Coal Mining Risk Assessment
at
Stonewell House, Sheffield Road
Birdwell, Barnsley
For
Mr Peter Dimberline

Client:-
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Contents

Executive summary 3

1. **Introduction** 4

2. **Site location and description** 6

   Proposed development

   Site history

3. **Geological setting and historical mining context** 8

4. **Risk assessment** 10

5. **Discussion** 12

   Shallow mineworkings

   Mine entries

   Mine gas

6. **Proposed mitigation strategy** 14

7. **Conclusions** 16

Appendices

Appendix A Site location plan and development layout

Appendix B Coal Authority consultants coal mining report

Executive Summary

Proposal	A total of 7 no. detached 2 storey dwellings.
Current land use	Existing residential property (Stonewell House) and associated gardens lying at approximately 122.0m AOD.
Mining related site history	No historic mining features recorded on the site. Several former collieries are present locally. The site lies within an area significantly affected by historic mining activities.
Geology	Directly underlain by Middle Coal Measures strata. The Swallow Wood coal seam underlies the north of the site at shallow depth. A fault crosses the northern part of the site.
Mining history and context	A total of 3 seams of worked coal are recorded beneath the site at depths of between 135 and 286m, last worked in 1967. The Swallow Wood coal seam has been historically worked locally. Numerous former mine entries (shafts and adits) are recorded north of the site, associated with the outcrop of the Swallow Wood coal seam. Unrecorded mine entries could be present on the site. Part of the site lies within an area of probable past shallow coal mining and is within a Development High Risk Area as defined by the Coal Authority.
Mining related risks	There is a potential for shallow mining beneath the north of the site potentially leading to surface instability – **High**. Unrecorded former mine entries may be present on site – **Moderate**. Mine gases may be present on the site – **Low to Moderate**.
Mitigation of risks	Proof drilling is recommended to confirm the status of the underlying Swallow Wood coal seam. If shallow mining is confirmed as potentially affecting surface stability, consolidation by drill and grout may be required. Vigilance during site enabling works to check for past unrecorded mine entries. Incorporation of protection measures for mine gases may be required within new development, subject to the advice of regulators.

Introduction

1.1 Design IT were appointed by Mr Peter Dimberline, on behalf of his client, to undertake a Coal Mining Risk Assessment (CMRA) for a site comprising land at Stonewell House, Balk Farm Court, off Sheffield Road, Birdwell, Barnsley, which is proposed for residential development. A planning application is to be submitted to Barnsley Metropolitan Borough Council (BMBC) and the site is identified as lying within a Coal Authority (CA) Coal Mining Development Referral Area, thus there is a requirement for a CMRA in order to provide BMBC with information on historic coal mining and an assessment of its potential impact on land stability.

1.2 The purpose of this CMRA is to:

- Present a desk-based review of all available information 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 remedial works and/or demonstrate how coal mining issues have influenced the proposed development, and
- 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

1.3 To this end the study has included an inspection of published historical mapping, published geological data, publicly available planning information and a review of a CA consultants coal mining report, together with other sources as indicated within the report.

1.4 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above.

1.5 The comments and opinions presented in this report are based on the findings of the available desk study assessment carried out by Design IT. Responsibility cannot be accepted for

any conditions not revealed by this desk study and which have not been taken into account by this assessment.

1.6 This report has been prepared for the sole use of Mr Peter Dimberline and his client. No other third party may rely upon or reproduce the contents of this report without written approval of Design IT. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and we do not owe them any Duty of Care or Skill.

1. Site location and description

2.1 The site is centred on National Grid Reference 434420mE 402090mN, immediately east of Sheffield Road (A61) and north of Balk Lane, within the northern part of Birdwell village. A site location plan is included as **Appendix A.**

2.2 The site is irregularly shaped comprising an existing detached residential property, Stonewell House, in the east together with associated formal hardstanding and an access road linking Balk Farm Court to the north. An inspection of aerial imagery indicates the central and western parts are occupied by formal gardens under grass and planting with several mature trees present. Across the site levels fall steadily towards the west/northwest with the east part of the site lying at approximately 124.0m AOD falling to approximately 119.0m AOOD in the southwestern corner. Existing residential properties and associated gardens bound the site on most sides with the exception of the A61 road and open land beyond to the west.

