority to deal with an actual or potential mine gas occurrence). The nearest potential mine gas source features to the site are the two known mineshafts, the coal seam outcrops and the mapped geological faults. The site therefore lies within an area where mine gas investigation and monitoring should be undertaken.

5.2 Site Specific Hazards

5.2.1 There is a risk of subsidence and roof collapse due to recorded workings in the Main coal seam. The extent of the hazard is defined as the area where the coal seam is within 30 m of the ground surface. This therefore includes most of the Low Road part of the site. The Bannock coal seam is approximately 30 m above the Main and hence the outcrop of the Bannock seam helps to identify the western limit of this particular hazard zone.

5.2.2 There is a risk of subsidence and roof collapse due to unrecorded workings in other seams that crop out on the site including the Bannock, Slaty, Black Metal and Unnamed. The eastern side of the hazard zone is defined by the outcrop location, and on the western side by the location at which the seam is estimated to be 30 m below ground level, assuming a dip of 18 degrees.

5.2.3 There is a ground instability hazard associated with two mineshafts that are recorded to have been constructed at the site.

5.2.4 There is a mine gas risk at the site. This is based on the understanding that the Cumberland coalfield is known to be gassy (i.e. there is a known source), in conjunction with the identification of pathways that would permit gas to migrate to the surface, for example mineshafts, seam outcrops and faulted ground in areas without significant cover of superficial deposits.

5.3 Risk Assessment

5.3.1 A risk assessment of the hazards identified in the previous section has been undertaken using one of the techniques described in Clayton (2001) 'Managing Geotechnical Risk'. For each of the four identified hazards, a qualitative assessment of probability has been made, together with an assessment of the impact of the hazard in terms of a scale of cost to rectify the damage. The numbers assigned to the values of 'probability' and 'impact' are multiplied to give a risk rating. Subsidence due to know workings in the Main coal seam have been assessed separately from the subsidence risks due to unknown workings in the other coal seams present at shallow depth on the site. In addition, the subsidence hazards have been assessed separately in terms of the impact on houses, access roads and other paved areas. The risk assessment is presented in Table 1 and its results have been used to devise a mitigation strategy which is described in the following section.

Table 1 **Risk Register**

no.	Hazard	Cause	Probability	Impact	Risk Rating	Consequence
1a	subsidence affecting houses	known workings in Main Band coal seam	probable (3)	high (4)	12	structural failure requiring ground stabilisation or demolition
1b	subsidence affecting access roads		probable (3)	medium (3)	9	structural failure requiring ground stabilisation and rebuild
1c	subsidence affecting other paved areas		probable (3)	low (2)	6	periodic maintenance and or rebuild
2a	subsidence affecting houses	unrecorded workings in other seams	unlikely (2)	high (4)	8	structural failure requiring ground stabilisation or demolition
2b	subsidence affecting access roads		unlikely (2)	medium (3)	6	structural failure requiring ground stabilisation and rebuild
2c	subsidence affecting other paved areas		unlikely (2)	low (2)	4	periodic maintenance and or rebuild
3	collapse/subsidence	mineshafts	unlikely (2)	high (4)	8	possible catastrophic collapse requiring ground stabilisation and capping
4	explosion	mine gas	unlikely (2)	high (4)	8	structural damage, personal injury or death

Notes

Risk Rating = Probability x Impact

Classification of Probability

5	very likely
4	likely
3	probable
2	unlikely
1	negligible

Classification of Impact

		possible cost impact	possible time impact
5	very high	> £1m	> 10 weeks on completion
4	high	100k to £1m	> 1 week on completion
3	medium	10k to 100k	> 4 weeks on activity, < 1 week on completion
2	low	1k to 10k	1 – 4 weeks on activity
1	very low	<1,000	< 1 week on activity

6 Mitigation Strategy

6.1 The risk assessment has identified three main hazards affecting the development site, viz: subsidence, mineshaft collapse and mine gas.

6.2 In relation to subsidence, the site has been divided into three zones. The highest risk areas are underlain at shallow depth by the Main coal seam, and these areas should be considered for ground stabilisation. The medium risk areas are underlain by the Bannock coal seam where it is unclear if mineworkings are present. It is recommended therefore that investigations be undertaken to determine ground stabilisation requirements. The lowest risk area is in the north-east corner of the site which lies below the Main coal seam. It is unlikely to be undermined at shallow depth and it is therefore unlikely that treatment would be required for this area. The western quarter of the site may also prove to be a low risk area where no treatment is required. The site zonation is illustrated in Figure 9.

