



GEOLOGICAL
GEOTECHNICAL
GEOENVIRONMENTAL
DATA AQUISITION
CONSULTANCY



Coal Mining Risk Assessment

LOCATION	New house at Plot 4 (adjacent to the Gate Inn and house No 75) Chapel Road, Pilley, Tankersley, Barnsley, S75 3AR
ISSUE DATE	31 st August 2017
FOR	Josiephine Oates
CLIENT REF.	
OUR REF.	G17364

Prepared by

A handwritten signature in black ink, appearing to read "Ross Nicolson".

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

1. INTRODUCTION

Name of Applicant: Josiephine Oates

Issuing Company: Geoinvestigate Ltd, Units 4 & 5, Terry Dicken Industrial Estate, Stokesley, North Yorkshire TS9 7AE

Competent Person: Ross Nicolson BSc (Hons.) Eng. Geol., MSc Eng., CEng IOM³ - Principal Geotechnical Engineer

Site Location and Description:

The boundary shown in red on the Coal Authority report provided in Appendix A corresponds with the planning application. The new house is to be erected on Plot 4 adjacent to the former Gate Inn and an existing detached next-door property - No 75 Chapel Road.

National Grid Reference SE 33361 00725 denotes the approximate position within the plot where the new building is to be erected. The plot is a 50m long x 11m wide strip on the north side of the Gate Inn and was formerly part of the inn's grounds. Google Satellite and Street View show the site comprises two small masonry outbuildings, hardstanding and overgrown rear lawn. The two buildings and a section of an off-shoot of the main inn building will be demolished to make space for the new development. The Gate Inn has been derelict since before 2009. A tree is present within the footprint of the new building which will be erected in line with the adjacent existing properties and therefore closer to the main road than the rear of the plot. Three modern detached houses are present immediately to the north of the site.

Ground level at the site lies at an elevation of about 164m AOD.

A review of historical OS maps dating back to 1855 describes the pub as the "Old Gate Inn". A row of houses (possibly miner's or farm labourer's cottages) is present to the north of the inn. The earliest maps show the Pilley Hills Colliery to the west of the site and several ironstone pits/workings close by to the west and northwest of the development.

The old housing row to the north of the site was removed sometime between 1961 and 1978 and replaced with three modern detached houses between 1978 and 1982.

The map record provided no evidence that the development site has itself been subject to surface mining activity though historical ironstone working occurred close by both to the west and north of the site.

Description & Layout of Proposed Development:

It is proposed to erect a detached house on the plot more or less in line with the existing properties on either side. 2 small out buildings and a section of the existing inn will be demolished to make space for the new building.

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.

Scope of the Coal Mining Risk Assessment

The purpose of this Coal Mining Risk Assessment Report is to:

- Present a desk-based review of selected items of available information reviewed on the coal mining issues which are relevant to the application site;

- Use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary further intrusive site investigation works and/or remedial works and/or demonstrate how coal mining issues have influenced the proposed development;
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

2. SOURCES OF INFORMATION USED TO INFORM THIS REPORT

The following sources of information have been used and form the basis of the risk assessment of coal mining issues provided in this report. Relevant reports/extracts have been appended.

- An up-to-date Coal Mining Report from the CA dated 24th August 2017 referenced 51001603973001.
- Geological information on the bedrock and superficial geology obtained from the British Geological Survey (BGS) Sheet 87 Barnsley at 1:50000 scale.
- The Coal Authority's online interactive map viewer.
- A site history based on limited Ordnance Survey map records of the area dating back to 1855.
- Historic borehole logs obtained from the BGS archive.
- Google Street View and Satellite images.