Proposed development

2.3 It is understood that it is proposed to redevelop the site with 7 no. detached 2 storey residential properties with an access drive linking Balk Farm Court in the north and associated parking provision and gardens on the site. Stonewell House is to remain. Details of the proposed development layout are included as **Appendix A.**

Site history

2.4 Historical maps for the site and its surroundings, available from internet based sources, have been reviewed and a summary of this information, specifically relating to mining related features, is provided below.

Date	On site features	Off site features (coal mining related)
1855 – 1990s	Open fields with a well indicated on the northeastern site boundary.	Old sandstone quarries approximately 140m north and 170m southwest. Rockley colliery approximately 650m northwest (disused post 1893). Rockingham colliery approximately 1.3km

		southeast (closed in 1979). Barrow collieries approximately 1.4km northeast.
1990s - present	Stonewell House residence and gardens developed on site.	No change.

2. Geological setting and historical mining context

3.1 Information obtained from various sources pertaining to the site's geology and historical mining perspective is summarised in the table below with information sources identified as appropriate.

Information sources	British Geological Survey (BGS) 1:50 000 scale, sheet 87, Barnsley, bedrock and superficial. BGS 1:10 560 scale County Series 2nd Edition 1945, sheet 282NE, Worsborough, bedrock and superficial. BGS online Borehole Database. Geological Survey memoir 'Geology of the Country around Barnsley', 1947. 'The Geology of the Yorkshire Coalfield', 1878 Green et. al. BGS 'The Pennine Lower and Middle Coal Measures formations of the Barnsley District', Report IR/06/135. BMBC online Planning Applications Search. CA online Interactive Viewer. CA Consultants coal mining report and accompanying plan, Ref. 51002047173001, 7 March 2019 (included as **Appendix B**). Historic Ordnance Survey (OS) online mapping.
Made ground	None shown.
Drift	None present.
Solid	Central and south: Unnamed sandstone unit of the Middle Coal Measures. North: Undifferentiated (sandstone, siltstone, mudstone and coal seams) strata of the Middle Coal Measures.
Dip of strata	Assumed 4 to 5^0 northeast.
Faults	Fault recorded as crossing the northern part of the site, striking southwest to northeast and downthrowing to the southeast.
Coal seams	The Swallow Wood coal seam is shown as outcropping approximately 25m west, immediately north of the fault. The coal seam is considered to underlie the northern part of the site at shallow depth. No other coal seams that are present below the Swallow Wood coal are considered to underlie the site at shallow depth. Locally, BGS stratigraphic section thicknesses for the Swallow Wood coal seam are between 0.2 and 3.7m, containing several dirt partings.

Shafts and collieries	The CA Interactive Viewer indicates numerous former mine entries (both shafts and adits) to the north of the site along the outcrop of the Swallow Wood coal seam. The Barnsley memoir records the Swallow Wood coal seam as being encountered within a well at the Travellers Inn public house in Birdwell at a total thickness of approximately 1.7m. It comprises 3 no. leaves (1 at approximately 0.45m thick and 2 at approximately 0.3m thick separated by 2 dirt partings each approximately 0.35m thick). Shaft records for the Rockingham colliery indicate the Swallow Wood coal seam as approximately 0.95m total thickness, including a single dirt parting. Additionally, shaft records relating to the Barrow colliery indicate the Swallow Wood coal seam as approximately 0.9m total thickness.
Nearby intrusive information	Archive National Coal Board (NCB) exploratory borehole information located north of the site and immediately northwest of Worsbrough Country Park recorded past mine workings within the Swallow Wood coal seam at between approximately 3.0 and 4.0m thick. Where intact, the seam was proved at 1.3m total thickness, comprising 2 dirt bands.
Coal Authority consultants coal mining report	The pertinent points presented in the CA consultants coal mining report are: A total of 3 seams of worked coal are recorded beneath the site at depths of between 135 and 286m, last worked in 1967. The depth of these seams is such that there is considered to be no adverse effect upon the surface stability of the site. There are probable unrecorded shallow coal workings beneath the site, considered to be associated with the Swallow Wood coal seam. No spine roadways are recorded beneath the site at shallow depth. There are no known mine entries within 100m of the site. There are no records of mining related subsidence claims within 50m of the site. There are no records of any mine gas emissions requiring action within 500m of the site.
Shallow mining	The CA Interactive Viewer indicates the northern area of the site to lie within an area of probable past shallow coal mining. As such, the northern part of the site is defined as being within a Development High Risk Area.
Surface mining	Areas associated with surface coal mining are shown approximately 200m to the southwest on the CA Interactive Viewer and the consultants mining report accompanying plan, assumed to be associated with mining of the Haigh Moor coal seam. However, none are indicated within the site itself. The historic OS mapping does not show any former quarrying as present at the site itself.

