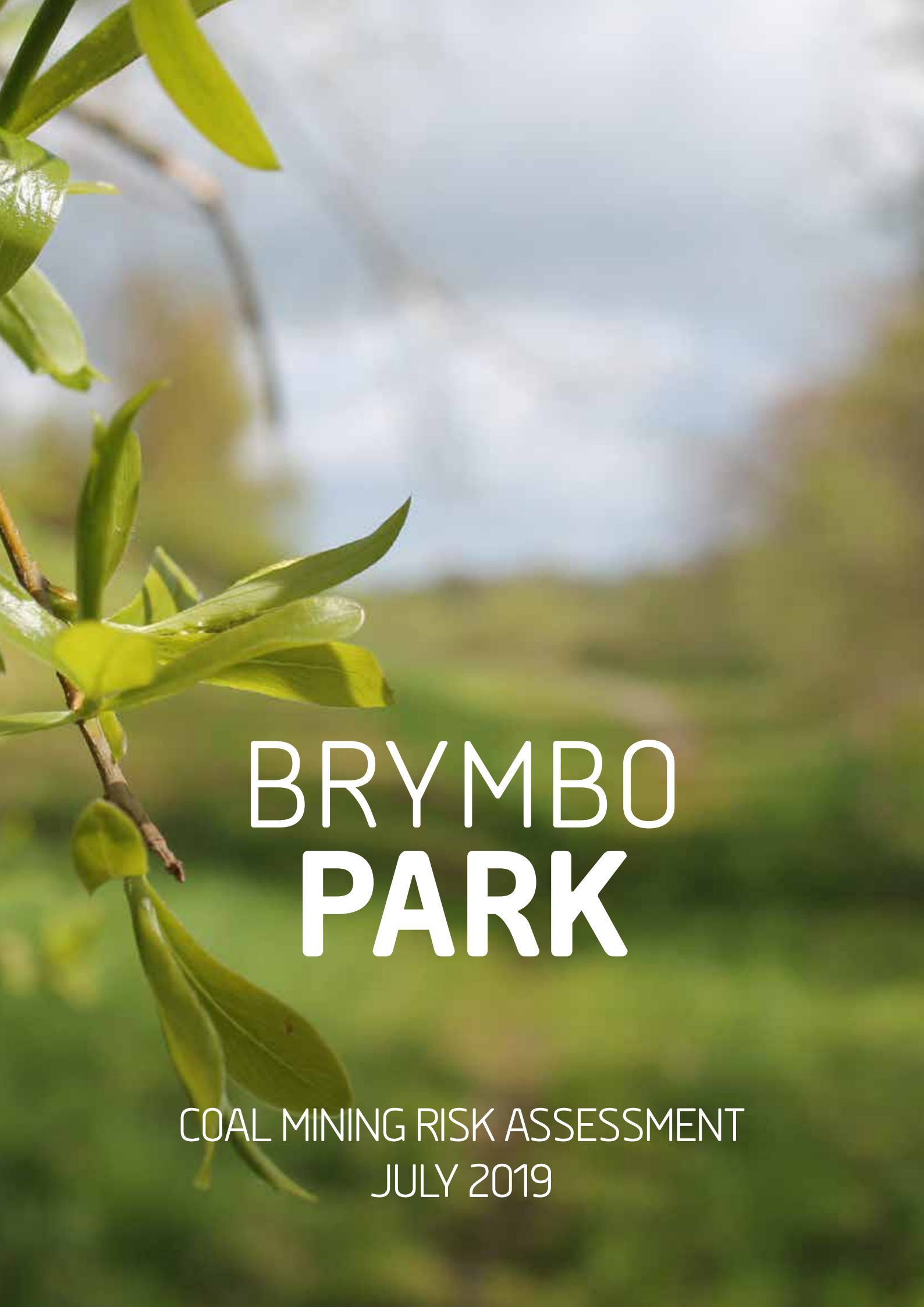




BRYMBO **PARK**

COAL MINING RISK ASSESSMENT
JULY 2019

OVERVIEW OF GROUND CONDITIONS AND PREVIOUS RECLAMATION WORKS

The Brymbo Development is composed of an eastern reclaimed area (the former Brymbo Steelworks) which is ready for built development; and a western area (the former Ty-Cerrig opencast coal site) which needs to be re-engineered to facilitate built development.

The former Brymbo Steelworks had a long history of development from the mid-1750s until it closed in 1990. This industrial site was subsequently acquired by Brymbo Developments who obtained planning permission for a major reclamation project. During 2003-2005 a major earthworks scheme was undertaken to regrade the steep eastern slopes, create development platforms in the southern and northern areas of the site; with a large excavation in the central area to remove shallow old mine workings and mine shafts and thereby recover the residual coal seams.

