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Glossary

Annual Exceedance Probability (AEP)	The probability of an event occurring within any year
Berm	An artificial ridge or embankment
Inter-granular fracture flow	Groundwater flow occurs through a combination of intergranular and fracture flow
Made Ground	Infilled ground comprising of unspecified materials (often a combination of backfilled natural material and man-made deposits i.e. rubble)
Micrograbbo	A medium grained basic hypabyssal igneous rock
Moderately Productive Aquifer	An aquifer system with moderate potential for groundwater abstractions, providing yield of up to 10l/s
Passage Formation	Cyclic sequence of sandstone, mudstone, seatearths and siltstone with ironstone and limestone bands
Port Setton Spittal Dyke	A Quartz Microgabbro rock
Quartz	A silica based mineral (SiO ₂)
Runoff	Movement of surface water across ground
Site Investigation	Intrusive investigation to confirm geological, geotechnical and hydrogeological conditions
Site Walkover	Walkover of the Application Site and surrounds to identify current ground conditions, identify watercourses etc.
Sump	A low lying area which receives drainage
Upper Limestone Formation	Sandstones, siltstones and mudstones with seatearths or seatclays and multiple coal seams. Sandstones are normally fine-grained and grey or pale yellow in colour but coarse-grained pebbly sandstones occur in parts

Abbreviations and Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CAR	Controlled Activities Regulations
CEMP	Construction Environmental Management Plan
DWS	Drinking Water Standards
EIA	Environmental Impact Assessment
ELC	East Lothian Council
ES	Environmental Statement
GPP	Guidance for Pollution Prevention
ICOL	Inchcape Offshore Limited
LDP	Local Development Plan
mAOD	metres Above Ordnance Datum
NPF3	National Planning Framework 3
OnTW	Onshore Transmission Works
PPC	Pollution Prevention and Control
PPG	Prevention of Pollution Guidance
SEPA	Scottish Environmental Protection Agency
SNH	Scottish National Heritage
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TMP	Traffic Management Plan

7B Coal Mining Risk Assessment

7B.1 Introduction

- 1 A mining assessment has been undertaken to address any potential historic mining activities that may impact the future development of the land proposed for the Onshore Transmission Works (OnTW) at the site of the former Cockenzie Power Station.
- 2 The Application Site is identified as located in a Coal Mining Reporting Area, which means it is underlain by Carboniferous coal bearing strata and a coal mining report should be prepared.
- 3 The Application Site is however not in an area classed as a Development High Risk Area, which is a coal mine reporting area which contains one or more recorded coal mining features which have potential for instability or a degree of risk to the surface from the legacy of coal mining operations.
- 4 This would include a combination of features which could include:
 - Mine entries;
 - Shallow coal workings (recorded and probable);
 - Recorded coal mining related hazards;
 - Recorded gas sites; and
 - Fissures and breaklines and previous surface mining site.
- 5 The Application Site occupies an area of land on the south shore of the Firth of Forth, between the villages of Prestonpans and Cockenzie, approximately 10 km east of Edinburgh city. See Figure 1.
- 6 The site of the former Cockenzie Power Station is bound to the north and north-west by the Firth of Forth, to the west by the open landscaped areas of the former Prestonlinks Colliery, to the south by the B1348 minor road and to the east by Cockenzie Harbour.
- 7 To complete this assessment geological information and maps were obtained from the British Geological Survey 1:10,000, 1:25,000 and 1:50,000 scale Ordnance Survey maps were reviewed. Additional searches were undertaken from the Coal Authority to address the extent of coal mining undertaken at the Application Site and based on past mining activity a search of coal mining abandonment plans was undertaken. To support the findings a review of all the available BGS boreholes drilled into the Coal Measures was used to verify findings and in some instance confirm the location of recorded workings.
- 8 This report provides a review of the mining activity which has taken place on the Application Site. The mining includes traditional underground mining recorded and unrecorded.
- 9 The geological setting and mining framework of the Application Site and surrounding area are described in Section 2.0, which is followed by the Mining Assessment in Section 3.0. Conclusions are presented in Section 4.0.