3. Risk assessment

4.1 The potential risks to the redevelopment of the site associated with the coal mining legacy of the locality are summarised in the following table.

Coal mining issue	Risk		Risk assessment (Risk rating)
	Yes	No	
Underground coal mining (recorded at shallow depths)	-	**No**	The Swallow Wood coal seam is present at shallow depth beneath the northern part of the site. The Swallow Wood coal seam has been exploited historically within the vicinity of the site. There is no evidence of recorded shallow mine workings beneath the site – **Low**
Underground coal mining (probable at shallow depths)	**Yes**	-	The northern part of the site lies within a DHRA and is affected by probable shallow mining. Evidence of widespread historic mining of the Swallow Wood coal seam at outcrop in the locality would suggest potential shallow mining of this coal seam beneath the north of the site - **High**
Mine entries (shafts and adits)	**Yes**	-	No mine entries recorded on site, however unrecorded mine entries are a possibility. Numerous recorded former mine entries (shafts and adits) are recorded to the north associated with the outcrop of the Swallow Wood coal seam - **Moderate**
Coal mining geology (fissures)	-	**No**	CA information and published geology indicate a fault as crossing the northern part of the site. There are no geological weaknesses recorded at the site as a consequence of mining related activities – **Low**
Record of past mine gas emissions	**Yes**	-	CA information states no mine gas related issues in the locality. However, given the presence of potential shallow mining beneath the site, generation of mine gases is possible - **Low to Moderate**
Recorded coal mining surface hazard	-	**No**	CA information does not record the presence of any mining surface hazards on or close to the site – **Low**
Surface mining (opencast workings including sandstone	-	**No**	CA information states the site to be unaffected by any past, current or future opencast workings. Former opencast coal

quarries)			workings are recorded approximately 200m southwest. Historical mapping records former sandstone quarries at between 140 and 170m of the site – **Low**

4. Discussion

5.1 The risk assessment above highlights several potential risks posed to the site during redevelopment, namely potential for shallow coal mine workings, potential for unrecorded mine entries and associated mine gas emissions, cumulatively assessed as **low to high**. These risks are discussed in turn more fully below.

Shallow mine workings

5.2 The Swallow Wood coal seam is recorded as underlying the northern part of the site at shallow depth and may potentially have been historically exploited through mining. Given the location of the site relative to the recorded outcrop of the Swallow Wood coal seam and taking cognisance of the dip of the strata and the local topography, it is estimated that the coal seam is likely to be present beneath the site within approximately 5m of the surface at the western site boundary and between 5 and 10m towards the site's northeastern boundary. Nearby historic records indicate a total exploitable thickness of approximately 1.7m for the Swallow Wood coal seam (including 3 leaves and 2 dirt bands). Assuming competent rock head is present within 2m and that a minimum of 10 times intact coal seam thickness of competent rock strata is required to be present above the seam to maintain surface stability in the event of the coal seam having been exploited, then there is considered to be *insufficient* competent rock cover above the Swallow Wood coal seam across the northern area of the site. However, the surface stability at the site can only be comprehensively determined through undertaking intrusive works. Such intrusive investigations will determine whether mine workings are present within the Swallow Wood coal seam and to what extent, as well as confirming the depth and thickness of the coal seam beneath the site.

Mine entries

5.3 Due to the proximity of the outcrop of the Swallow Wood coal seam and numerous recorded abandoned mine entries associated with this coal seam within the site's locality, the presence of on-site unrecorded former mine entries associated with the exploitation of the coal seam, and deeper coal seams, cannot be discounted. Prior to 1872, it was not a statutory requirement to record mine entries and mining plans. Furthermore, CA information records the north of the site as within an

area of probable past shallow coal mining. Such features are considered as presenting a potential risk to development by way of instability and potential collapse.

Mine gas

5.4 The potential for upward migration of mine gases beneath the site cannot be discounted. Such gases are particularly prevalent in former pillar and stall workings that remain open and allow them to build up over time. Mine gases pose a potential significant human health risk to the future occupants of dwellings and existing occupants of adjacent dwellings.