The earthworks materials were placed to an engineering specification to facilitate subsequent development and this work was designed and supervised by the consultants Scott Wilson (now AECOM). The environmental consultants, Smith Grant, provided advice on dealing with the industrial contamination plus supervision of the earthworks. The reclaimed site area was notionally sub-divided into a series of development modules. The consultants provided reports for each module which confirmed that the ground conditions were suitable for built development and that residual contamination was not a constraint to development.

Three of the modules in the southern area of the site have already been developed for residential housing. The Brymbo Land Use Plan incorporates four of the former development modules to the east of the Spine Road which runs north / south through the site. Wardell Armstrong have been commissioned to review the previous reports, particularly in respect of the geotechnical and contamination aspects, and to provide a new Ground Conditions Assessment report for each of the four modules. This will ensure that all of the (revised) development modules shown on the Land Use Plan will have a report confirming the suitability of that module for built development with no residual contamination constraints.

The Ty-Cerrig site area was not included in the steelworks reclamation project, as it was not affected by the industrial development of the steelworks. The site area is part of the much larger Ty-Cerrig opencast coal site which operated in the early 1970's. The natural materials which were returned to the excavation void were not compacted to an engineering specification. Consequently, the land needs to be re-engineered to facilitate built development. The granular nature (predominantly sandstones) of the backfill materials and the extensive depth to the groundwater table indicates that a range of ground improvement techniques would be available to re-engineer the ground conditions. For example:

- excavation, recompaction and re-contouring works upto a depth of circa 5m could provide a uniform surface crust across the whole development area for subsequent building, including roads and services.
- dynamic compaction is the technique of dropping a large weight (typically 15 tonnes) from a height of 20 m onto the ground. This technique could be used on the uncompacted ground prior to the formation of the compacted crust – thereby further improving the bearing capacity of the ground with reduced settlements.
- the excavated materials could be placed as a surcharge on the development areas – thereby improving the bearing capacity of the ground with reduced settlements.

The development module boundaries shown on the Land Use Plan have taken into account the former batter areas of the Ty-Cerrig excavation void. These steep batter zones have been avoided, in order to ensure there are no ground movement problems due to large differential settlements. At the appropriate time, a ground investigation will be undertaken to provide geotechnical information on the backfill materials and thereby decide on the most appropriate ground improvement technique(s). It is not anticipated that there will be constraints due to old shallow mine workings or old shafts at the Ty-Cerrig site. Further work has been commissioned to advise on the required scope of reclamation and re-engineering works.

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)
Sources of information:

Coal Authority Mining Report Ref 51002058064001

Wardell Armstrong LLP archive records

Published British Geological Survey geological mapping –SJ25SE

Coal Authority Datasets available under the Open Government Licence v3.

Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
1. Are there any recorded coal mine entries within the site or within 20m of the site boundary?	- Catastrophic collapse of mine entry leading to ground instability or voids at the ground surface. - Settlement of the ground surface above/adjacent to the mine entry. - Generation of crown holes at the ground surface. - Mines gas emissions	Yes: The Coal Authority (CA) report provides details on 33 mine entries (26 mine shafts and 7 adits). Of which, 26 are reported to be located within, or within 20m of the site boundary. 25 of the mine entries have no records of any kind of treatment being afforded to them. Mine entries 329353-119, -126, -127, -128, -131, -150, -151 and -280 are reported to have been treated, the details of which are provided within the attached mining report. Within the site, mine shaft 329353-151 is reported to have been stabilised in 2003, with the construction and installation of a concrete reinforced cap; mine shafts -150 and -280 are reported to have been potentially removed as part of the previous opencast operations; mine shaft -119 is reported to have been filled to an unknown specification at an unknown date. The remaining 4 mine entries are not reported to have been stabilised. The approximate locations of the mine entries can be seen on the map attached to the CA mining report.	Ground subsidence associated with the untreated mine entries. Sudden collapse of mine entry/entries leading to voids or instability at the ground surface. Possible mine gas emissions.	There are a substantial number of mine entries recorded to be present within the boundaries of the site and within influencing distance of the site. Only 4 of the recorded mine entries within the site have any records of treatment being afforded to them in the past. It is considered that the presence of the mine entries within, and within influencing distance of the site represents a considerable ground stability constraint in relation to any future proposed development. Nonetheless, it is known that thick deposits of fused steelworks slag (historically known to have supported the former rolling mill and steelworks buildings) are present at the site. It is anticipated that these fused slag materials should provide resistance to the formation of a broad area of collapse in the unlikely event of a catastrophic failure of a mine entry beneath the slag deposits. In this regard, the former site layout with added surcharge loading incorporated substantial longstanding non-engineered slopes standing at high angle (>60°), with no record of failure. It is recommended to ensure that the development layout seeks to avoid construction within the influencing distance of a mine entry. If the mine entries' locations are physically proven and the mine entry is stabilised, it may be possible to construct built development within a zone of influence, if agreed in advance with the CA and typically subject to the new built development including additional structural precautions. A desk based mine entry appraisal, whereby copies of the original source records of the mine entries have been obtained in order to verify their position, has been completed. This serves as a basis to inform the development layout and engineering options for the site. As part of the development, a scheme of intrusive investigation would be required to confirm the physical location of each mine