7B.2 Geological Setting

7B.2.1 Geology and Hydrogeology

- 10 Information on geology and mining has been obtained from British Geological Survey (BGS) maps and memoirs, including BGS Scotland 1:50,000 Sheet 33W (Solid and Drift Editions) and the Geology of the Midlothian Coalfield (Geological Survey of Great Britain, 1958).

Superficial Deposits

- 11 The area around the Application Site is underlain by thin post glacial raised beach deposits, underlain in turn by Glacial Till of uncertain thickness. The beach deposits comprise mainly shelly sands and gravels, with thickness indicated to decrease eastwards.
- 12 Made ground deposits cover large areas of the Application Site, resting on bedrock on the former intertidal zone of the foreshore. Much of this material is understood to be coal mining wastes from the former Prestonlinks Colliery waste tips, formerly located immediately to the west of the former Cockenzie Power Station.
- 13 Bedrock occurs near the surface beneath much of the Application Site and surface outcrops are indicated on historical maps covering most of the foreshore area.

Solid Geology

- 14 The Application Site is located on the eastern limb of the Main Syncline of the Carboniferous Midlothian Basin, within a small downfaulted block of Middle Carboniferous strata. The main portion of Application Site is underlain by strata of the Upper Limestone Formation, comprising mainly cyclic sequences of sandstone, siltstone, mudstone, limestone, with thin coals and seatrocks. Strata of the Limestone Coal Formation outcrop immediately to the south-west of the Application Site and underlie the Upper Limestone Formation below the site. The Limestone Coal Formation comprises a cyclic sequences of sandstone, siltstone, mudstone, with coals and seatrocks. Dips are generally shallow and south-easterly.

7B.2.2 Coal Mining History

- 15 The Cockenzie area lies within the Midlothian Coalfield and there is a long history of coal exploitation in the surrounding locally. A number of formerly economic coal seams are present in the strata beneath the Application Site, with workings in many of these from the adjacent Prestonlinks Colliery continuing until 1964. Several old shafts are indicated on the historical maps in the surrounding area, although none are located within the site of the former Cockenzie Power Station but a number are located immediately south west and south of the site of the former Cockenzie Power Station. Figure 1 shows the foundations of the former Cockenzie Power Station being constructed and Prestonlinks Colliery in the background.



Figure 7B.1: Cockenzie Foundations being excavated with Prestonlinks Colliery in Background (looking west)

- 16 The shallowest coal seam of importance is the Great Seam, towards the top of the Limestone Coal Formation, anticipated at a depth of greater than 40 m below surface and extending to over 100 m below surface to the north of the Application Site. Available information indicates that mining beneath the site of the former Cockenzie Power Station resulted in the extraction of 40 per cent of coal at approximately 42 m at the Round Shaft (Prestonlinks Colliery) to the west of the Application Site to between 56 m to over 100 m depth below surface.
- 17 A pre-construction assessment for the site of the former Cockenzie Power Station (anecdotal information) concluded that the power station site was minerally stable, due to the working methods used and the overlying sandstone beam. BGS borehole data obtained for the site indicate strata dominated by sandstone and shale with only thin coals, down to a depth of 90 m below surface. Boreholes in this area have been identified with 'cavity' at depths in boreholes NT37NE67 at 90 m consistent with the mining records, and coals at equivalent depths in NT37NE65 and NT37NE5 respectively. The coals across the entire site extend from depths of 56 m to over 200 m below the Firth of Forth. Borehole locations are shown on Figure 2.

