# WHITESTONE SOLAR FARM

## Volume 6: Environmental Statement

## 6.20 Appendix 9.12: Coal Mining Risk Assessment: Whitestone 3

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## Glossary

| Term | Meaning |
|---|---|
| *Aquifer* | "Underground layers of water-bearing, permeable rock from which groundwater can be extracted" (British Geological Survey). |
| *Cable Corridors* | Corridors within which the high voltage cables would be constructed. |
| *Environmental Statement (ES)* | The Environmental Statement which presents the environmental information relating to the Proposed Development. The ES has been prepared to present information for formal consultation in accordance with current EIA regulation. |
| *Made Ground* | Land where the pre-existing ground surface is raised or replaced by artificial or man-made deposits. |
| *Order Limits* | Maximum extent of the Proposed Development comprising the Site and Cable Corridors. |
| *Secondary Aquifer* | Rocks which "can provide modest amounts of water, but the nature of the rock or the aquifer's structure limits their use. They support water supplies at a local rather than strategic scale (such as for private supplies) and remain important for rivers, wetlands and lakes. They have a wide range of water permeability and storage" (Environment Agency). Secondary Aquifers may be further classified as 'A', 'B' or 'Undifferentiated' based on their permeability and ability to support local water supplies and/or base flow to rivers. |
| *Study Area* | The spatial extent within which environmental receptors may experience likely significant effects from the Proposed Development. |
| *The Applicant* | Whitestone Net Zero Ltd |
| *The Application* | The Application submitted to the Secretary of State for a Development Consent Order. |
| *The Proposed Development* | The proposed Whitestone Solar Farm. |
| *The Site* | The land planned to be used for solar PV array and associated infrastructure, BESS, substation, and landscaping and habitat enhancement. The Site is split into W1, W2, and W3. |
| *Whitestone 1 (W1)* | The northern parcels of the Whitestone Solar Farm. |
| *Whitestone 2 (W2)* | The middle parcels of the Whitestone Solar Farm. |
| *Whitestone 3 (W3)* | The southern parcels of the Whitestone Solar Farm. |

## Acronyms

| Acronym | Meaning |
|---|---|
| *AIL* | Abnormal Indivisible Load |
| *AOD* | Above Ordnance Datum |
| *BESS* | Battery Energy Storage System |
| *BGL* | Below Ground Level |
| *BGS* | British Geological Society |

| Acronym | Meaning |
|---|---|
| *DCO* | Development Consent Order |
| *ERM* | Environmental Resources Management |
| *ES* | Environmental Statement |
| *NEDDC* | North East Derbyshire District Council |
| *NSIP* | Nationally Significant Infrastructure Project |
| *PCS* | Power Conversion System |
| *PV* | Photovoltaic |
| *SAC* | Special Areas of Conservation |
| *SPA* | Special Protection Areas |
| *SSSI* | Sites of Special Scientific Interest |
| *W1* | Whitestone 1 |
| *W2* | Whitestone 2 |
| *W3* | Whitestone 3 |

**Units**

| Units | Meaning |
|---|---|
| *ha* | Hectares |
| *km* | Kilometres |
| *kV* | Kilovolt |
| *m* | Metres |
| *MW* | Megawatts |

# 9.12 Coal Mining Risk Assessment: Whitestone 3

## Introduction

9.12.1 This Appendix of the Environmental Statement (ES) has been prepared by Environmental Resources Management (ERM) on behalf of Whitestone Net Zero Ltd (the Applicant) in relation to the Development Consent Order (DCO) Application for the construction, operation, maintenance and decommissioning of the Whitestone Solar Farm (the Proposed Development). It is understood that the Applicant wishes to understand the potential structural stability risks for redevelopment activities that may be undertaken in relation to the Proposed Development.

## Order Limits

9.12.2 The extent of the Order Limits are described in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]** and shown in **ES Volume 3, Figure 3.1: Order Limits [EN0110020/APP/6.19]**. The Proposed Development is described in **ES Volume 1, Chapter 5: The Proposed Development [EN0110020/APP/6.5]** and shown spatially on the **Works Plans [EN0110020/APP/2.3]**.