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)
Sources of information:

Coal Authority Mining Report Ref 51002058064001

Wardell Armstrong LLP archive records

Published British Geological Survey geological mapping –SJ25SE

Coal Authority Datasets available under the Open Government Licence v3.

Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
				entry and to afford an appropriate scheme of stabilisation works, in order to facilitate secure development. It would be prudent for the physical investigation to also seek to confirm the level of treatment afforded to mine entries -119, -126, -127, -128 and -131. A review of the draft land use plan (attached) shows that the eastern extent of the site (where the recorded mine entries are most prevalent) there is a mix of development including a public realm (including a Primary School), Residential and Retail. It is anticipated that the presence of the mine entries will significantly impact the proposed site layout in the eastern area (east of Phoenix Drive).
2. Is the proposed development in the likely zone of influence of past deep underground mining?	- Ground subsidence. - Ground instability.	Yes: The CA report that there are recorded deep workings beneath the site between 35m and 179m depth, last date of working being 1929.	Ground subsidence associated with deep underground coal mining can give rise to levels of damage to the built environment that may affect both serviceability and design life of a structure.	Ordinarily, ground movements arising from past deep underground mining activities would be expected to have ceased by say the 1940s. Accordingly, past deep mining activities do not represent a risk to the development area and as such no mitigation measures are required.
3. Is the proposed development in the likely zone of influence of any present underground mine workings?	- Ground subsidence. - Ground instability, loss of ground, generation of crown holes.	Active Mining: There are no active underground mines in the locality.	N/A	N/A
4. Is the proposed development within the likely zone of influence of recorded underground workings at shallow depth (depths of less than 30m)?	- Ground subsidence. - Ground instability, loss of ground, generation of crown holes.	Yes: The CA report the presence of abandoned shallow mine workings beneath the site within the Two Yard, Crown, and Blackbed coal seams at depths of 0m, 23m and 30m respectively. Review of BGS Geological Mapping shows that the Crown and Blackbed seams subcrop to the north and north-east of the site and dip towards the south/south-west at an approximate angle of 8°.	Ground subsidence associated with past shallow underground mining can result in severe localised ground instability and damage to the environment, harm to human health, injury or death of site users, site employees,	Based upon published geological mapping and the available CA data, potentially unstable abandoned mine workings within the Two Yard, Crown and Blackbed are present at influencing depths beneath the site. Additionally, the Main coal seam sits between the Blackbed and Crown coal seams, which may also have been worked at influencing depths beneath the site.

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)				
Sources of information: Coal Authority Mining Report Ref 51002058064001 Wardell Armstrong LLP archive records Published British Geological Survey geological mapping –SJ25SE Coal Authority Datasets available under the Open Government Licence v3.				
Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
		The BGS Mapping shows that the following coal seams are inferred to subcrop within the site; Smiths, Drowsell, Powell, Hollin, Crank and Quaker. Therefore it is possible that shallow unrecorded workings may be present at influencing depths within the site within these seams. The generalised vertical section (GVS) on the geological mapping also shows that the Main coal seam, recorded to be of a 3m thickness, sits between the Blackbed and Crown coal seams. Therefore it is possible that this seam has potentially been worked in the past and is present at influencing depths beneath the site.	maintenance operatives or construction workers using the site.	The geological mapping identifies that there are a further 6 seams which are inferred to subcrop within the boundaries of the site and are likely to be present at shallow depths. A large scale reclamation scheme was undertaken in 2003-2005, resulting in the partial removal of some of the coal seams present at shallow depth beneath the site. This process identified the presence of remnant abandoned mine workings in these excavations. It is recommended to undertake a comprehensive scheme of further investigation as part of the development, to confirm the coal seams present and to confirm the coal seams present and consider further the risk of shallow mine workings presenting possible areas of instability to future development. In the event that the proposed further investigations prove potential areas of instability then a scheme of stabilisation, usually by a programme of drilling and grouting, would need to be undertaken. It would also be beneficial to obtain the opencast completion plans for the site to determine if any of the identified coal seams have been removed as part of the opencast operations. The opencast completion plans could also be used to further inform future site investigation work.
5. Is there a possibility of unrecorded shallow mine workings and/or mine entries?	- Ground subsidence. - Ground instability, loss of ground, generation of crown holes. - Catastrophic collapse of mine entry leading to ground instability or voids at the ground surface. - Settlement of the ground surface above/adjacent to the mine entry. - Mine gas emissions	Yes: Although the CA do not refer to the potential for unrecorded shallow mine workings beneath the site, inspection of the geological mapping shows that Main coal seam is present stratigraphically between the Blackbed and Crown coal seams, which are both recorded to have been worked at shallow depth. Whilst the CA do not record workings within the Main coal seam, the BGS refer to it having a thickness of 3m, so is likely to have been of significant economic interest. In addition to the Main coal, there are a number of coal seams identified to subcrop within the eastern boundaries	Ground subsidence associated with past mine entries can result in severe localised ground instability and damage to the built environment, harm to human health, injury or death of construction workers using the site.	See Item 4