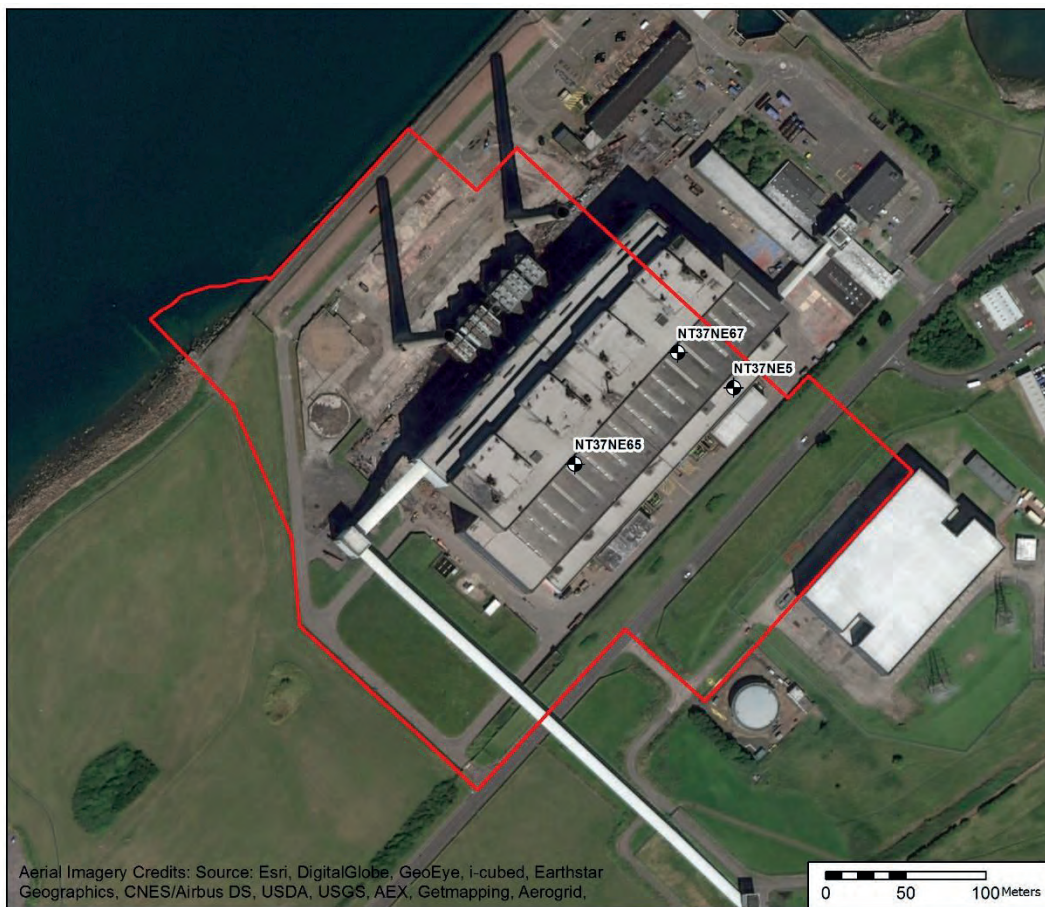


Figure 7B.2 Boreholes in Application Site (Plan shows former Cockenzie Power Station)

Hydrogeology

- 18 According to the British Geological Survey 1:625,000 Scale Groundwater Vulnerability Map of Scotland (1995) and the 1:625,000 Hydrogeological Map of Scotland (1988), the underlying solid strata are classified as moderately permeable. These strata therefore have the potential for significant permeability in fissures and fractures, but are unlikely to produce large volumes of water for abstraction.
- 19 The presence of underground mining may have significantly influenced the groundwater behaviour in the underlying strata at depth, and may also have affected groundwater quality.
- 20 The superficial strata are relatively thin and unlikely to host significant quantities of groundwater. Where present, Glacial Till will act as an aquiclude, a barrier to downward movement of shallow groundwater into the underlying solid strata.

Hydrology

- 21 The Application Site is located adjacent to the Firth of Forth, a tidal arm of the North Sea. Surface drainage in the surrounding area is generally northwards towards the Forth, although there are no significant surface water bodies within the surrounding area.

7B.3 Mining Assessment**7B.3.1 Coal Mining Report**

- 22 A site specific Coal Mining Report was obtained from the Coal Authority, see *Report Reference 51001689828001* (Annex 7.2). The report is summarised below.