5. Proposed mitigation strategy

6.1 A review of geological and historical mining information at the site has shown that there is a **high** risk to surface stability from shallow mine workings that may be present within the Swallow Wood coal seam. Additionally, there is a potential **moderate** risk to surface stability by way of unrecorded former mine entries and a **low to moderate** risk exists for the site to be affected by potential mine gas emissions.

Shallow mine workings

6.2 Geological, historical and CA mapping all demonstrate there to be a plausible risk presented by shallow mine workings within the Swallow Wood coal seam that may be present beneath the northern part of the site. It would be prudent, therefore, to undertake proof drilling across the site to confirm the depth to rockhead and depth to/nature of the underlying coal seam. Boreholes should be put down to 30m below existing ground levels with appropriate permission and licences obtained from the Coal Authority prior to commencing any such intrusive works. If shallow mining of the above is proved as presenting a risk to the surface stability of the site then drilling and grouting works may be required to consolidate the workings or the use of appropriately designed foundations may be appropriate, subject to the findings of an intrusive investigation.

Mine entries

6.3 The presence of unrecorded mine entries should be confirmed. During site enabling works and a site strip the exposed sub soils should be checked for the presence of disturbed and potentially unstable ground associated with backfilling of such features. Vigilance should be taken during such works with respect to any anomalous findings. If mine entries are identified on the site, then these will require treatment by either grouting and capping at the surface or spanning by geogrids, as appropriate. The siting of any new development footprint over such features or within influencing distance should be avoided. In such circumstances consultation with the Coal Authority is recommended.

Mine gas

6.4 The incorporation of robust gas protection measures during construction are considered likely within the new development. However, such measures are inherently incorporated within the construction of new buildings by way of use of a well-constructed suspended floor slab offering a passively vented underfloor void, incorporation of a radon protection membrane (if appropriate) and a damp proof membrane together with the sealing of service entries. The requirement for a gas monitoring programme is considered warranted and will be better informed by the results of an intrusive investigation. It is recommended that advice and approval is sought from regulators at an early stage.

6. Conclusions

7.1 There is a potential risk posed to the redevelopment of the site from historic shallow mine workings that may be present in the underlying Swallow Wood coal seam. Such risks comprise surface instability from collapse of past shallow mine workings. Proof drilling is recommended to better understand these risks.

7.2 In addition, as there can never be total certainty with regards to unrecorded mine entries, the developer should be made aware of this possibility during site stripping and excavation for foundations. Any evidence of the suspected presence of former mine entries should be investigated further.