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)
Sources of information:

Coal Authority Mining Report Ref 51002058064001

Wardell Armstrong LLP archive records

Published British Geological Survey geological mapping –SJ25SE

Coal Authority Datasets available under the Open Government Licence v3.

Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
		of the site, these include the Smiths, Drowsell, Hollin, Crank, and Quaker seams. Although the CA record workings within these seams at a greater depths within the site, it is possible that these have also been worked closer to surface, towards the subcrop of the seam. Yes: Unrecorded mine entries may also exist on or within influencing distance of the site.		
6. Is there a record of mine gas emissions within the site boundary?	Mixtures of noxious of explosive gases reaching the ground surface via superficial deposits, faulted/broken strata or poorly filled mine entries and entering structures, confined spaces etc, when an explosive or asphyxiating hazard may be generated.	No: The Coal Authority has no record of any gas emissions requiring action within the site.	N/A	N/A
7. Is the proposed development in an area for which the Coal Authority is determining or has granted a licence to remove coal by underground methods?	- Ground subsidence. - Ground instability.	No	N/A	N/A
8. Are there known faults or other lines of weakness (eg. fissures) due to mining at the site?	- Ground subsidence. - Mixtures of noxious or explosive gases reaching the ground surface via faulted/broken strata and entering buildings, structures, confined spaces etc, when an explosive or asphyxiating hazard may be generated.	Yes: The Coal Authority records the presence of 3 faults which intersect the site in a northwest-southeast orientation. One of which is identified on the published geological mapping as the 'Brymbo Fault'. This fault is the most easterly fault.	Geological faults and mining induced weakness planes may provide the opportunity for unorthodox ground movements. Ground movement associated with faults in mining areas may cause significant damage.	The prospect of mining induced fault re-activation or significant differential movement across a geological fault is considered to be low. Should site investigation establish the presence of shallow mine workings, the risk of re-activation of a geological fault would be mitigated in the course of stabilisation work undertaken.

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)				
Sources of information: Coal Authority Mining Report Ref 51002058064001 Wardell Armstrong LLP archive records Published British Geological Survey geological mapping –SJ25SE Coal Authority Datasets available under the Open Government Licence v3.				
Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
	Stepped rockhead profiles where there has been subsidence across faults, impacting settlement of proposed structures.		Geological faulting dislocates the solid strata and the stratigraphy either side of the fault could differ. If depth to rock head is shallow and there is a “stepped” rock head profile across the fault, there may be differential settlement of any spread foundations constructed over it. Broken strata (associated with the fault) may allow a preferential route for mines gas migration to surface, where it may represent a potential hazard to both human health and the development.	The depth to rockhead should be accurately determined prior to construction starting. Different depths and founding conditions across the site should be allowed for during the design phase. Ground gas monitoring is recommended, prior to construction works commencing at the site, to determine the scope of any ground gas migration measures required in the new build.
9. Has the site been subject to remedial works by, or on behalf of, the Coal Authority under its surface hazard call out procedures?	Indication of past and potential future subsidence issues on site.	No.	N/A	N/A
10. Is the proposed development within the boundary of a surface mining/opencast site from which minerals have been removed by surface mining/opencast methods?	Potential of a ground gas source and/or migration pathway. Potential settlement problems.	Yes: The site is partially located within a former opencast mine licence area and unlicensed opencast site. The areas where the former opencast occupies the site are as shown on the attached plan accompanying the CA mining report.	Possible ground stability constraints including ground disturbance affecting properties and structural integrity of properties.	It would be advised to review the opencast completion plans for the site, in order to determine the areas where coal has been removed and in order to try and locate the position of any buried highwalls. A comprehensive site investigation is recommended in order to locate the buried highwalls and to determine the thickness and condition of backfill materials. Thick backfill deposits may provide a source and pathway for the migration of gases and an investigation and monitoring programme should be undertaken in order to inform the design of