## The Proposed Development

9.12.3 The Proposed Development involves the construction, operation and maintenance, and decommissioning of more than 100 megawatt (MW) of solar photovoltaic (PV) array, Battery Energy Storage System (BESS), onsite substations and supporting infrastructure, and grid connection infrastructure. The grid connection infrastructure would connect the Proposed Development to the new 400 kilovolt (kV) National Grid substation proposed on land immediately east of Long Lane, Brinsworth, S60 4JJ (Long Lane 400kV Substation). National Grid have applied to Rotherham Metropolitan Borough Council for the development of this new substation which is intended by National Grid to be operational in time for the Proposed Development to connect in 2029. This substation is therefore not included in the Proposed Development and will be subject to a separate planning application taken forward by National Grid.

9.12.4 As the Proposed Development would have a generating capacity in excess of 100MW, it is considered to be a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008.

9.12.5 The Proposed Development would be located within the Order Limits. The Order Limits encompass the total area of the project comprising the Site and Cable Corridors. The Site is specifically the land that is planned to be used for solar PV array and associated infrastructure, BESS, substation, landscaping and habitat enhancement. The Site is split into Whitestone 1 (W1), Whitestone 2 (W2), and Whitestone 3 (W3).

9.12.6 Highway Works are sections of the highway network that will contain localised improvements, such as improvements to road edge where it is deteriorated, or temporary highway and traffic works required to safely accommodate the Abnormal Indivisible Load (AIL) deliveries. These areas will support the movement of construction vehicles on narrower sections of the local highway

network within parts of the construction vehicle routes to the Site (as described in **ES Volume 2, Chapter 13: Traffic and Transport [EN0110020/APP/6.13]**)

9.12.7 This Appendix is supported by the following figures [**EN0110020/APP/6.19]**:

- **ES Volume 3, Figure 3.1: Order Limits**;
- **ES Volume 3, Figure 3.2: Site Referencing**;
- **ES Volume 3, Figure 3.4: Environmental Designations**;
- **ES Volume 3, Figure 9.3: Coal Mining High Risk Development Areas**;
- **ES Volume 3, Figure 9.10.1: Superficial Geology**;
- **ES Volume 3, Figure 9.10.2: Bedrock Geology**; and
- **ES Volume 3, Figure 9.10.3: Bore Hole Locations**.

9.12.8 This Report covers the associated baseline and risks attributed to historic coal mining activity for the W3. W1 and W2, the remaining sections that comprise the Proposed Development will be covered in their own coal mining risk assessments (**ES Volume 3, Appendix 9.10: Coal Mining Risk Assessment: Whitestone 1 [EN0110020/APP/6.20]** and **ES Volume 3, Appendix 9.11: Coal Mining Risk Assessment: Whitestone 2 [EN0110020/APP/6.20]**.

## Whitestone 3

9.12.9 W3 is the name for the southern area of solar panels and is located in RMBC, centred around NGR SK 481807. Where the Site intersects the A618 (Mansfield Road), the Site crosses into North East Derbyshire District Council (NEDDC). W3 covers an area of approximately 172ha and is bisected in the south by the M1.

9.12.10 W3 abuts Harthill Reservoir and Hard Lane to the east, the A618 and the Derbyshire County border to the south and west and is approximately 500m south of Kiveton Park and the village of Wales. It is a broad open landscape with expansive views from elevated areas; the topography consists of small hills such as Stone Hill (144m above ordnance datum (AOD)) in the west of the Site. In the lower parts there are belts of trees which contain views from these areas. Residential receptors are generally concentrated in the villages of Woodall, Harthill, Kiveton Park, Wales, and High Moor. W3 is also located in the Rotherham Green Belt as discussed in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN0110020/APP/6.4]**, and **ES Volume 3, Appendix 2.1: Relevant Legislation, Policy, and Guidance [EN0110020/APP/6.20]**, and shown in **ES Volume 3, Figure 3.4: Environmental Designations [EN0110020/APP/6.19]**.