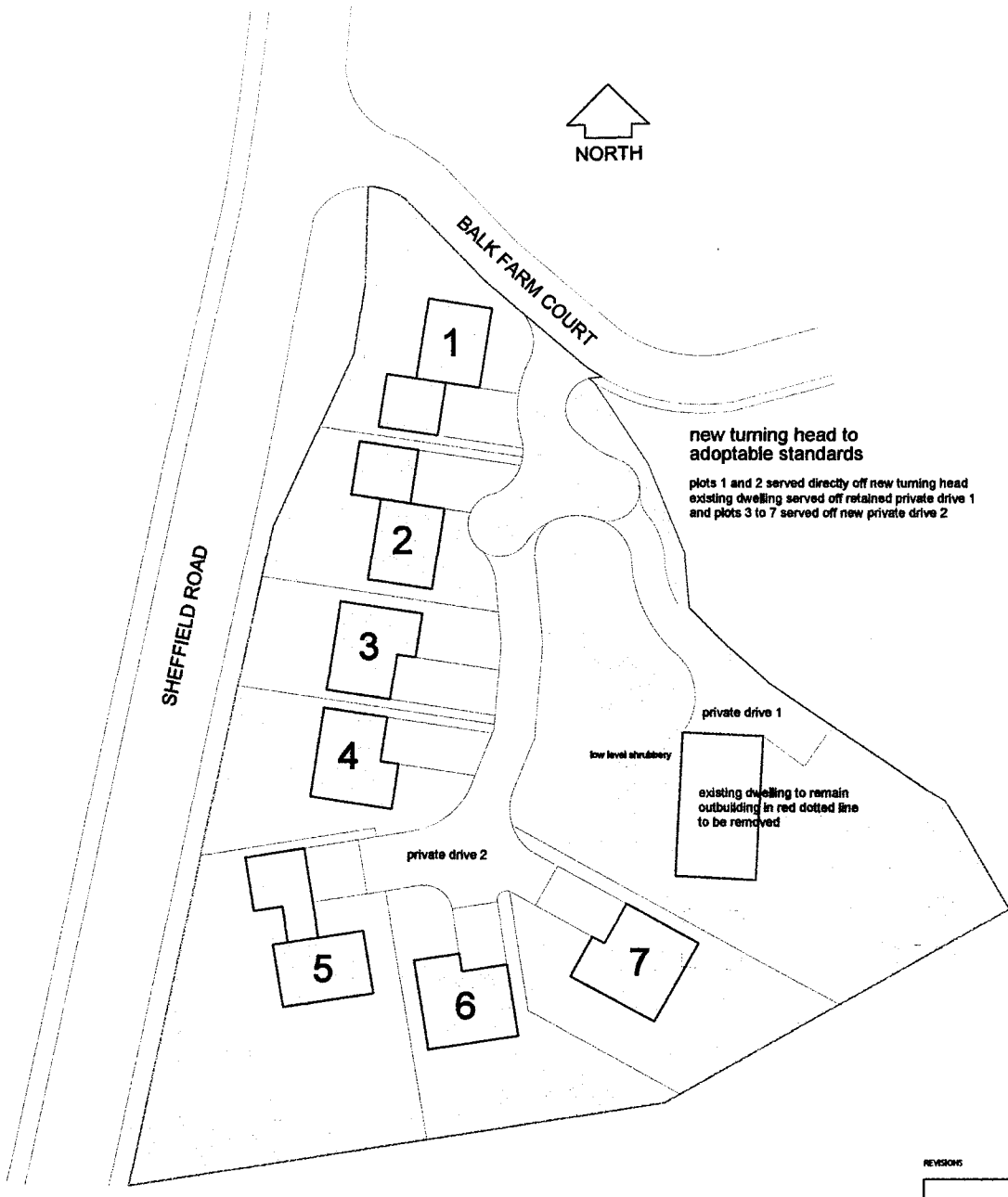
7.3 Advice should be sought from regulators as to adoption of appropriate measures to protect against ground (mine) gases within the new development.

Appendix A

Site location plan and development layout

A3

1) This drawing and the design and details depicted thereon are the copyright of Peter Dimberline Chartered Architect.
2) All dimensions on this drawing are to be checked by the Contractor and any discrepancies are to be reported to the Architect.
3) Do not scale critical dimensions off this drawing.
4) Contractor to ensure that all Health & Safety requirements (CDM Regulations) in relation to this project will be complied with.



PROPOSED SITE LAYOUT, 1:500 at A3

REVISIONS

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CHARTERED ARCHITECT

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CLIENT
Mr G Sharman

PROJECT
Proposed development of 7 detached houses & retention of an existing house

LOCATION
Site off Balk Farm Court, Sheffield Road, Birdwell, Barnsley S70 5RB

DRAWING
Proposed site layout in respect of an : OUTLINE PLANNING APPLICATION

SCALES 1:500 at A3 DATE Jan' 19

DWING No. 2018/16/01 REV. DRAWN BY PD

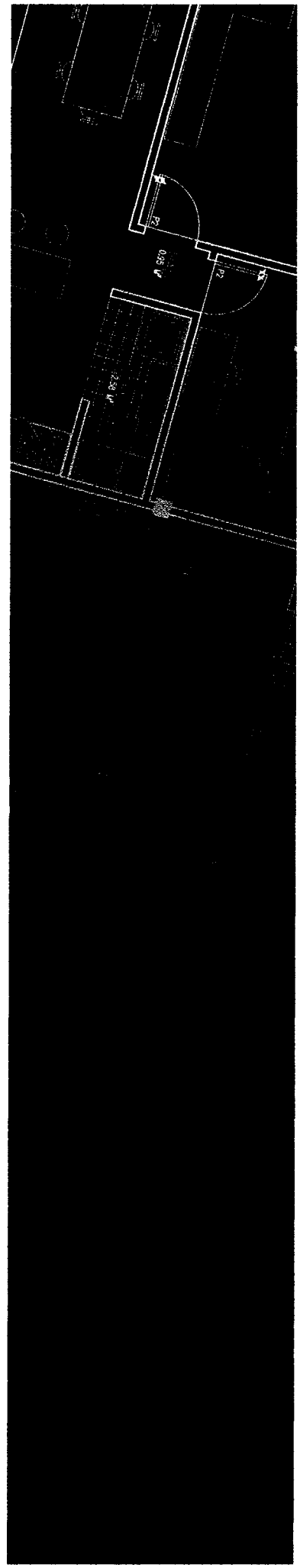
Appendix B

Coal Authority consultants coal mining report

The Coal Authority

Consultants

Coal Mining Report



Stonewell House
Sheffield Road
Birdwell
Barnsley
S70 5RB

Date of enquiry:	7 March 2019
Date enquiry received:	7 March 2019
Issue date:	7 March 2019
Our reference:	51002047173001
Your reference:	18142 CMRA