6.3 The site zonation is based largely on current geological mapping. This appears to show that a fault drops the elevation of the Main coal seam out of the zone of influence across the north-western half of the site. However, the mine abandonment plan shows continuous workings in the Main coal seam with no indication of the fault shown on the geological map. Therefore, owing to the uncertainty in delineating these zones, ground investigations may be required to check the validity of the site zonation. It should be noted that grid patterns of exploration should be avoided to prevent inadvertent matching of the borehole layout with the pillar and stall coal extraction layout.

6.4 The two mineshafts present a development hazard. One option is to establish an exclusion zone around the mineshafts and leave the area undeveloped. Alternatively, in order to maximise the developable area, the mineshafts can be positively identified and capped. This will require clearance of the vegetation to improve access, a local geophysical survey to identify suitable targets for investigation, and exploratory excavation to identify the shafts. The mineshafts should then be backfilled and capped in accordance with current guidance (eg CIRIA 32 and its recent replacement CIRIA RP940).

6.5 All developments should incorporate a gas proof membrane.

7 Conclusions

7.1 The proposed development site occupies an 8 hectare plot 1.8km south of Whitehaven. The site is bounded by Low Road to the east, Woodhouse road to the south-west and a cemetery to the north. It is proposed to develop the site for housing.

7.2 Three mining related risks have been identified:

(i) subsidence due shallow mineworkings
(ii) two mineshafts within the boundary of the site with no known treatment or stabilisation
(iii) site-wide mine gas hazard.

7.3 The risk of subsidence varies across the site. The highest risk area is across the central eastern part of the site. This area is underlain at shallow depth by the Main coal seam which is known to have been worked by pillar and stall extraction techniques. Unrecorded workings may have taken place in other coal seams, and where these lie within influencing distance of the surface defines an area of medium risk. Low risk areas lie in the north east corner of the site and probably along the western boundary of the site.

7.4 A graded response to the subsidence risk can be devised with ground stabilisation for high risk areas, further investigations to determine stabilisation requirements for medium risk areas, and low risk areas designated as a no treatment zone.

7.5 The site zonation is based on geological mapping which is not necessarily definitive. A ground investigation can therefore be undertaken to check the validity of the hazard mapping.

7.6 Two options have been identified for the mineshaft hazard. One option is to establish an exclusion zone around the mineshafts and leave the area undeveloped. Alternatively, in order to maximise the developable area, the mineshafts can be positively identified and capped. This could be achieved with a combination of techniques including ground clearance (de-veg), geophysical surveys, and exploratory excavations. The mineshafts could then be backfilled and capped in accordance with current guidance.

7.7 All developments should incorporate a gas proof membrane.

7.8 Prior written permission from the Coal Authority is required for intrusive activities which will disturb or enter any coal seams, coal mine workings or coal mine entries (shafts and adits).

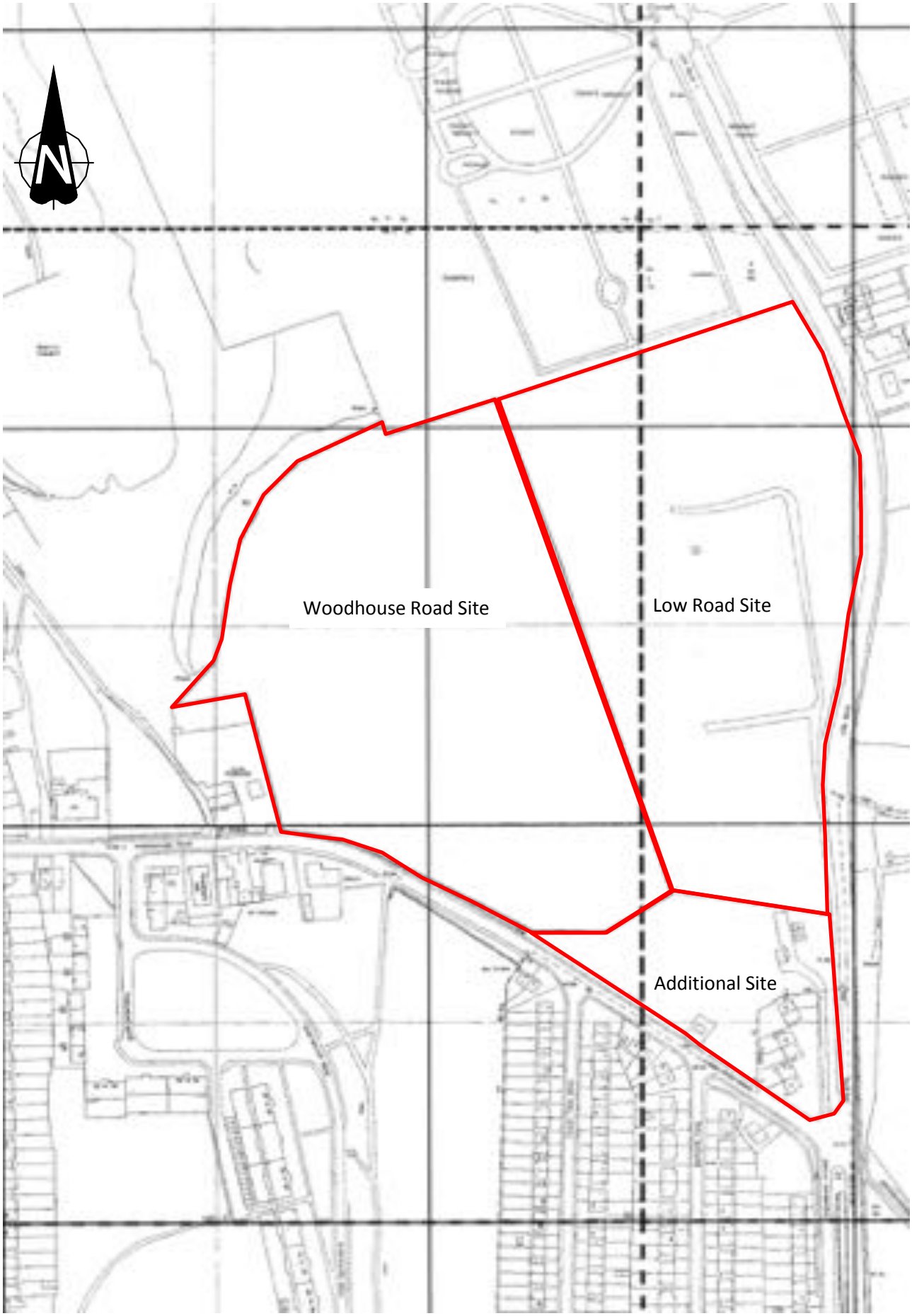
For and on behalf of Meridian Geoscience Ltd
26 September 2014