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)				
Sources of information: Coal Authority Mining Report Ref 51002058064001 Wardell Armstrong LLP archive records Published British Geological Survey geological mapping –SJ25SE Coal Authority Datasets available under the Open Government Licence v3.				
Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
				any required ground gas precautions within new built development. It would be beneficial to combine this investigation with the shallow mining investigation as detailed within Items 4 and 5.
11. Is the proposed development within 200m of a surface mining/opencast site from which minerals are being removed?	Development constraints associated with environment/noise/dust	No.	N/A	N/A

Coal Mining Risk Assessment – Proposed Mixed Use Development (Residential, Commercial & Public Realm)
Sources of information:

Coal Authority Mining Report Ref 51002058064001

Wardell Armstrong LLP archive records

Published British Geological Survey geological mapping –SJ25SE

Coal Authority Datasets available under the Open Government Licence v3.

Issue	Hazard	Site Affected (Yes/No) (Detail – where appropriate)	Consequences (where appropriate)	Recommended Mitigation Measures (where appropriate)
-------	--------	---	-------------------------------------	--

Assessment of Cumulative Impact of Mining Issues:

This risk assessment has identified that there are 26 mine entries located within, or within 20m of the boundary of the site, of which only 4 have a record having been previously stabilised. The presence of a mine entry (particularly if not stabilised) can provide a significant constraint to the stability of built development and a desk based appraisal of the original source records has been undertaken to verify the identity and most probable position of each mine entry, in order to better inform detailed development layout proposals. Thereafter, it is recommended that physical investigation is undertaken to confirm the actual location of each mine entry and to facilitate an appropriate scheme of stabilisation works. It would be prudent to extend the scope of investigation to also confirm the level of treatment afforded to the 4 recorded treated mine entries. It should be noted that the majority of the reported mine entries are situated within the eastern part of the site, and their presence may influence the layout of the proposed development.

Parts of the site are situated within the boundaries of former opencast sites, as shown on the accompanying plan attached to the CA report. The presence of buried highwalls and significant thicknesses of backfill could represent a ground stability risk. The location of the buried high walls and the thicknesses and composition of backfill within the former opencast excavations is recorded within reports pertaining to both the Ty-Cerrig and eastern development parcels. Consideration of the performance of the opencast backfill should be undertaken during the detained design phase, ahead of the construction of new built development.

The CA also report that there are recorded underground workings at influencing depths beneath the site within the Two Yard, Crown and Blackbed coal seams at depths of 0m, 23m and 30m respectively. Review of BGS Geological Mapping also identifies that the Smiths, Drowsell, Powell, Hollin, Crank and Quaker coal seams are also inferred to subcrop within the boundaries of the site. Although the CA do report recorded workings within these seams at greater depths, it is possible that these seams could also be worked at shallow depth, towards their subcrop location. The BGS mapping also identifies that the Main coal seam may be present on site, between the Blackbed and Crown coal seams, and therefore this seam could also be potentially present at influencing depths beneath the site. It is recommended to undertake a comprehensive investigation to confirm the shallow mining setting at the site and determine whether potential areas affected by shallow mining exist. If potential areas of shallow mine workings are proven, then stabilisation would be required, typically by a programme of drilling and pressure grouting. Opencast and reclamation completion plans for the site have been obtained to identify the coal seams that have been removed as part of these operations, in order to refine the areas potentially requiring a scheme of further stabilisation.

The CA records the presence of 3 geological faults which intersect the site. Variable ground conditions may persist in the vicinity of geological faults and the depth to rockhead should be accurately determined prior to any construction works starting.

A ground gas investigation is recommended to be undertaken in consideration of the potential for sources of gas (coal seams, mine entries and thick backfill deposits) and viable migration pathways (mine entries, geological faults, permeable backfill deposits). The results of this investigation should be considered to determine the requirement and scope of ground gas protection measures required in the new development, as is routine for a development within a former coal mining area.

Prior to carrying out any works which may intersect, disturb or enter any coal seams, coal mine workings or mine entries (within the ownership of the Coal Authority), the written permission of the Coal Authority shall be obtained (www.coal.gov.uk/services/permissions/index.cfm).