3. IDENTIFICATION AND ASSESSMENT OF SITE SPECIFIC COAL MINING ISSUES

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

Coal Mining Issues	Yes	No	Risk Assessment/Remarks
Past underground coal mining	Yes		The CA report in Appendix A lists mine workings in 6 seams of ironstone and coal at depths ranging from 26m to 245m beneath the property. The shallowest or highest of these is the Tankersley Ironstone (I/S) with an extraction thickness of 100 cms. Working of 1.00m thickness at a depth of 26m would not normally be expected to affect surface stability providing there is in this case > 10m of rock cover. Whether the site meets this requirement needs to be assessed further in this report.
Probable unrecorded shallow workings	Yes		The CAs interactive map viewer confirms that the site falls within an area of Probable shallow coal mine working. The CA define Probable Workings as underground workings for which no recorded plan exists but where IT IS LIKELY that workable coal at shallow depths HAS BEEN MINED before records were kept. Consequently the possible occurrence of shallow coal mine working beneath the development requires further consideration in this report.
Outcrops		No	No. The CAs interactive map viewer shows coal outcrop occurs to the west and east of the site but not within it.
Spine roadways at shallow depth		No	None recorded
Future underground mining		No	None recorded
License details (AOR)		No	None recorded
Section 46 notices		No	None recorded
Geology		No	No faults, fissures or breaklines recorded
Mine entries	Yes	No	Only one ironstone shaft (433400-014) is shown very close to or ON the far northwest rear corner boundary of the site. Alternatively it is possible that this shaft may lie within the rear

			site boundary. There is no treatment information on this shaft. As the new house lies >20m from the shaft coordinates provided in the CA report this mine shaft would not be expected to impact the stability of the new building. However, this will need to be assessed further in the report. Several other ironstone shafts are shown in the vicinity of the site. Of these only 433400-008 lies some 20m to the east of the site boundary and around 25m from the east end of the new building. Chapel Road lies between shaft 008 and the development site.
Court orders		No	None recorded
Worked out opencast sites		No	None recorded.
Coal mining related hazards		No	None recorded
Coal mining subsidence		No	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, 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 preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Note For those coal mining issues above identified as “yes” a more detailed discussion and assessment should be made of the risks, both individually and cumulatively, to the application site and the proposed development.

DETAILED DISCUSSION & ASSESSMENT RESPONSE

1. The Coal Authority’s interactive map viewer shows the site falls within a Development High Risk Area (DHRA) raising serious concern about ground instability arising from mine workings and hazardous mine gases as well as other potential coal legacy hazards.
2. The CA report in Appendix A states that the site is underlain by mine workings in the Tankersley Ironstone (TI) at a depth of 26m. The extraction thickness of the seam was 1m
3. The extract of the CA map viewer presented in Appendix B show the site falls within an area where there has been PROBABLE shallow coal mine working.
4. *The CA define Probable Workings as underground workings for which no recorded plan exists but where **IT IS LIKELY** that workable coal at shallow depths **HAS BEEN MINED** before records were kept.*
5. The location of the site is shown on the extract of BGS geology map Sheet 87 Barnsley presented in Appendix C.
6. The tentative elevation of the site relative to the vertical geology column is shown on the map inset.
7. CA mining panel information records dip and dip direction of 4.2 & 5.9 degs to dir. 051 & 055 degs or NE respectively.
8. There are no BGS boreholes in the near vicinity of the site that might assist in shedding light on the coal and ironstone mining geology beneath it.
9. Borehole log SE30SW/103 some 600m to the ENE of the site records drift/soil to 1.37m depth followed by shale and mudstone bedrock. Log 103 is not included in this report.
10. Bedrock within the site would be expected to lie at similar or greater depth than Log 103.
11. Assuming bedrock lies at or close to surface then > 10 x seam thickness of rock cover would exist above the Tankersley (TI) ironstone workings which occur at 26m below the site. Such appreciable thickness of rock cover would be sufficient to safeguard surface development within the site against upward void migration and crown-hole formation. Consequently, workings in the TI seam are unlikely to significantly impact surface stability within the development site.
12. The vertical geology column indicates that the Joan (J) Coal seam (of 0 to 1.4m thickness) may lie some 13m above the Tankersley Ironstone. Therefore if workings exist in the J coal seam they might lie at only 13m below the surface in which case they may impact the stability of the new development.