Underground Coal Mining**Past**

- 23 The property (the Application Site) is in the likely zone of influence from workings in 4 seams of coal at 40 to 200 m depth, and last worked in 1915.

Present

- 24 The property (the Application Site) is not in the likely zone of influence of any present underground coal workings.

Future

- 25 The property (the Application Site) is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.
- 26 The property (the Application Site) 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.
- 27 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

- 28 There are no known mine entries within 20 m of the boundary of the property (Application Site).

Coal Mining Geology

- 29 The Coal 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

- 30 The property (Application Site) is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

- 31 The property (the Application Site) does not lie within 200 m of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

- 32 The property (the Application Site) is not within 800 m of the boundary of an opencast site for which the Coal
- 33 Authority is determining whether to grant a licence to remove coal by opencast methods.
- 34 The property (the Application Site) is not within 800 m of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal Mining Subsidence

- 35 There is no evidence of any damage from coal mining subsidence.

Mine Gas

- 36 There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property (the Application Site).

7B.3.2 Coal Mining Abandonment Plans

- 37 A search of the mine abandonment plans was undertaken for the Application Site and a total of thirteen plans were found and have been used to complete the mining assessment. The following table indicates the number of seams mined by underground mining techniques.

Table 7B.1 Seams Mined by Underground Mining Techniques

Upper Great (Perpetual)	S2654
Great Seam	S492/3, S492/4
First or Upper Fireclay (Gillespie)	9646
Tranent Splint	7529/2, S2557
Three Feet (Kittlepurse)	S444/2, S2672
Four Feet (Coronation)	S492/5, S492/6

Upper Great (Perpetual)	S2654
Five Feet (Bryans Splint)/Jewel	S492/7, S492/8
No1 Diamond (CornieCraig)	7529/1

- 38 The underground mines were called Prestonlinks and Northfield Colliery to the south west of the former Cockenzie Power Station and Seton Colliery to the south. The Prestonlinks Colliery operated pre-nationalisation from 1899 and was closed by 1964. Northfield Colliery was closed pre-nationalisation (1949) around 1907 and Seton Colliery operated until the late 1870's when it was closed.
- 39 The main deep mine, Prestonlinks Colliery was operated from the late 1899's when production commenced and during its peak employed an average workforce of 794 until 1964. The mine operated from two shafts at 121 m and 115 m deep. After closure in 1964, the site was cleared to make way for Cockenzie Power Station.
- 40 Prestonlinks Mine immediately south west of the former Cockenzie Power Station, was the main entry for seams worked below the former Cockenzie Power Station.
- 41 A search of the Application Site revealed that plans depicting underground workings in eight seams of coal and fireclay workings, relevant to the Application Site were available. The extents of these workings are shown in Table 7B.2.

Table 7B.2 Underground Mine Working Relevant to the Application Site

Stratigraphic Unit Coal Seam	Mined Underground	Date Mined	Approximate depth of shallowest workings below Application Site	Mining Risk
Upper Great Seam	Yes	1902	Not worked	–
Great Seam	Yes	1899-1911	56 m+	Low
First Fireclay Seam	Yes	1906	65 m+	Low
Tranent Splint Seam	Yes	1915-17	70 m +	Low
Three Feet Seam	Yes	1907-09	75 m +	Low
Four Feet Seam	Yes	1912-19	120 m+	Low
Five Feet Seam	Yes	1913-	200 m	Low

- 42 To determine the residual mining impact upon the Application Site, the mining plans were scanned and overlain on to the Application Site layout plan to screen the sites for evidence of underground mining activity, which could impact upon the Application Site. A composite plan showing extent of coal mining working areas was created showing the extent of all the underground workings. From this it was confirmed the shallowest workings were on the Great Seam. No shafts were identified within the Application Site; See Figure 2.

- 43 The seams were mined from surface utilising either incline shafts (adits) along the outcrop of the seams or vertical shafts (pits). The shallow seams were mined from surface from incline shafts working along the seams; the mining techniques appeared to be shortwall and longwall mining, which left negligible amounts of coal behind which meant later opencast mining of these shallow coal seams was not a viable option.