9.12.11 The solar PV arrays will be mounted on frames with foundations extending up to 3m below ground level (BGL). The BESS, Substations and Power Conversion System (PCS) will be mounted on permanent concrete foundations which may extend up to 4m BGL. The cable routes will be installed in temporary trenches, which will be dug to depths of up to 1.2m BGL.

9.12.12 W3, is shown in **ES Volume 3, Figure 3.2: Site Referencing [EN0110020/APP/6.19]**. As shown on **ES Volume 3, Figure 9.10.3: Bore Hole Locations [EN0110020/APP/6.19]**, the areas located within the blue line boundaries depict the areas of W3 which have been identified as having the highest potential risks due to historic coal mining activity. This was determined through an assessment of the Mining Remediation Authority Map Viewer[1] and identifying which areas of W3 overlapped with areas designated as Development

High Risk Areas. As such, these are the areas that will be focused on for this risk assessment. These areas of W3 will be henceforth referred to as the Site.

9.12.13 Historically this area has been subject to extensive deep coal mining activities. The Kiveton, Highmoor, Kiveton Park, Norwood, Barlborough, Westthorpe, Holbrook & Norwood, Wales and Baugy Hill collieries have been identified as having worked coal seams beneath the Proposed Development.

9.12.14 This Report uses available, identified data to review the potential coal mining risks that may be associated with future redevelopment and also determine if an intrusive investigation is warranted.

## Environmental Site Setting

9.12.15 ERM has completed an assessment of the environmental setting of the Site (geology, hydrogeology, hydrology, and surrounding land uses including sensitive receptors). A summary of the current setting is presented below:

### Geology

9.12.16 Much of the Site is not underlain by any superficial deposits. The southern and western sections do not have any superficial deposits.

9.12.17 The most northern sections are partially underlain by two distinct superficial deposits:

- Head of clay, silt, sand and gravel (Quaternary); and
- Alluvium of clay, silt, sand and gravel (Quaternary).

9.12.18 Large areas of the southern section, and the most western boundary of the northern section are recorded by the British Geological Society (BGS) Geoindex[2] as Artificial Ground.

9.12.19 The solid (bedrock) geology consists varying narrow bands of the Pennine Middle Coal Measures of mudstone, siltstone and sandstone, and Oaks Rock of sandstone in the southwest of the Site.

9.12.20 According to the Coal Mining Consultants Report and the BGS Geoindex, the nearest geological fault line is shown running through the southern sections of the Site, running southwest to northeast.

9.12.21 There are a number of previously drilled boreholes. Many of these boreholes are from underground coal mining in order to identify the thickness and geological makeup of the coal seams. One such borehole in the south (SK48SE46), starts at the Clowne coal seam (~130m BGL) and identifies multiple thin banded coal seams and sandstone layers up to a depth of ~175m BGL. A further deeper borehole in the north (SK48SE32) identifies the geology as interbedded clays, sandstones, siltstones and mudstones up to a depth of ~160m BGL where the Clowne coal seam is encountered. The superficial and bedrock geology are shown on **ES Volume 3, Figure 9.10.1: Superficial Geology [EN0110020/APP/6.19]** and **ES Volume 3, Figure 9.10.2: Bedrock Geology [EN0110020/APP/6.19]**, respectively.

### Hydrogeology

9.12.22 The alluvium superficial deposits underlying the north of the Site are categorised as a secondary (undifferentiated) aquifer.

9.12.23 The coal measures bedrock underlying the Site is classed as a Secondary A Aquifer.

9.12.24 There is no record from the surrounding borehole logs of a groundwater depth.

### Hydrology

9.12.25 There are no significant surface water features located on the Site.

9.12.26 The closest significant surface water feature is Harthill Reservoir located approximately 200m from the southern section of the Site.