13. Because of this drilling will be required to establish the depth of coal seam beneath the site and whether this coal contains mine workings.
14. Drilling should also confirm the depth of mine working within the TI seam expected at 26m
15. It is our opinion therefore that shallow mine working poses significant surface stability risk to the proposed development and further investigation is required to resolve this uncertainty.
16. Hazardous gases associated with coal seams and underground coal workings are unlikely to pose a significant risk to the development in this instance because firstly typically across the UK coalfields gas is rarely a problem, secondly with regard to this property there is no record of a site-specific gas problem and thirdly there is no geological faulting beneath the site which might otherwise provide a favourable pathway for gas migration to the surface.
17. However, because workings may exist in coal at very shallow or shallow depth below the site and a major geological fault, the Tankersley Fault, occurs a short distance to the east of the site it is our opinion that the gas risk should be raised from Low to Moderate until proven otherwise by drilling and gas monitoring.
18. No mine entries are recorded by the CA within 20m distance of the new house.
19. Ironstone mine shaft (433400-014) is shown in the CA report ON or very close to the sites far northwest corner boundary. The position of shaft 014 shown in Appendix D has been plotted using an online grid reference finding service using the CA coordinates provided. In this instance, the shaft appears to be located within the Plot 4 though there may be some inaccuracy in the position of the site boundary and therefore this position is tentative only.
20. However, assuming the position of shaft 014 to be reasonably reliable then the new building would lie >20m from the shaft in which case given that bedrock is expected to be shallow at the site the stability of the new building is unlikely to be impacted by shaft 014.
21. The client may or may not wish to confirm if shaft 014 lies within the rear of the property and if it does what is its condition and does it pose a hazard in this garden setting. Alternatively, the rear of the garden could be fenced-off using the existing rear boundary line shown on the satellite image (assuming it still exists) to mitigate this potential hazard.
22. Excavation would be required to locate the mine shaft assuming it lies within the curtilage of Plot 4 and assuming that it can be found. This is not always the case as mine entries can be elusive and in some instances not even present because either they never existed in the first place or their position is wrong because of errors or inaccuracies in the records. The latter is not an uncommon.
23. Shaft 008 to the east of the site and Chapel Road is unlikely to impact the new building because it lies > 20m from the new building and is outwith the property.
24. The risk of additional or other mine entries occurring within the site is considered by us to be LOW but not negligible. If an additional mine entry/s are found during subsequent investigations of the site or during construction groundworks the appropriate remedial action can be taken then including notifying the Coal Authority.
25. **In light of the foregoing this CMRA desk study has shown that there are potentially significant coal mining stability and mine gas hazards to the proposed development.**
26. **Consequently, further exploratory coal legacy drilling and gas monitoring and perhaps other mitigation measures may be required to properly assess the safety of this site and make it safe.**
27. **Consideration needs to be given to whether the client wishes to confirm if shaft 014 lies within the far NW corner of the rear garden of Plot 4 and if so whether this shaft poses a hazard in a garden setting.**
28. **Excavation by either trenching or a localised site strip would be required to locate the shaft or to confirm its absence.**
29. **Assuming bedrock is confirmed to lie at or near surface in Plot 4, shaft 014 will not impact the stability of the new house.**

4. MITIGATION STRATEGY PROPOSED

Notes This section is the key part of the Coal Mining Risk Assessment Report. It should explain how the coal mining issues have influenced the proposed layout and design of the development. The mitigation strategy will set out and illustrate with plans where necessary how the on-site issues identified in section 3 will be dealt with to ensure safety

and stability of the development. This should include the assessment of mine gas and the necessary mitigation measures required as necessary. You may wish to refer to the Construction Industry Research and Information Association (CIRIA) publication Special Publication 32 "Construction over Abandoned Mine Workings"

Where the desk-based assessment cannot conclude with certainty the extent of the coal mining risks on the site; details of further proposed on-site intrusive investigation works should be set out.

However, it is of paramount importance that this does not simply evade the issue and therefore place the Local Planning Authority in a position where it cannot be satisfied that coal mining legacy could give rise to some doubt that planning permission could not be granted.