Richard Lote
BSc, MSc, FGS, CGeol

Figures

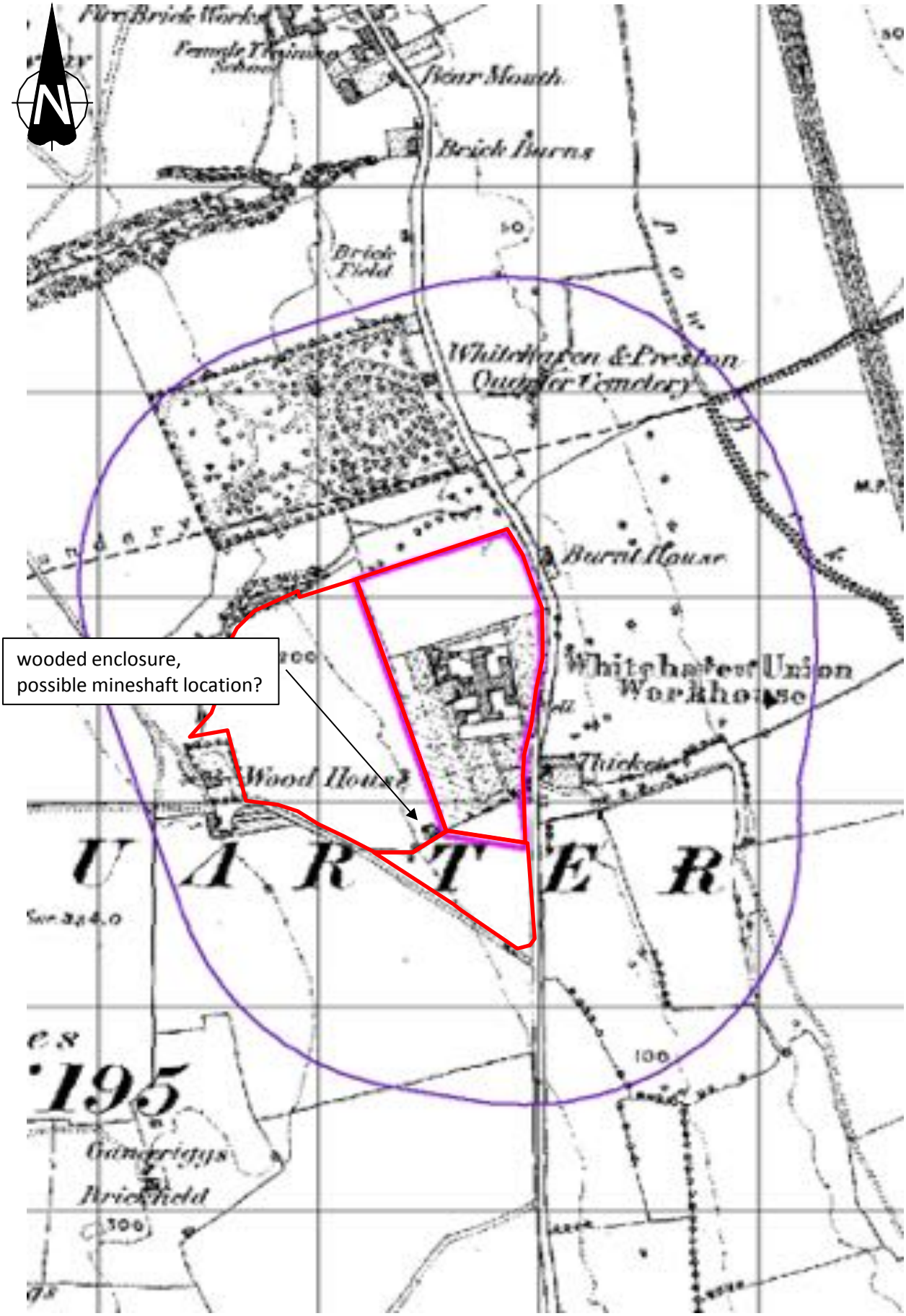
meridian GEOSCIENCE

project	Woodhouse - Low Road, Whitehaven	scheme	1042
client	Astime Properties Ltd	scale	nts
drawing	Site Location Map	**figure**	**1**