### Other Sensitive Land Uses

9.12.27 There are no Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) or Special Protection Areas (SPAs) within 1km of the Site.

9.12.28 The nearest Ancient Woodland is Nor Wood, located approximately 400m west of the northern section of the Site.

### Vulnerability and Sensitivity

9.12.29 ERM considers the groundwater vulnerability to be low-moderate due groundwater depth being undefined but with predominantly low permeability geology. ERM considers groundwater sensitivity to be moderate due to the Secondary A aquifer bedrock.

9.12.30 ERM considers the surface water vulnerability to be moderate due to the closest water feature being located within 200m of the Site. ERM considers the surface water sensitivity to be moderate-low based on poor ecological and chemical status of Harthill Reservoir and Broad Bridge Dike.

## Coal Authority Report Review – South

9.12.31 ERM have reviewed the Coal Authority Report for the Site which is summarised below.

### Past Underground Coal Mining

9.12.32 Past underground coal mining is considered a Low risk to the southern section of W3.

9.12.33 The southern section of W3 is in an area that could be affected by underground mining in 17 seams of coal from 91m BGL to 478m BGL and last worked in 1981.

9.12.34 The seams are not likely within influencing depth of the surface and if movement in the ground had occurred due to coal mining activity associated with these workings, this should have ceased by now. All ground disturbance associated with the Proposed Development will only be up to a depth of 4m BGL which is not in influencing depth of past underground workings.

9.12.35 In addition, the southern section of W3 is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past.

9.12.36 The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. This is further considered later in the risk assessment.

## Present Underground Coal Mining

9.12.37 Present underground coal mining is considered a Low risk to the southern section of W3.

9.12.38 The southern section of W3 is not within an area that could be affected by present underground mining.

9.12.39 The southern section of W3 is not in an area where the Coal Authority has received an application for or is currently considering whether to grant a licence to remove or work coal by underground methods.

9.12.40 The southern section of W3 is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

9.12.41 The southern section of W3 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.

## Future Underground Coal Mining

9.12.42 Future underground coal mining is considered a Low risk to the southern section of W3.

9.12.43 The southern section of W3 is not located in an area where the Coal Authority has received an application for a coal mining license.

## Mine Entries

9.12.44 Mine entries are considered a Medium risk to the southern section of W3.

9.12.45 There is one recorded mine entry located on the Site. It is recorded as a mine shaft (ref. 448379-001) located in the south of the Site. The condition of the disused mine shaft is described as probably having been removed to some extent by opencast mining. The Coal Authority notes that pre-1947, there was no requirement for operators to record mine entry treatment details when ceasing operations. Therefore, it does not necessarily mean that these shafts were left untreated. The mine entries are shown on **ES Volume 3, Figure 9.3: Coal Mining High Risk Development Areas [EN0110020/APP/6.19]**.

## Coal Mining Geology

9.12.46 Coal mining geology is considered a Low risk to the southern section of W3.

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

## Past, Present and Future Opencast Coal Mining

9.12.48 Past, present and future opencast coal mining is considered a Medium risk to the southern section of W3.

9.12.49 The eastern and northern areas of the Site are recorded as being Unlicensed Opencast Sites. The Wales and 2nd Wales outcrops are both present within the southern section of W3. The opencast site mirrors the BGS Geoindex records for artificial, infilled land. This information suggests that the Wales and 2nd Wales outcrops were likely worked for opencast coal and subsequently infilled with mine spoil or other unknown material. As such the vast majority of the Site is classified as a Development High Risk Area.

9.12.50 Outside of the Order Limits of W3, there are further Unlicensed Opencast Sites to the south and southwest, both within 500m. There is also an Opencast Mine License Area, named as Park Brook Reclamation (High Moor Colliery Site) located 600m west, on the western side of the A618.

9.12.51 There are no Coal Authority managed tips within 500m of the Site.

## Coal Mining Subsidence

9.12.52 Coal mining subsidence is considered a Medium risk to the southern section of W3.

9.12.53 There is a subsidence claim within 50m of W3 that does not match the address. It is located adjacent to the western section of W3 (south of the A618).

