



**NKC Geotech Ltd**

engineering geologist specialising in the investigation and treatment of disused mineworkings

25 Grosvenor Road  
Wrexham LL11 1BT

t 01352 762080

e neil@nkc.co.uk  
w www.nkc.co.uk

# Coal Mining Risk Assessment

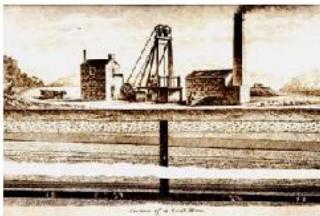


**High Road, Whitehaven**

Smith Grant LLP  
Station House  
Ruabon  
Wrexham  
LL14 6DL

**1926**

5 March 2021



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## **Site**

A site for residential development at High Road, Whitehaven.

### **Risk Assessment by**

Neil Catlow B.Sc F.G.S Engineering geologist.

### **Summary of relevant mining information**

Publication CIRIA32 'Construction over Abandoned Mineworkings'

Coal Authority Report 51002131844001 dated 20th June 2019

Coal Authority Report 51002422819001 dated 8th March 2021

Geological Conservation Review, Barrowmouth 2007

Ordnance Survey 1:2500 First Edition 1878

Geological Survey 1:10560 plans 1972

URS Corporation reports 44320110 dated 13th March 2007

## **Assessment of risk that past mining activity and limestone solution features pose to the proposed development**

### **URS Corporation reports 44320110**

These reports of March 2007 are principally desktop and intrusive contamination studies over the former Rhodia works which occupied the southern part of the site.

The purpose of this CMRA is to summarise the coal and anhydrite mining information, adding comments on natural limestone solution features which may have been extended by acid groundwater from the Rhodia, formerly Marchon, works.

### **Geology**

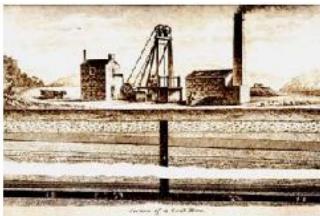
The northern half of the site is underlain by the Carboniferous Westphalian 'D' Whitehaven Sandstone. These sandstones were laid down 310m years ago at the close of the Carboniferous period and are overlain southwards by successively younger rocks that signify the transition from coal bearing deltaic and marine deposits to Permian age Brockram marking the base of the St Bees Evaporite beds containing anhydrite deposits and limestones. In turn, these are overlain by the St Bees Shale and finally the St Bees Sandstone, laid down in an arid desert environment 250m years ago.

## **Coal mining**

The Carboniferous Coal Measures of the Whitehaven Coalfield are predominantly shales and sandstones laid down in a tropical delta environment when Europe lay on the equator as part of the continent of Pangea. Westphalian strata contains seams of coal upto 4.5m in thickness at vertical intervals typically varying from 4.0m to 40.0m and interbedded with ironstone beds. Those coal and ironstone seams which were of economic importance were given an identity when they were of sufficient quality and thickness to justify extraction by mining. Typical names for local coal seams reflect primarily on quality and thickness, for example Brassey Coal, Main Band, and Yard Coal.

### **Past underground coal mining**

Coal mining in Whitehaven is first recorded in 1560, 1km north of the site, and there has been extensive coal and iron ore mining activity in the locality until Haig Colliery closed in 1986. Industrial mining deeper than the outcrop workings and simple bell pits of the 'cole farms' dates from the 16th century, with rapid expansion in the late 18th century when canal construction, railways, and steam powered mine pumping marked the Industrial Revolution.



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Only two seams of coal have been mined under the site, the Bannock Band at a depths increasing from 102m to 231m and the Main Band from 130m to 234m. These workings date from 1914 to 1933 respectively and were from Ladysmith Pit 296515-002 and Croft Pit 296515-001 located on the site and capped to the contemporary NCB standards for active industrial sites by Albright & Wilson in 1977. The Ladysmith Adit 296516-001 connects to Ladysmith Pit at a depth of 85m for minewater drainage outfall at sea level and was sealed in 1988 by Albright & Wilson together with the associated shaft 296516-002.

### **Present underground coal workings**

There is no current coal mining within 20km of the site.

### **Future underground coal workings**

The nearest coal mining proposal is the Woodhouse Colliery 400m south of the southern site boundary within the former Marchon works. This proposed mine will extend the existing open but abandoned adits, driven in 1952 by the Sandwith Anhydrite Mine and sealed with concrete stoppings in 1987, to access the Bannock Coal and the Main Band coal seams offshore under the Irish Sea. The Six Quarters Coal, 90m below the Main Band, may also be mined. There is no planned onshore mining. Coal output is intended to be 3m tonnes/year of coking coal for steel production, either in the UK or exported to Europe from Redcar, and mined using US mechanised herringbone pillar & stall techniques.