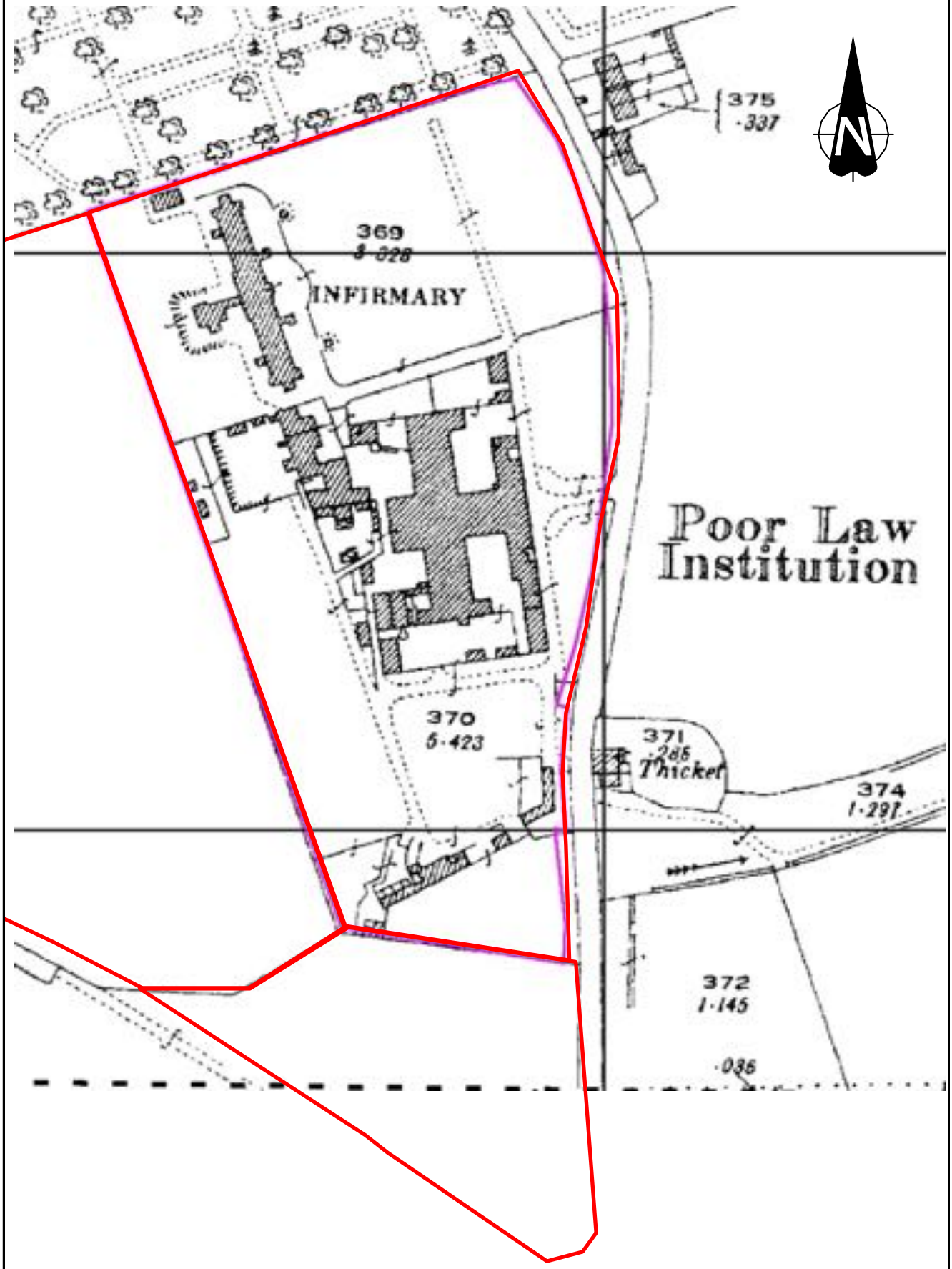


meridian GEOSCIENCE

project	Woodhouse - Low Road, Whitehaven	scheme	1042
client	Astime Properties Ltd	scale	nts
drawing	Site Plan	**figure**	**2**



meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Historical Map 1867	**figure 3**



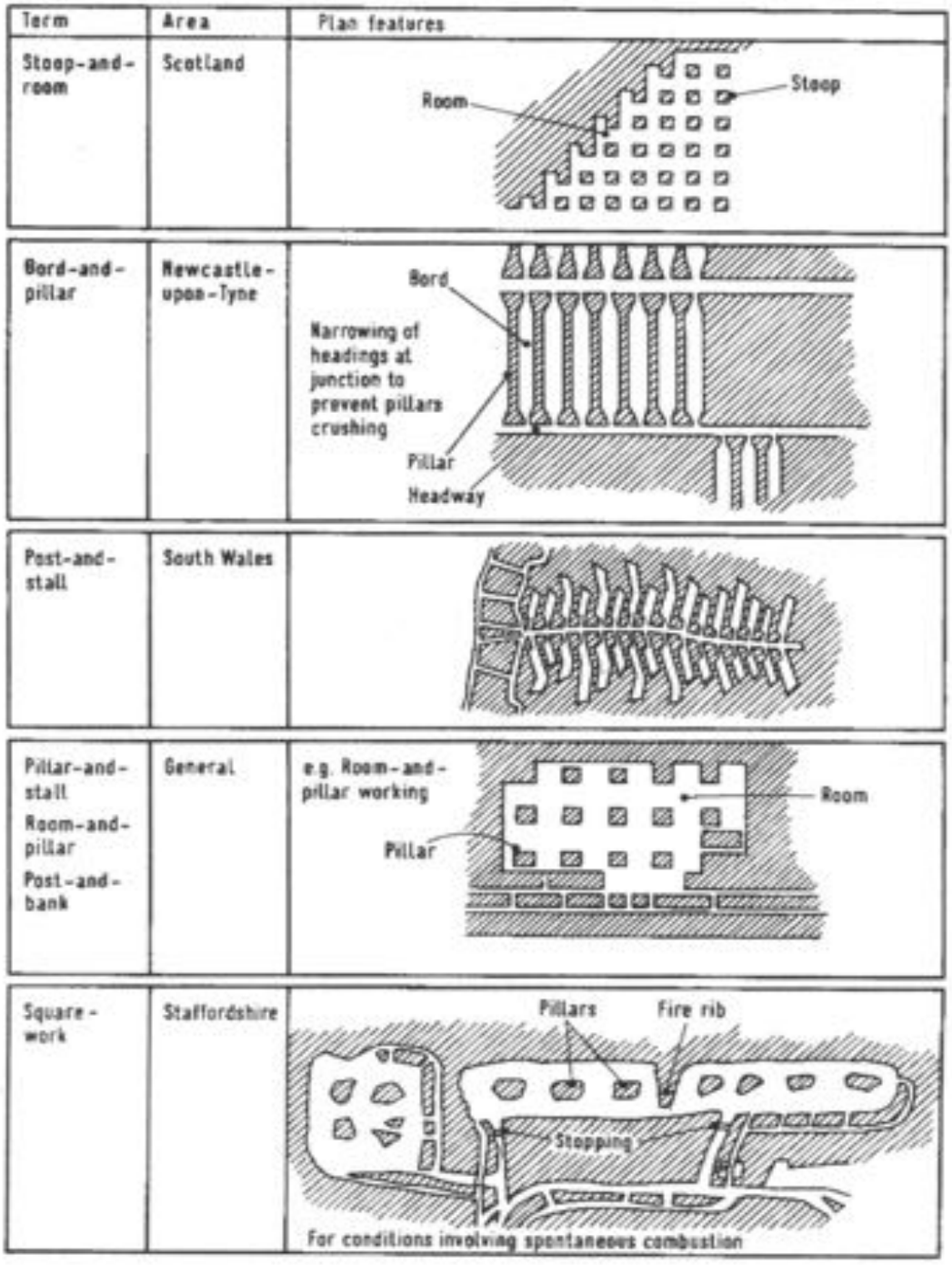
meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Historical Map 1925	**figure 4**

meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Historical Map 1994	**figure 5**

meridian GEOSCIENCE

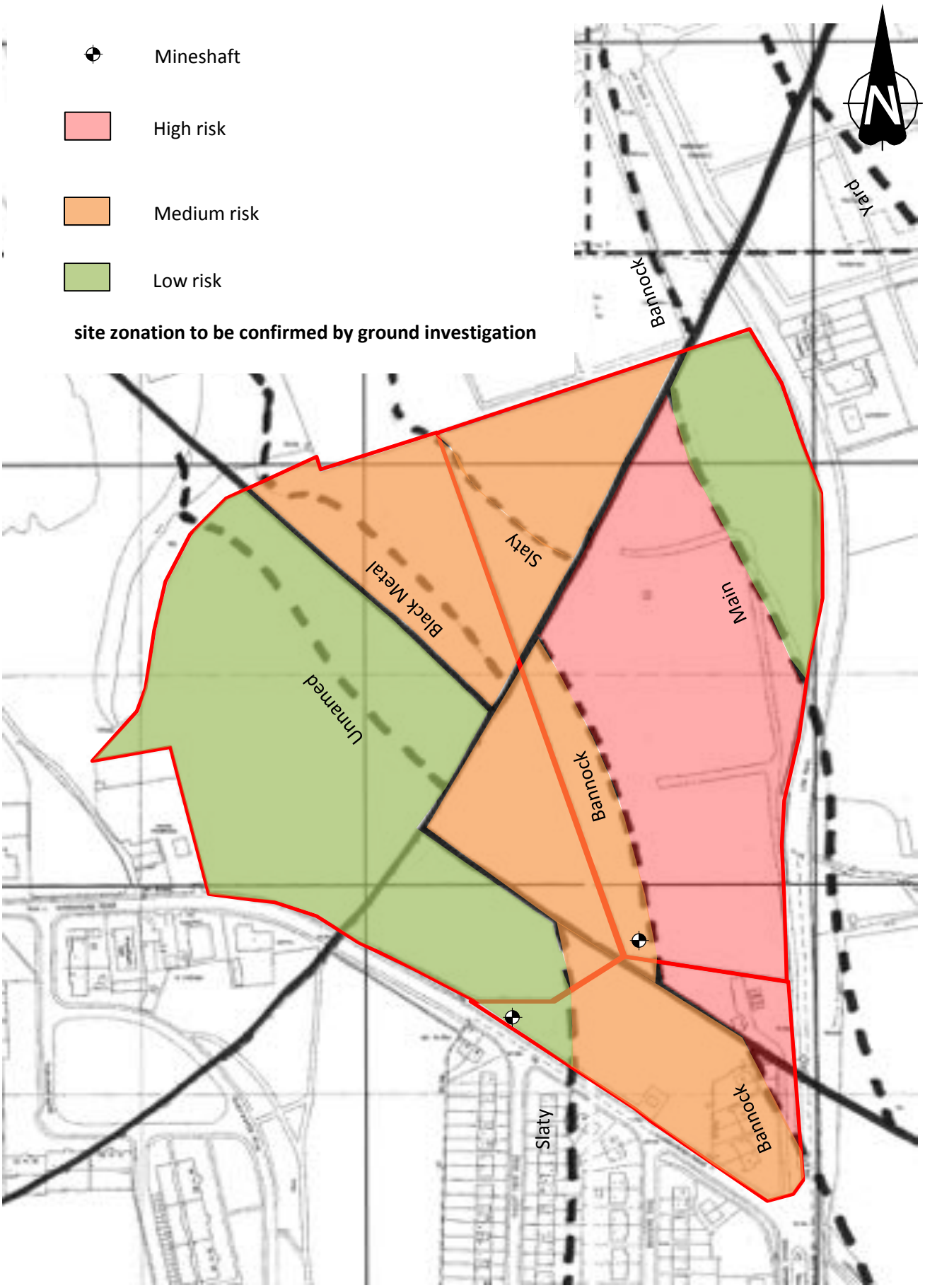
project	Woodhouse - Low Road, Whitehaven	scheme	1042
client	Astime Properties Ltd	scale	nts
drawing	Geological Map	**figure**	**6**

meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Abandonmnet Plan (Main Seam)	**figure 7**



Extract from Healy and Head (1984) showing variations on the theme of pillar and stall workings

meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Pillar and Stall workings	**figure 8**



meridian GEOSCIENCE	project	Woodhouse - Low Road, Whitehaven	scheme 1042
	client	Astime Properties Ltd	scale nts
	drawing	Site Zonation	**figure 9**

Appendix A

Borehole Logs (BGS Archive)

BGS ID: 819849 : BGS Reference: NX91NE82
British National Grid (27700) : 297305,516295

29/9A.