7B.4 Coal Mining Risk Assessment

- 44 For the purposes of this mining risk assessment all aforementioned sources (abandonment plans, coal authority reports, available borehole records etc.) have been assessed and assigned a relative degree of risk to highlight potential areas of concern based on identified features and potential future actions.

7B.5 Risk Assessment

Table 7B.3 Risk Assessment Framework

Risk Status	Action
No Risk	Identified feature(s) not considered to pose any risk to proposed development. No further action required.
Low Risk	Identified feature(s) are unlikely to pose a risk to any future proposed development and further action may be required such as intrusive site investigation works.
Medium Risk	Identified feature(s) may present a risk to any future proposed development and further actions are likely to be required including but not limited to an intrusive site investigation works and potentially ground improvement works.
High Risk	Identified feature(s) present a risk to any future proposed development and further actions are required including but not limited to an intrusive site investigation works and potentially ground improvement works.

- 45 Where mining is identified as ~ <10-30 m from surface, this should be considered as a high risk for any future potential development. If the mining has taken place between 30-50 m a medium risk and in excess of 50 m a low risk.
- 46 Depth to workings is not the only factor to consider, the type of coal mining technique used, the amount and type of rock cover, the geological setting, dip of the coal strata are all significant factors which must also be considered. Finally the most important consideration is the type of proposed end use, which will dictate the risk associated with historic mine workings.
- 47 As the shallowest seam mined below the Application Site is the Great Seam at depths in excess of 50 m it is considered the Application Site is at Low Risk, verified by the geological sections, the mine abandonment plans and borehole records, it is apparent that the mining activity

below the Application Site poses Low Risk to any future development. Development of the OnTW is therefore considered appropriate.

- 48 Any future intrusive investigation at the Application Site will require Coal Authority permission to undertake drilling into the Coal Measures.