Prepared by

K.D. Walker

: K Walker, Senior Geologist

Approved by

C. Smith

: C Smith, Technical Director



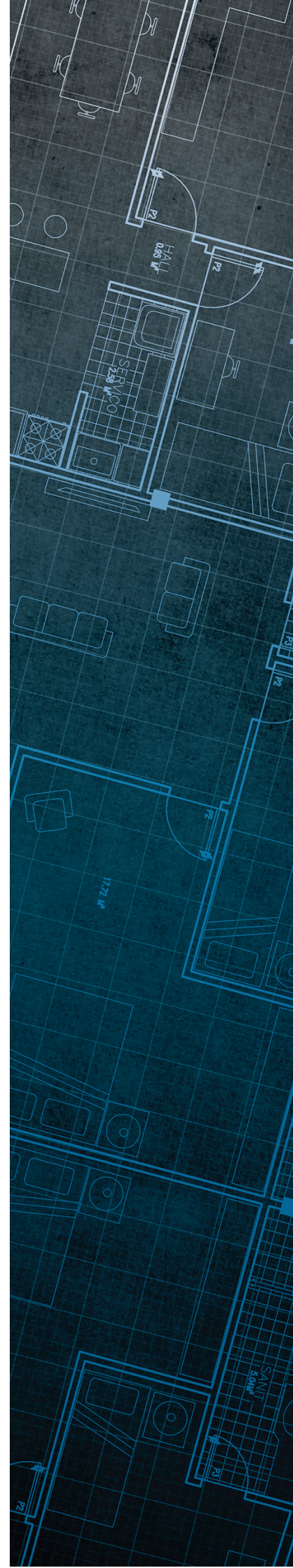
The Coal
Authority

Consultants Coal Mining Report

Former Brymbo Colliery Site
Wrexham
Wrexham

Date of enquiry:	13 March 2019
Date enquiry received:	13 March 2019
Issue date:	13 March 2019

Our reference:	51002058064001
Your reference:	ST23690



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

Wardell Armstrong LLP

Enquiry address

Former Brymbo Colliery Site
Wrexham
Wrexham

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

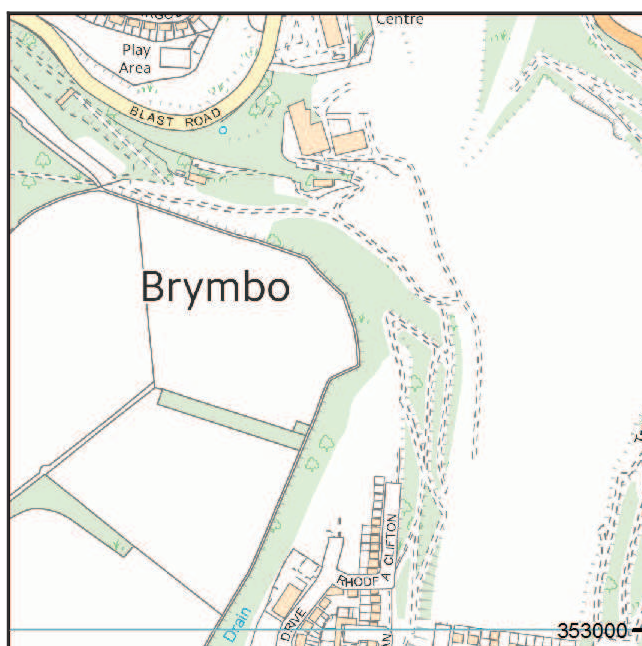
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2018. All rights reserved.

Ordnance Survey Licence number: 100020315

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
unnamed	TWO YARD	Coal	7OLT	0	Beneath Property	8.0	East	150	1800
unnamed	CROWN	Coal	3U6R	23	Beneath Property	8.0	East	110	1860
unnamed	BLACKBED	Coal	3U73	30	Beneath Property	8.0	East	120	1800
unnamed	UPPER STINKING	Coal	3VJ9	35	Beneath Property	8.1	South-East	100	1818
BRYMBO	CRANK	Coal	7OLR	64	Beneath Property	9.3	South-East	100	1864
unnamed	CRANK	Coal	7OLQ	72	Beneath Property	10.0	West	100	1889
unnamed	QUAKER	Coal	7P0K	79	Beneath Property	5.2	East	100	1874
unnamed	TWO YARD	Coal	3U2J	82	Beneath Property	11.1	East	150	1874
unnamed	POWELL	Coal	3VKG	89	Beneath Property	8.1	South-East	120	1914
unnamed	QUAKER	Coal	7P0L	89	Beneath Property	5.2	East	100	1842
unnamed	DROWSELL	Coal	3VJV	91	North-West	11.1	East	100	1827
unnamed	QUAKER	Coal	7OLK	96	Beneath Property	8.0	East	100	1800
unnamed	DROWSELL	Coal	3VJW	98	Beneath Property	8.1	South-East	90	1914
unnamed	RUABON YARD (SOFT 5 QTRS)	Coal	3U75	98	Beneath Property	8.1	South-East	90	1914
unnamed	WALL AND BENCH	Coal	3V5K	99	Beneath Property	11.3	East	70	1906
BRYMBO	CRANK	Coal	7OLS	102	South-West	9.3	South-East	100	1874
unnamed	BLACKBED	Coal	3U71	103	Beneath Property	3.4	North-East	120	1871
unnamed	POWELL	Coal	3VKJ	112	Beneath Property	8.1	South-East	120	1896
unnamed	WALL AND BENCH	Coal	3V5H	116	Beneath Property	8.1	East	50	1913
BRYMBO	MAIN	Coal	39YF	119	Beneath Property	5.0	South-East	200	1895
VRON	POWELL	Coal	3VKP	120	South-West	8.0	East	110	1929
unnamed	WALL AND BENCH	Coal	3V3J	123	Beneath Property	8.1	East	50	1913