For Institute use only

Geological Classification	NATURE OF STRATA (If measurements start below ground surface, state how far.)	Thickness Feet	Thickness Inches	Thickness Meters	Depth Feet	Depth Inches	Depth Meters
	Needale Construction Co. No.1 6/6/80						
	Soil	2	6		2	6	
Diluvium Boulder Clay	Yellow Clay	4	0		6	6	
	Grey Clay	2	0		8	6	
	Brown Clay	4	6		13	0	
Westphalian probably high — Westphalian B	Sandstone	2	0		15	0	
	Grey Shale	1	0		16	0	
	Dark Grey Shale & thin beds of Sandstone	25	0		41	0	
	Fireclay	1	0		42	0	
	Coal	2	3		44	3	
	Fireclay	1	0		45	3	
	Fireclay with harder bands	2	9		48	0	
	Brown Sandstone with shale beds	27	0		75	0	
	No voids. Lost circulation at 44 ft.						
	Water level on completion 44 ft.						
pp. 3.G.O. sheet 10/2/82							

For Institute use only

NATURE OF STRATA — NX 91 NE/82

If measurements start below ground surface, state how far.

Rewdale Construction Co. No.2 4/6/80

Meadow View(Centre hole)

Westphalian: probably high in Westphalian "B"

Geological Classification	Nature of Strata	Thickness Feet	Thickness Inches	Thickness Metres	Depth Feet	Depth Inches	Depth Metres
	Soil		9			9	
	Yellow Clay	7	3		8	0	
	Brown Clay	2	6		10	6	
	Grey Shale	17	0		27	6	
	Brown Sandstone with shale beds	27	6		55	0	
	Mudstone	5	0		60	0	
	Coal	2	9		62	9	
	Grey Fireclay	2	3		65	0	
	Sandstone	8	6		73	6	

No voids. Lost circulation at 60ft.

Water level on completion 62ft.

SE 91 NE/82

For Institute use only

Geological Classification	NATURE OF STRATA	Thickness			Depth		
	If measurements start below ground surface, state how far.	Feet	Inches	Metres	Feet	Inches	Metres
	Rowdale Construction Co. No.3 30/6/80 (nearest Cemetery)						
	Soil	1	6		1	6	
Westphalian:	Yellow Clay	2	0		3	6	
probably high in	Stiff Brown Clay	7	0		10	6	
Westphalian 'B'	Grey Clay	3	6		14	0	
	Sandstone with shale beds	31	0		45	0	
	VOID	2	0		47	0	
	Soft Clay	1	0		48	0	
JfoS 18/2/80	Fireclay	5	0		53	0	
	Sandstone	5	0		58	0	
	Lost water at 45 ft. Water level on completion 47 ft.						

Geological Classification	NATURE OF STRATA *If measurements start below ground surface, state how far.*	Thickness			Depth		
		Feet	Inches	Metres	Feet	Inches	Metres
	Newdale Construction Co. No.4 30/6/60						
	Soil	1	6		1	6	
	Yellow Clay	2	6		4	0	
	Sandstone & shale on thin beds	6	0		10	0	
	Dark Shale with thin beds of sandstone	4	0		14	0	
	Coal	1	3		15	3	
	Fireclay		6		15	9	
	Grey Shale	29	3		45	0	
	Sandstone with thin beds of Grey Shale	25	0		70	0	
	No voids. No loss of circulation.						

Appendix B

Coal Authority Reports

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

LANDMARK INFORMATION GROUP LIMITED
SOWTON INDUSTRIAL ESTATE
ABBEY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY

Our reference:	**51000456980001**
Your reference:	**52929281_2|**
Date of your enquiry:	**03 February 2014**
Date we received your enquiry:	**03 February 2014**
Date of issue:	**03 February 2014**

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

Non-Residential Coal Authority Mining Report

SITE AT LOW ROAD, WHITEHAVEN, CUMBRIA,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 1 seam of coal at shallow to 60m depth, and last worked in 1900.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

Within, or within 20 metres of, the boundary of the property there is 1 mine entry, the approximate position of which is shown on the attached plan.

There is no record of what steps, if any, have been taken to treat the mine entry.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie. for development sites and new build).

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

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 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

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

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

Comments on Coal Authority information

The attached plan shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848 or online at www.coal.decc.gov.uk/en/coal/cms/services/claims.

If you wish to discuss the relevance of any of the information contained in this report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are normally available at our Mansfield office, free of charge, by prior appointment, telephone 01623 637235. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006.