MITIGATION RESPONSE

1. To properly determine the coal mining risk at this site it is proposed to drill boreholes to target depths up to 30m (but not necessarily reaching 30m) to locate possible coal and ironstone mine workings beneath the development site.
2. Borehole depths will be subject to adjustment by the supervising Competent Person on-site and depending on the geological conditions encountered (namely depth to rockhead, seam thickness and ratio of rock cover to seam thickness) found during drilling and therefore may be terminated less than 30m.
3. A minimum of three boreholes is required in the vicinity of the new buildings.
4. The main purpose of the borehole investigation is to confirm the possible presence shallow coal and ironstone seams beneath the site and if present to establish whether these seams contain mine workings.
5. If mine shafts are found during the intrusive site exploration works or during the subsequent construction groundworks the appropriate remedial action can be taken then. In addition the CA should be notified.
6. If mine workings are clearly confirmed to be absent, or beyond an influencing depth of the surface development it is unlikely that ground treatment/stabilisation by injection grouting or special foundation design measures will be required in respect of coal mining legacy.
7. The requirement for gas protection measures and the level of gas protection will be determined by a risk assessment based on a source - pathway - receptor model. This will depend on the gas concentrations found during coal legacy drilling together with the configuration of the site geology - particularly the nature and thickness of the drift/soil cover and the presence (or potential) for fissures or other pathways to exist.
8. Localised site strip or trenching at close spacing will be required if an attempt is to be made to locate shaft 014 in the far northwest corner of the rear garden though it is possible that this shaft may not be found by such effort or it may occur outside the plot in the neighbouring field.
9. A **Coal Authority Permit** must be obtained prior to the commencement of drilling at this site. The permit would need to include any excavation or trenching works carried out to locate mine shaft 014.
10. A risk assessment has been carried out in the section below (**The Coal Authority Permit**) for the exploratory site drilling works. In accordance with the RA drilling must be carried out using **small volume water injection flush** as this carries Low or Negligible risk of causing explosion or creating, releasing or causing hazardous gases to move upwards into nearby occupied housing and buildings. Gas monitoring must be carried out during drilling and boreholes must be sealed at the end of drilling.
11. The drilling flush used at this site MUST be that that stated in this CMRA - namely WATER and no other.
12. The drilling contractor/site manager should be warned that the CA operate permit compliance checks on drill sites and that a change in drilling fluid may be a breach of contract and may be liable to prosecution.
13. A 2nd specialist report will required on the findings of the coal drilling investigation finalising the scope of the mitigation measures needed (if any) to safeguard the development from coal mining related ground instability and hazardous gases.
14. **On the basis of the work to date, we are of the opinion that the mining stability risks posed by the strata beneath this site from coal mining legacy can be mitigated by routinely adopted measures and should not preclude the planning permission being registered.**

The Coal Authority Permit

Note The report should state whether enquiries have been made or will be made; whether a permit application has been submitted or if a permit has already been obtained from the Coal Authority for the mitigation and/or further site investigation works.

RESPONSE

A Coal Authority Permit needs to be obtained for further intrusive exploratory drilling works (as recommended above) which will disturb or enter any coal seams or coal mine workings present beneath the site.

Drilling Risk Assessment

In order to obtain a permit a coal drilling risk assessment has been carried out in accordance with Section 6 of CA publication: “Guidance on Managing the Risk of Hazardous Gases when Drilling, or Piling near Coal” which deals with the risks posed by various drill flushing mediums and different drilling Scenarios or Situations.

Situation Assessed: The site has been assessed to fall within “Unworked coal or coal workings; High or UNKNOWN risk of hazardous gases being created/ generated; Occupied property within risk area”. Therefore it is concluded that an Undetermined/Unknown hazardous gas risk exists at this site. In accordance with Table 6.2.7 Water Flush falls within Low risk while Air, Mist and Foam flush all fall within High & High to Medium risk categories respectively. In this situation water flush is by far the safest drilling medium available and should ONLY be used.

6.2.7 Table of Risks for Different Drilling Scenarios						
Situation	Air flush	Mist flush	Foam flush	Water flush	Mud flush	Additional controls
- Unworked coal or coal workings - High or unknown risk of hazardous gases being present / created - Occupied property within risk area	HIGH	HIGH / MED'M	HIGH / MED'M	LOW	LOW	- Monitoring at rig and other open holes. - Seal boreholes as soon as possible.

Air, Mist and Foam flush are much less safe than water or mud.

Outcome: For safer drilling small volume water injection drill flush is should ONLY be used. The stipulation in this instance of water flush only for exploratory drilling accords with the CA’s own internally managed and licensed safe exploratory coal drilling protocol.

Drill Flush to be used when drilling: Permit application must state WATER only, as mud though safe is too messy.

Other precautions: Gas monitoring to be carried out during drilling. Boreholes to be sealed as soon as possible.

5. CONCLUSION

Notes The Coal Authority would expect the Coal Mining Risk Assessment Report to conclude with a brief summary of risks and the remedial measures required for the proposed development site. The report should demonstrate a clear strategy for addressing the coal mining legacy and how the requirements of national planning policy with regard to development on unstable land have been addressed.

OUR RESPONSE

The Coal Authority have identified this site as falling within a Development High Risk Area (DHRA) where there is potentially a serious risk to surface development from mining related ground instability and hazardous mine gases arising from past coal mining legacy.