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
unnamed	WALL AND BENCH	Coal	3V5N	147	Beneath Property	8.1	East	50	1913
unnamed	QUAKER	Coal	7P0M	179	Beneath Property	7.1	East	100	1877

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	329353-119	329014 353380	The shaft is filled to an unknown specification at an unknown date.	Coal	
Adit	329353-125	329238 353535		Coal	
Adit	329353-126	329278 353503	Drift entrance bricked up and rendered in 1970.	Coal	
Shaft	329353-127	329325 353494	In 1968 the shaft top was covered with RSJ's and sheeting. The entry was found to be open to a depth of 31.5m in 2002. The area around this shaft was secured with pallisade fencing.	Coal	
Shaft	329353-128	329336 353494	This shaft was found to be open to a depth of 61m from the top of the heapstead in 2002. The shaft was secured by constructing a palisade fencing on top of the brick heapstead.	Coal	
Adit	329353-129	329361 353478		Coal	
Shaft	329353-130	329439 353425		Coal	
Adit	329353-131	329458 353513	This entry was investigated in 2002 by JMC Mining Services and was found to be within a building. A metal grill was placed across the entrance to the building to prevent access. The adit was found to be open.	Coal	
Shaft	329353-132	329413 353672		Coal	
Shaft	329353-133	329492 353698		Coal	
Shaft	329353-134	329502 353635		Coal	
Shaft	329353-135	329532 353519		Coal	
Shaft	329353-136	329533 353505		Coal	
Adit	329353-137	329594 353501		Coal	
Shaft	329353-138	329682 353530		Coal	
Shaft	329353-139	329681 353492		Coal	
Shaft	329353-140	329735 353504		Coal	
Adit	329353-141	329688 353472		Coal	
Shaft	329353-142	329733 353458		Coal	
Adit	329353-143	329788 353452		Coal	
Shaft	329353-144	329771 353415		Coal	

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	329353-145	329779 353459		Coal	
Shaft	329353-146	329814 353438		Coal	
Shaft	329353-147	329830 353608		Coal	
Shaft	329353-150	329641 353274	Not located when area opencasted in 2003. This entry may now have been partially or fully removed by this method.	Coal	
Shaft	329353-151	329670 353200	Located by Brymbo Reclamation and Development when opencasted circa 2003. The shaft was capped to a British Coal specification which comprised of a 8m x 8m x 1.5m r/c cap founded at 173.3m AOD. Surface restored to 199.2m AOD	Coal	
Shaft	329353-152	329777 353243		Coal	
Shaft	329353-153	329765 353211		Coal	
Shaft	329353-154	329795 353163		Coal	
Shaft	329353-155	329895 353292		Coal	
Shaft	329353-156	329905 353273		Coal	
Shaft	329353-240	329767 353326		Coal	
Shaft	329353-280	329673 353176	The entry has been partially or fully removed by opencast methods	Coal	

Abandoned mine plan catalogue numbers

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

9528	NW1485	NW1483
NW1432	NW1425	NW1448
NW1414	16713	NW1528

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
POWELL	Coal	Yes	Within	N/A	140

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.

Faults 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.

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

Distance to site investigation (m)	Direction
14.9	North-East
18.0	East

See Section 4 for further information.

Remediated sites

Distance to site remediation (m)	Direction
23.7	North
21.8	North
21.8	North
23.7	North

See Section 4 for further information.

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.

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.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

Remediated sites

The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards.