### **Recorded coal mine entries on or within 20m of the site boundary**

There are records of 5 mine entries on or within 20m of the site.

Shaft 296515-001 Ladysmith Pit, 333m deep

Shaft 296515-002 Croft Pit, 281m deep

These shafts are located within the southern half of the site and both shafts were capped to the contemporary NCB requirements for industrial sites in 1977.

Shaft 296515-003 is located east of High Road and 50m south-east of the site. There is no record of any previous investigation.

Adit 296516-001 Ladysmith Adit is the sea-level drainage drainage outfall from Ladysmith Pit and is associated with the shaft 296516-002. Both these mine entries were investigated and sealed by Albright & Wilson in 1988. Both the adit and the shaft lie outside the site, the shaft 002 is 8m west of the site boundary and the adit 001 is on the foreshore.

### **Coal mining geology**

The Coal Authority have no records of any damage caused by geological faults.

### **Past opencast coal mining**

There are no former opencast coal mining sites within 200m of the site.

### **Present opencast coal mining**

There are no current opencast coal mining sites within 200m of the site.

### **Future opencast coal mining**

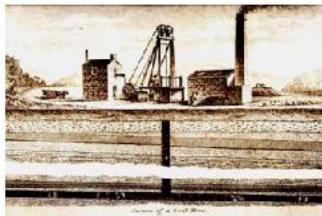
There are no proposed opencast coal mining sites within 800m of the site.

### **Coal mine gas emissions**

There are no recorded mine gas emissions within the site boundary.

### **Coal mining surface hazards**

There are no recorded remedial works being carried out by the Coal Authority on the site nor any subsidence claims.



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### **Anhydrite mining**

In addition to past coal mining activity, the Barrowmouth Gypsum Mine worked gypsum and anhydrite under the western part of the site until 1908. Whilst the Barrowmouth Mine worked from four adits in the cliff face close to the shore where gypsum was exposed and there are surviving abandonment plans, the St Bees Evaporite outcrop crosses the site at a probable depth of 50m under glacial deposits but there may also be historic and unrecorded workings at shallow depth south of the Brockram outcrop.

### **Limestone solution cavities**

Previous environmental investigations by URS from 2002 to 2007 were focused on contamination and groundwater movements, and shallow sampling revealed possible dissolution features within the limestones of the St Bees Evaporites. These features in the former URS Areas D and G may be natural occurring limestone solution hollows, perhaps enhanced by acid groundwaters from the former Marchon works.

### **Further investigation**

#### **Desktop study**

A desktop study of all the available mining and geological information will be required.

#### **Coal mining**

The Ladysmith and Croft Pits are known to have been capped on rockhead at 5m depth in 1977 to a standard acceptable to the NCB for industrial sites at that time. The reinforcement is much lighter than current designs and the capping, although of sufficient thickness, may be confined to the shaft linings with no bearing on rockhead. The Coal Authority description of the size of the caps is ambiguous in that the cap sizes are given as metres squared instead of metric dimensions and It is possible that the capping design is unacceptable to the Coal Authority for the proposed residential development. New caps over the existing may be required. An intrusive investigation is necessary to accurately locate the shafts on site for a subsequent topographical survey and prove the shaft cap dimensions. The location proving can be by excavation to expose the caps or probe drilling if site disturbance is to be minimised.

#### **Anhydrite mining**

An intrusive investigation of perhaps 10 holes to 30m depth may be required following the desktop study to determine whether historic shallow gypsum mining is present in the area underlain by the St Bees Evaporites.

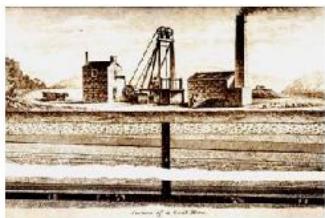
#### **Solution voids in the limestone**

An intrusive survey of possible solution cavities with the limestone can be carried out by drilling rotary holes to 9m depth into the St Bees Evaporites. A few of the former URS shallow boreholes and trial pits located voids of under 200mm in the limestones under Areas D and G. A geophysical survey may locate shallow voids but may be compromised by remnants of the former industrial activity.

For Nkc Geotech Ltd



**Neil Catlow, B.Sc, F.G.S**



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### Geological and mining plan of the locality