Ironstone mine working of 1m thickness has been identified by the CA at a depth of 26m. Providing as anticipated bedrock lies at or close to surface within the site the presence of such working at this depth should not impact the stability of the new building.

The site is identified by the Coal Authority as one where there is PROBABLE shallow coal mine working.

The CA define Probable Workings as underground workings for which no recorded plan exists but where **IT IS LIKELY** that workable coal at shallow depths **HAS BEEN MINED** before records were kept.

This CMRA has indicated that one coal seam containing mine workings up to 1.4m thickness may occur at a depth of 13m beneath the new development.

Therefore, potentially coal mining legacy poses significant risk to surface stability in the proposed development area requiring further assessment.

Because of this exploratory drilling is required to establish the depth of the coal seam beneath the site and whether this seam contains mine workings and hazardous mine gases.

The boreholes will also establish bedrock depth and confirm the presence of ironstone working at 26m depth below the site.

Gas monitoring must be carried out during drilling.

A localised site strip or close spaced trenching will be required at the far west end of the rear of Plot 4 to locate mine shaft 014 which is shown by the CA to fall within or very close to this part of the site. Alternatively, the client may not wish to locate the shaft but to exclude this area from use with the existing west boundary fence assuming it has not been taken down.

Notwithstanding, on the basis of the work to date, we are of the opinion that the coal mining legacy risks posed by this site can be mitigated by routinely adopted engineering/design measures (as outlined in our mitigation proposal above) and therefore should not preclude the planning permission being registered.

In order to finalise what (**if any**) mitigation measures are required it will be necessary to carry out further intrusive borehole investigations into the geological sequence to establish this sequence beneath this site and particularly the presence or absence of coal and workings in coal and hazardous ground gases.

The sinking of exploratory boreholes with perhaps excavation/trenching to locate shaft 014 will be required at the site to do this.

A safe method of sinking boreholes which will reduce the risk to drill operators and the public has been proposed. A Coal Authority Permit will be required before drilling and site excavation takes place. This must state that only water flush will be used for drilling. The permit would also need to cover any excavation work carried out to locate shaft 014.

Depending on the outcome of the additional coal mining legacy investigation it may be necessary to stabilise these seams/workings using routine drilling and grouting techniques and/or adopt special foundations design measures and perhaps install gas protection measures.

In conclusion we see no reason why Planning Permission should not be granted in the interim and that these works form a condition on the planning approval.

Appendices:

- A. CA Report ref 51001603973001 dated 24th August 2017.
- B. Extract of CA interactive map viewer
- C. Extract of BGS bedrock and superficial geology map Sheet 87 Barnsley at 1:50000 scale
- D. Satellite image showing approximate position of shaft 014 and site boundary.

Other historical OS maps, borehole logs, site images and photographs have not been included because it was considered that they did not provide significant useful additional information.

APPENDIX A
COAL AUTHORITY REPORT



The Coal
Authority

Resolving the **impacts** of mining

Non-Residential Coal Mining Consultants Report



RUSZKAI, 75 CHAPEL ROAD, PILLEY, BARNSELEY, S75 3AR

Date of enquiry:	24 August 2017
Date enquiry received:	24 August 2017
Issue date:	24 August 2017

Our reference:	51001603973001
Your reference:	G17364

Non-Residential Coal Mining Consultants 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

RUSZKAI, 75 CHAPEL ROAD, PILLEY, BARNSELY, S75 3AR

How to contact us

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+44 (0)1623 637 000 (International)

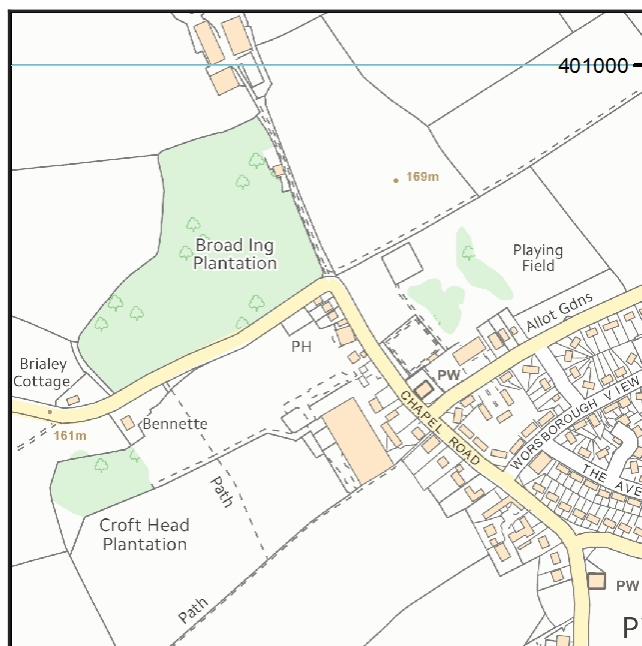
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www.groundstability.com