The site requires further investigation and may influence your risk assessment. We recommend that you order the Coal Authority **Surface Hazards Incident Report**, which will include more information about the hazard.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

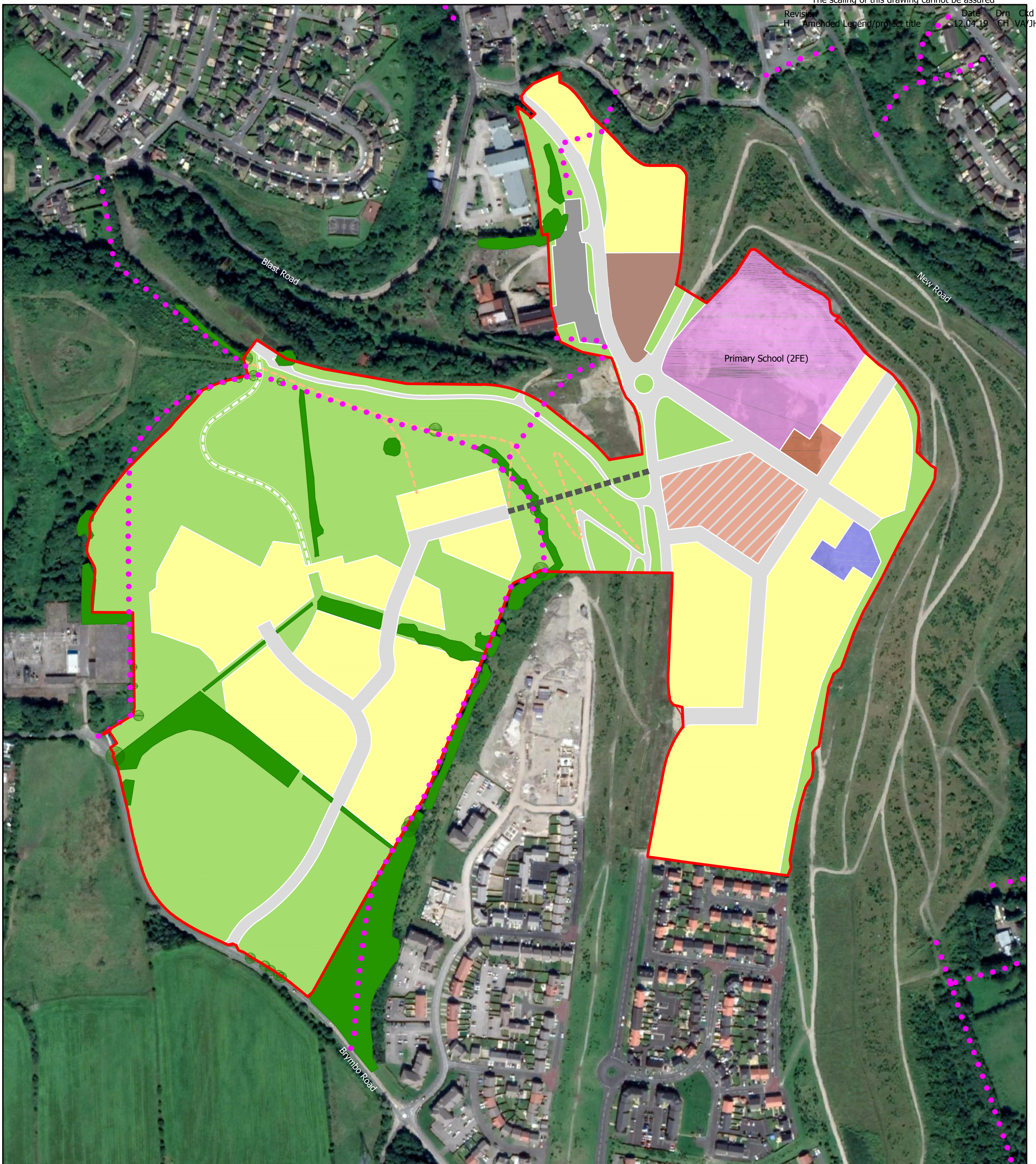
Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com



- Legend:

 - Site Boundary Boundary
 - Residential
 - Pub/Restaurant
 - Mixed Use (Foodstore, retail & residential)
 - Non Residential Use
 - Primary School (2FE)
 - Existing Access / Infrastructure
 - Shared Car Parking and Public Realm
 - Public Open Space
 - Steps
 - Footpath Network
 - Emergency Access
 - Existing Public Right of Way
 - Existing Trees
 - Existing Hedgerows Woodland Areas



**BARTON
WILLMORE**

Planning • Master Planning & Urban Design • Architecture •
Landscape Planning & Design • Environmental Planning • Graphic
Communication • Public Engagement • Development Economics

bartonwillmore.co.uk



Reproduced from the Ordnance Survey Map with the permission of the Controller of HMSO. Crown Copyright Reserved. Licence No. 10001927927000 - 27999\27900 - 27999\27968 - Brymbo Colliery\A4 - Dwgs & Registers\M Planning\27968 - RG-M-05H - Land Use Plan.dwg - -3 Aerial (1-2500\A2)