9.12.54 There are no current Stop Notices delaying the start of remedial works or repairs to W3

9.12.55 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

9.12.56 Mine gas is considered a Medium risk to the southern section of W3.

9.12.57 There is one record of mine gas incident located 403m northwest of the Site. The Coal Authority recommends that the Site requires further investigation and may influence the risk assessment. It is recommended to order the Coal Authority Mine Gas Emission Report.

## Hazard Related to Coal Mining

9.12.58 Hazard related to coal mining is considered a Low risk to the southern section of W3.

9.12.59 W3 has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

## Mine Water Treatment Schemes

9.12.60 Mine water treatment schemes are considered a Low risk to the southern section of W3.

9.12.61 The Coal Authority has no record of Mine Water Treatment Schemes within 500m of W3.

### Coal Authority Managed Tips

9.12.62 Coal Authority managed tips are considered a Low risk to the southern section of W3.

9.12.63 The Coal Authority report that there are no Coal Authority Managed Tips within 500m of W3.

## Coal Authority Report Review – West

9.12.64 ERM have reviewed the Coal Authority Report for the Site which is summarised below.

### Past Underground Coal Mining

9.12.65 Past underground coal mining a Low risk to the western section of W3.

9.12.66 The western section of W3 is in an area that could be affected by underground mining in over 20 seams of coal from 41m to 482m depth and last worked in 1968.

9.12.67 The seams are not likely within influencing depth of the surface and if movement in the ground had occurred due to coal mining activity associated with these workings, this should have ceased by now. All ground disturbance associated with the Proposed Development will only be up to a depth of 4m BGL which is not in influencing depth of past underground workings.

9.12.68 In addition, the western section of W3 is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. There are no outcrops recorded within the western section of W3.

9.12.69 The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. This is further considered later in the risk assessment.

### Present Underground Coal Mining

9.12.70 Present underground coal mining is considered a Low risk to the western section of W3.

9.12.71 The western section of W3 is not within an area that could be affected by present underground mining.

9.12.72 The western section of W3 is not in an area where the Coal Authority has received an application for or is currently considering whether to grant a licence to remove or work coal by underground methods.

9.12.73 The western section of W3 is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

9.12.74 The western section of W3 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.

## Future Underground Coal Mining

9.12.75 Future underground coal mining is considered a Low risk to the western section of W3.

9.12.76 Not in an area where the Coal Authority has received an application for a coal mining license.

## Mine Entries

9.12.77 Mine entries are considered a Medium risk to the western section of W3.

9.12.78 There are three recorded mine entries located on the Site. Two are located in the south of W3 (refs. 447379-001 and 447379-010), while the third is in the northwest (ref. 447380-001).

9.12.79 All three are identified as shafts. The two southern shafts are described as likely removed to some extent by opencast mining. The condition and treatment details of the third, northwestern shaft is unknown. The Coal Authority notes that pre-1947, there was no requirement for operators to record mine entry treatment details when ceasing operations. Therefore, it does not necessarily mean that these shafts were left untreated. These are shown on **ES Volume 3, Figure 9.3: Coal Mining High Risk Development Areas [EN0110020/APP/6.19]**.

## Coal Mining Geology

9.12.80 Coal mining geology is considered a Low risk to the western section of W3.

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

## Past, Present and Future Opencast Coal Mining

9.12.82 Past, present and future opencast coal mining is considered a Low risk to the western section of W3.

9.12.83 The western section of W3 is not within the boundary of an opencast site and there are no records of unlicensed opencast mining within the Site boundaries. There are unlicensed opencast mine sites located between 150m southwest and 500m south.

9.12.84 There are no opencast licensed areas within the western section of W3. The Coal Authority indicates that the Park Brook Reclamation opencast mine licensed area is located approximately 50m southwest of the Site.