Location map

Approximate position of property

Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

Mapping sourced from Ordnance Survey

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

LANDMARK INFORMATION GROUP LIMITED
SOWTON INDUSTRIAL ESTATE
ABBEY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY

Our reference:	**51000457025001**
Your reference:	**52929693_2|**
Date of your enquiry:	**03 February 2014**
Date we received your enquiry:	**03 February 2014**
Date of issue:	**03 February 2014**

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

Non-Residential Coal Authority Mining Report

LAND OFF WOODHOUSE ROAD,, WHITEHAVEN, CUMBRIA,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 1 seam of coal at 50m to 110m depth, and last worked in 1900.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

Within, or within 20 metres of, the boundary of the property there are 2 mine entries, the approximate positions of which are shown on the attached plan.

There is no record of what steps, if any, have been taken to treat the mine entries.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie. for development sites and new build).

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

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 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

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

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

Comments on Coal Authority information

The attached plan shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848 or online at www.coal.decc.gov.uk/en/coal/cms/services/claims.

If you wish to discuss the relevance of any of the information contained in this report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are normally available at our Mansfield office, free of charge, by prior appointment, telephone 01623 637235. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the

public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006.

Location map

Approximate position of property

Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

LANDMARK INFORMATION GROUP LIMITED
SOWTON INDUSTRIAL ESTATE
ABBEY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY

Our reference:	**51000573906001**
Your reference:	**58040949_1|**
Date of your enquiry:	**07 July 2014**
Date we received your enquiry:	**07 July 2014**
Date of issue:	**07 July 2014**

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

Non-Residential Coal Authority Mining Report

LAND ADJACENT TO LOW ROAD, WHITEHAVEN, CUMBRIA,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 1 seam of coal at 30m to 70m depth, and last worked in 1900.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on Coal Authority Information section of the report.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

Within, or within 20 metres of, the boundary of the property there are 2 mine entries, the approximate positions of which are shown on the attached plan.

There is no record of what steps, if any, have been taken to treat the mine entries.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie. for development sites and new build).

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

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 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

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

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

Comments on Coal Authority information

The attached plan shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848 or online at www.coal.decc.gov.uk/en/coal/cms/services/claims.

If you wish to discuss the relevance of any of the information contained in this report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are normally available at our Mansfield office, free of charge, by prior appointment, telephone 01623 637235. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be

aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

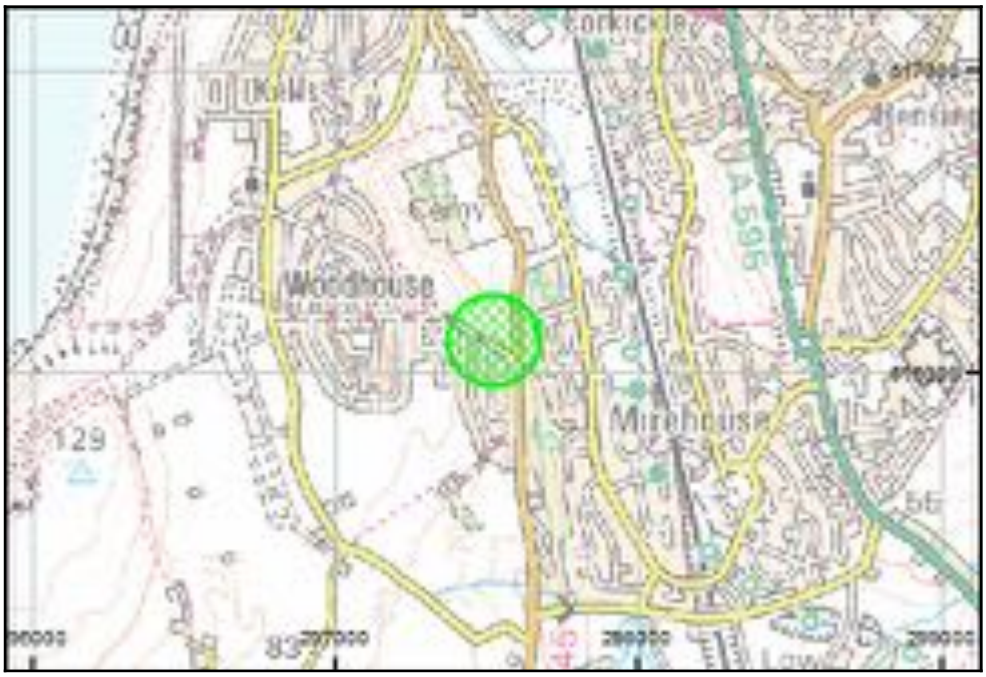
The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006.

Location map

Approximate position of property



Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

Mapping sourced from Ordnance Survey