 /company/the-coal-authority

 /thecoalauthority

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Approximate position of property



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Detailed findings

Past underground coal mining

Colliery	Seam	Mineral	Panel	Depth (m)	Direction to working	Disposition	Extraction thickness (cm)	Year
unnamed	TANKERSLEY I/S	Ironstone	7PZE	26	Beneath Property	0.0	100	1850
ROCKINGHAM	LOW FENTON	Coal	6J6Q	91	SW	0.4	140	1966
unnamed	TOP FENTON	Coal	6J6P	93	Beneath Property	0.0	114	1963
unnamed	PARKGATE	Coal	6J72	110	Beneath Property	0.0	160	1878
unnamed	MIDDLETON MAIN	Coal	6J6V	137	Beneath Property	0.0	94	1893
unnamed	SILKSTONE	Coal	6J79	196	Beneath Property	0.0	152	1880
unnamed	WHINMOOR	Coal	6J7I	215	NW	0.6	86	1910
unnamed	WHINMOOR	Coal	6J7G	245	Beneath Property	0.0	84	1912

Probable unrecorded shallow workings

Yes.

Outcrops

None recorded.

Spine roadways at shallow depth

None recorded.

Future underground mining

None recorded.

Licence details (AOR)

None recorded.

Section 46 notices

None recorded.

Geology

No faults, fissures or breaklines recorded.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyance details
Shaft	433400-022	433271 400666		Ironstone	
Shaft	433400-021	433239 400712		Ironstone	
Shaft	433400-024	433307 400621		Ironstone	
Shaft	433400-008	433395 400725		Ironstone	
Shaft	433400-014	433330 400713		Ironstone	
Shaft	433400-015	433361 400663		Ironstone	
Shaft	433400-013	433264 400729		Ironstone	
Shaft	433400-011	433281 400784		Ironstone	
Shaft	433400-012	433358 400785		Ironstone	
Shaft	433400-016	433441 400673		Ironstone	

Court orders

None recorded.

Worked out opencast sites

None recorded.

Coal mining related hazards

None 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 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.