9.12.85 There are no Coal Authority managed tips within 500m of the Site.

## Coal Mining Subsidence

9.12.86 Coal mining subsidence is considered a Medium risk to the western section of W3.

9.12.87 There is a claim within 50m of W3 that does not match the address. It is located adjacent to the southern section of the Order Limits of W3 (south of the A618).

9.12.88 There are no current Stop Notices delaying the start of remedial works or repairs to the western section of W3.

9.12.89 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

9.12.90 Mine gas is considered a Medium risk to the western section of W3.

9.12.91 There are two records of mine gas incident located 25m and 230m southwest of the Site. The Coal Authority recommends that the Site requires further investigation and may influence the risk assessment. It is recommended to order the Coal Authority Mine Gas Emission Report

## Hazard Related to Coal Mining

9.12.92 Hazard related to coal mining is considered a Low risk to the western section of W3.

9.12.93 The western section of W3 has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

## Mine Water Treatment Schemes

9.12.94 Mine water treatment schemes are considered a Low risk to the western section of W3.

9.12.95 The Coal Authority has no record of Mine Water Treatment Schemes within 500m of W3.

## Coal Authority Managed Tips

9.12.96 Coal Authority managed tips are considered a Low risk to the western section of W3.

9.12.97 The Coal Authority report that there are no Coal Authority Managed Tips within 500m of W3.

## Coal Authority Report Review – North

9.12.98 ERM have reviewed the Coal Authority Report (380831843_1, dated 7 July 2025) for the Site which is summarised below.

## Past Underground Coal Mining

9.12.99 Past underground coal mining is considered a Low risk to the northern section of W3.

9.12.100 The northern section of W3 is in an area that could be affected by underground mining in 22 seams of coal from 2m BGL to 557m BGL and last worked in 1980. The shallower seams will have been open cast.

9.12.101 The deeper seams are not likely within influencing depth of the surface and if movement in the ground had occurred due to coal mining activity associated with these workings, this should have ceased by now. All ground disturbance

associated with the Proposed Development will only be up to a depth of 4m BGL which is not in influencing depth of past underground workings.

9.12.102 In addition, the northern section of W3 is in an area where the Coal Authority believes there is coal at or close to the surface. This coal is likely to have been worked at some time in the past. There are inferred coal outcrops of the Wales seam located in the very northwest of the Site.

9.12.103 The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. This is further considered later in the risk assessment.

## Present Underground Coal Mining

9.12.104 Present underground coal mining is considered a Low risk to the northern section of W3.

9.12.105 The northern section of W3 is not within an area that could be affected by present underground mining.

9.12.106 The northern section of W3 is not in an area where the Coal Authority has received an application for or is currently considering whether to grant a licence to remove or work coal by underground methods.

9.12.107 The northern section of W3 is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

9.12.108 The northern section of W3 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.

## Future Underground Coal Mining

9.12.109 Future underground coal mining is considered a Low risk to the northern section of W3.

9.12.110 The northern section of W3 is not in an area where the Coal Authority has received an application for a coal mining license.

## Mine Entries

9.12.111 Mine entries are considered a Medium risk to the northern section of W3.

9.12.112 There are 15 recorded mine entries located on the Site and within 100m of W3, with eight of these directly on Site. They are all concentrated in the northern area of the Site.

9.12.113 All 15 are identified as shafts. Six of them have been reported as filled and capped with reinforced concrete, while two have been found filled but with no further details on their capping. The remaining seven shafts have no detailed treatments. The Coal Authority notes that pre-1947, there was no requirement for operators to record mine entry treatment details when ceasing operations. Therefore, it does not necessarily mean that these shafts were left untreated. These are shown on **ES Volume 3, Figure 9.3: Coal Mining High Risk Development Areas [EN0110020/APP/6.19]**.