Figures

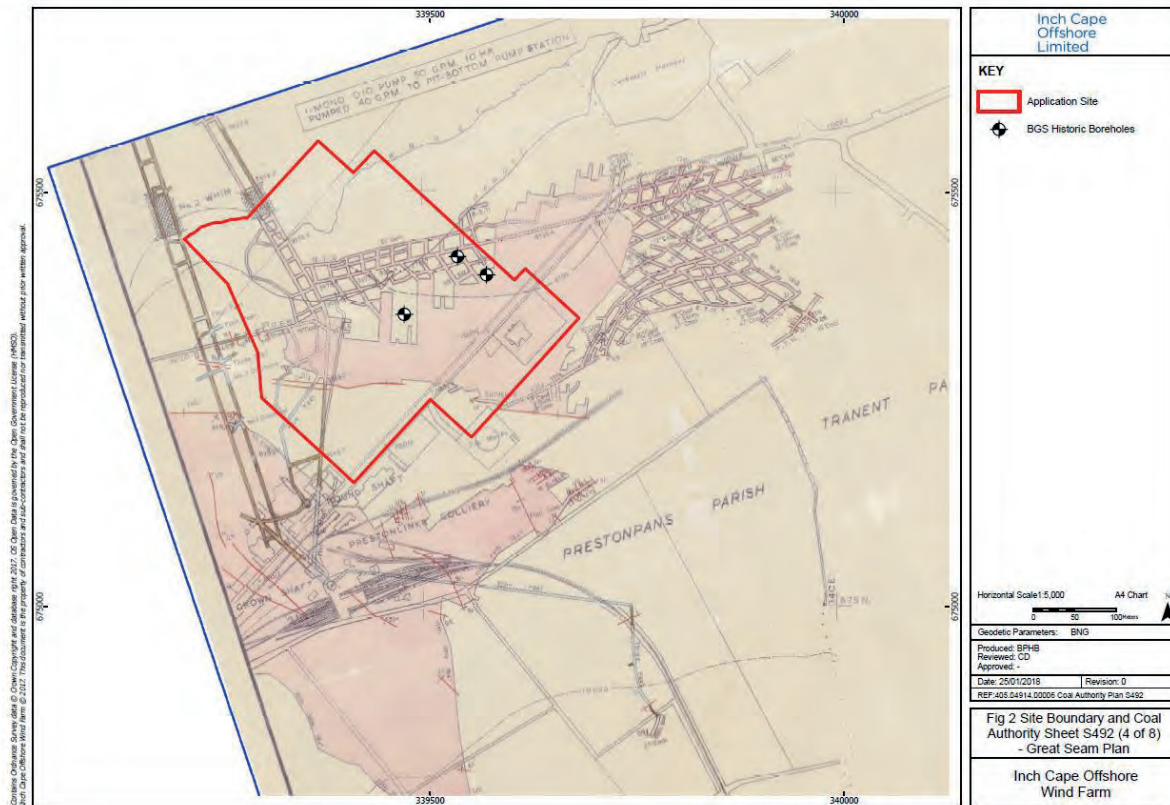


Figure 7B.1 Application Site and Coal Authority Sheet

Annex 7.2 Coal Mining Authority Report



The Coal
Authority

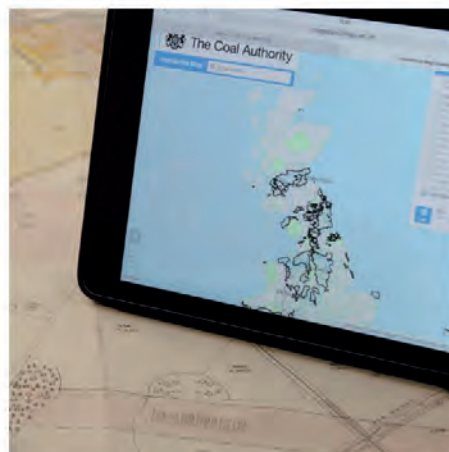
Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

COCKENZIE POWER STATION
COCKENZIE
EAST LoTHIAN
EH32 9SF

Date of enquiry: 17 November 2017
Date enquiry received: 17 November 2017
Issue date: 17 November 2017

Our reference: 51001689828001
Your reference:



CON29M Non-Residential Mining Report

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

Client name

Colin Duncan

Enquiry address


COCKENZIE POWER STATION, COCKENZIE, EAST
LOTHIAN, EH32 9SF


How to contact us


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+44 (0)1623 637 000 (International)

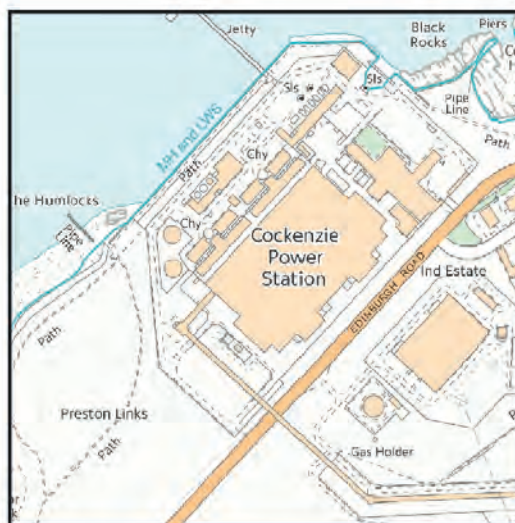
200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



Approximate position of property



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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 5 seams of coal at 40m to 200m depth, and last worked in 1915.

Any movement in the ground due to coal mining activity should have stopped.

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 the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

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.

9. 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 31st October 1994.

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

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. 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.

12. Withdrawal of support

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.

13. Working facilities order

The property is not in an area where 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.

14. 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.

Comments on the Coal Authority information

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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.

Additional remarks

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Property search for	COCKENZIE POWER STATION COCKENZIE EAST LOTHIAN EH32 9SF
Reference number	51001689828001
Date of issue	17 November 2017
Cost	£78.30
VAT @ 20%	£15.66
Total received	£93.96
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