Consultants
Coal Mining Report

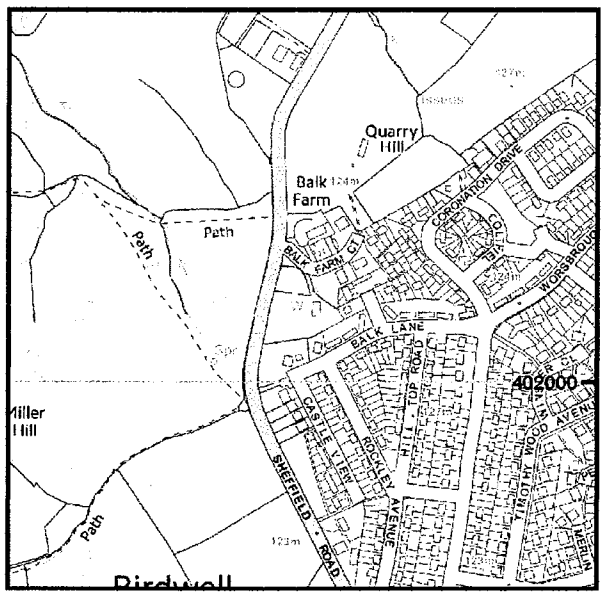
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

Ian Thorpe

Enquiry address

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Approximate position of property

Map data

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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
ROCKLEY	FLOCKTON THICK	Coal	6IGM	131	South-West	5.2	North-East	90	1886
ROCKLEY	FLOCKTON THICK	Coal	6J9R	135	Beneath Property	4.6	North-East	90	1874
ROCKINGHAM	FLOCKTON THICK	Coal	6J9S	167	South-East	4.9	North-East	178	1956
ROCKINGHAM	FLOCKTON THICK	Coal	6IGK	169	South	4.4	North-East	178	1955
unnamed	TOP FENTON	Coal	6IGQ	183	South	4.4	North-East	96	1958
ROCKINGHAM	LOW FENTON	Coal	6IGU	183	South-West	4.4	North-East	117	1960
ROCKINGHAM	TOP FENTON	Coal	6J9V	185	Beneath Property	4.3	North-East	96	1960
ROCKINGHAM	LOW FENTON	Coal	6J9X	189	Beneath Property	4.5	North-East	132	1963
ROCKINGHAM	PARKGATE	Coal	6JA2	204	Beneath Property	4.8	North-East	161	1967
ROCKINGHAM	PARKGATE	Coal	6IH1	204	South	5.1	North-East	161	1963
unnamed	TOP FENTON	Coal	6IGP	216	South	4.0	North-East	106	1931
unnamed	MIDDLETON MAIN	Coal	6IH6	231	South-West	4.9	North-East	127	1918
unnamed	MIDDLETON MAIN	Coal	6JAF	232	West	3.1	North-East	132	1935
unnamed	PARKGATE	Coal	6IGZ	236	South	4.1	North-East	129	1896
WHARNCLIFFE	PARKGATE	Coal	6JA3	240	South-East	3.5	North-East	130	1896
ROCKINGHAM	MIDDLETON MAIN	Coal	6JAD	271	East	4.7	North-East	91	1912
unnamed	SILKSTONE	Coal	6IHD	283	South	4.0	North-East	180	1909
unnamed	SILKSTONE	Coal	6JAL	286	Beneath Property	4.5	North-East	180	1913
unnamed	SILKSTONE	Coal	6ICH	314	South-East	4.1	North-East	147	1916
unnamed	SILKSTONE	Coal	6JAM	316	South-East	5.6	North-East	147	1921

Probable unrecorded shallow workings

Yes.

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Spine roadways at shallow depth
No spine roadway recorded at shallow depth.

Mine entries
None recorded within 100 metres of the enquiry boundary.