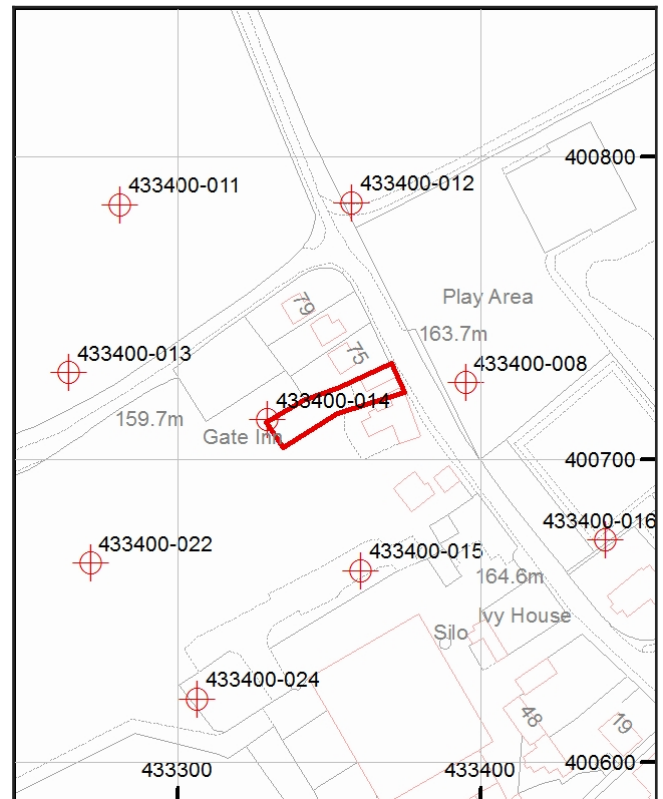
Enquiry boundary

Key

Approximate position of enquiry boundary shown



Disused mineshaft



How to contact us

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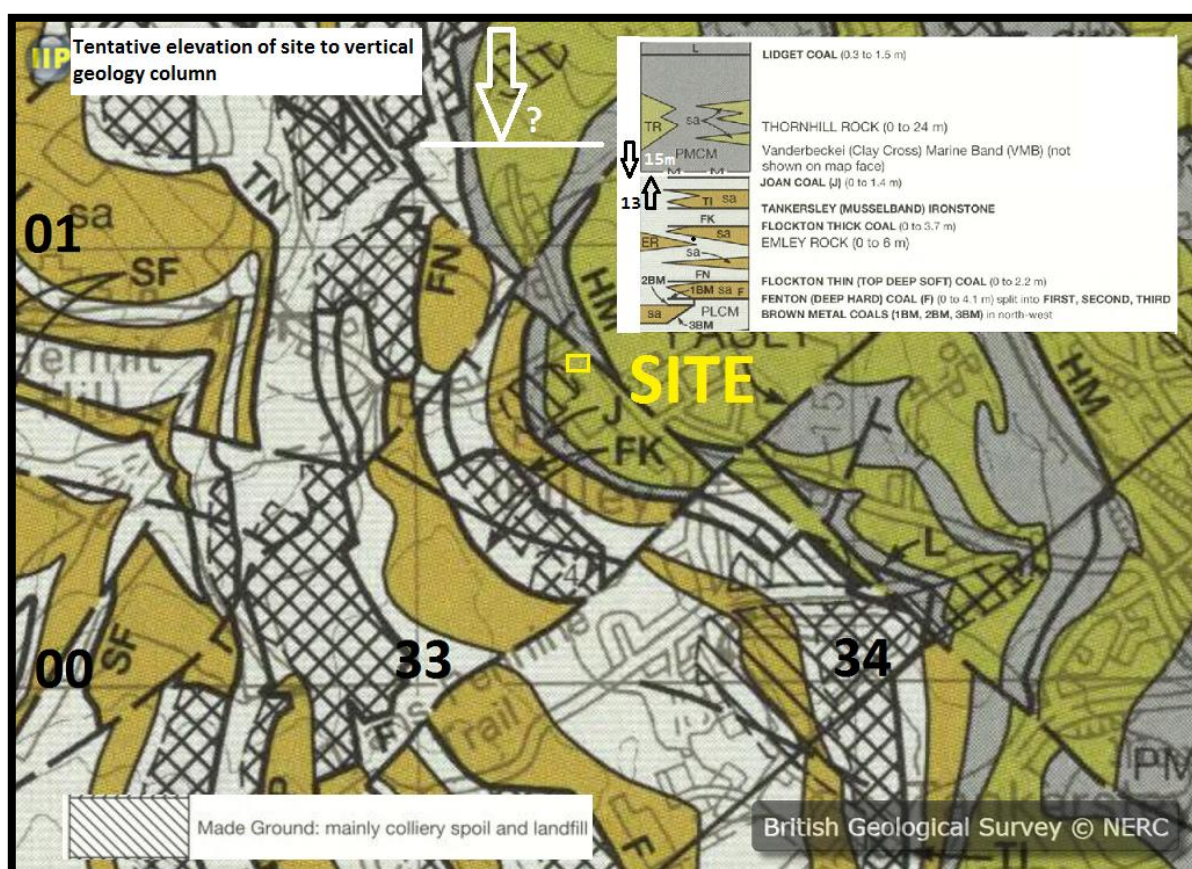
Ordnance Survey Licence number: 100020315

VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	24 August 2017
Issued to	GEOINVESTIGATE TERRY DICKEN INDUSTRIAL ESTATE TERRY DICKEN INDUSTRIAL ESTATE, ELLERBECK WAY STOKESLEY NORTH YORKSHIRE TS9 7AE
Property search for	RUSZKAI 75 CHAPEL ROAD PILLEY BARNSELEY S75 3AR
Reference number	51001603973001
Date of issue	24 August 2017
Cost	£101.70
VAT @ 20%	£20.34
Total received	£122.04
VAT registration	598 5850 68

APPENDIX C

EXTRACT OF BGS GEOLOGY MAP



APPENDIX D SITE & MINE SHAFT 014