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

SY173	NE852	12461
NE855	SY103	NE853
8805	NE36	1974

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

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

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
SWALLOW WOOD	Coal	Yes	24.0	West	11

Geological faults, fissures and breaklines
Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Fault under or close to the property recorded.

Opencast mines
Please refer to the "Summary of findings" map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

Coal Authority managed tips
None recorded within 500 metres of the enquiry boundary.

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Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

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Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

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

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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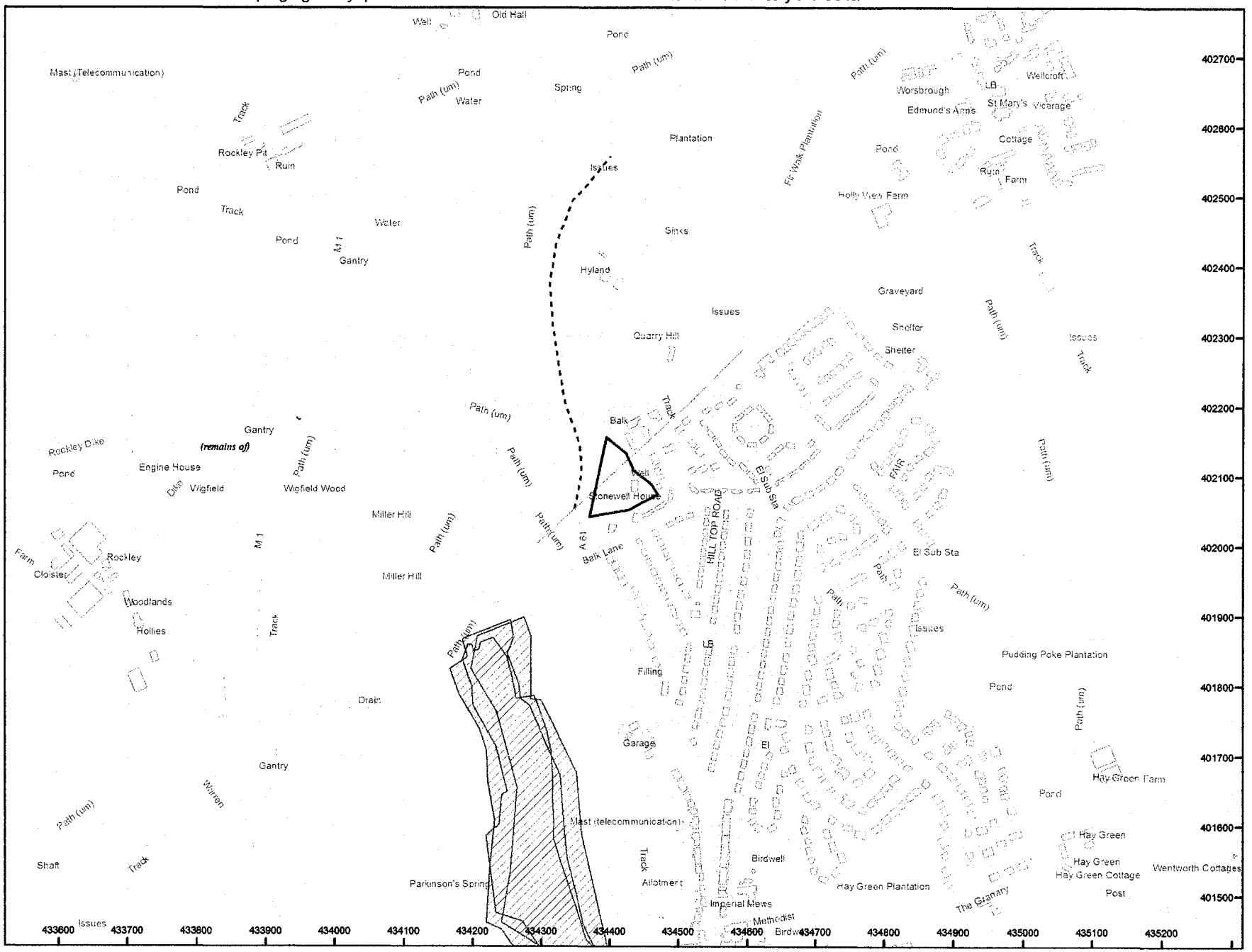
Summary of findings

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The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown
- Outcrop (Conjectured)
- Geological faults
- Unlicensed opencast site



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