## Coal Mining Geology

9.12.114 Coal mining geology is considered a Low risk to the northern section of W3.

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

## Past, Present and Future Opencast Coal Mining

9.12.116 Past, present and future opencast coal mining is considered a Medium risk to the northern section of W3.

9.12.117 The northeastern areas of the Site are recorded as being Unlicensed Opencast Sites. The Wales outcrop is inferred within the Order Limits of W3. The opencast site mirrors the BGS Geoindex records for artificial, infilled land. This information suggests that the Wales outcrop was likely worked for opencast coal and subsequently infilled with mine spoil or other unknown material. The Wales and 2nd Wales seams are also identified at depths of 2m and 12m, implying that shallow and opencast coal mining works would be likely.

9.12.118 There are no opencast licensed areas within the northern section of W3.

## Coal Mining Subsidence

9.12.119 Coal mining subsidence is considered a Low risk to the northern section of W3.

9.12.120 There are no claims within 50m of W3 for coal mining subsidence.

9.12.121 There are no current Stop Notices delaying the start of remedial works or repairs to W3.

9.12.122 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

9.12.123 Mine gas is considered a Low risk to the northern section of W3.

9.12.124 There are no records of mine gas incidents within 500m of W3. The Coal Authority states that this does not necessarily mean that no mine gas is present within the vicinity of the Site and that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases.

## Hazard Related to Coal Mining

9.12.125 Hazard related to coal mining is considered a Low risk to the northern section of W3.

9.12.126 The northern section of W3 has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

## Mine Water Treatment Schemes

9.12.127 Mine water treatment schemes is considered a Low risk to the northern section of W3.

9.12.128 The Coal Authority has no record of Mine Water Treatment Schemes within 500m of W3.

## Coal Authority Managed Tips

9.12.129 Coal Authority managed tips are considered a Low risk to the northern section of W3.

9.12.130 As detailed in the Coal Authority Report, there are no Coal Authority Managed Tips within 500m of W3.

# Summary of Mine Entries

9.12.131 The summary of mine entries are set out in **Table 9.12.1**.

**Table 9.12.1 Summary of Mine Entries**

| Entry Type | Reference | Grid Reference | Treatment Description |
|---|---|---|---|
| Shaft | 448379-001 | 448314 379449 | Has probably been removed to some extent by opencast mining |
| Shaft | 447381-001 | 447960 381913 | Was found filled and subsequently capped with 4.6m x 4.6m x 0.23m thick reinforced concrete in 1974 |
| Shaft | 447381-004 | 447975 381982 | Treatment details unknown |
| Shaft | 447381-005 | 447978 381863 | Treatment details unknown |
| Shaft | 447382-008 | 447963 382050 | Has been filled and capped with 0.22m thick reinforced concrete. |
| Shaft | 447382-018 | 447934 382004 | Treatment details unknown |
| Shaft | 448381-001 | 448048 381901 | Treatment details unknown |
| Shaft | 448381-002 | 448048 381848 | Has been filled and capped (4.27m sq. x 0.23m concrete) |
| Shaft | 448381-003 | 448070 381927 | Has been filled and capped (3.65m sq. x 0.23m thick reinforced concrete) |
| Shaft | 448381-004 | 448060 381774 | Has been filled and capped (3.5m sq. x |

| | | | |
|---|---|---|---|
| | | | 0.23m thick reinforced concrete) |
| Shaft | 448381-005 | 448035 381956 | Was found filled in 1975 |
| Shaft | 448381-006 | 448081 381993 | Treatment details unknown |
| Shaft | 448381-007 | 448072 381857 | Treatment details unknown |
| Shaft | 448381-008 | 448001 381801 | Has been filled and capped (4.9m sq. reinforced concrete) |
| Shaft | 448382-002 | 448038 382019 | Was found filled in 1974 |
| Shaft | 448382-007 | 448045 382006 | Treatment details unknown |
| Shaft | 447379-001 | 447162 379944 | Has probably been removed to some extent by opencast mining |
| Shaft | 447379-010 | 447190 379926 | Has probably been removed to some extent by opencast mining |
| Shaft | 447380-001 | 447025 380604 | Treatment details unknown |

*Before the coal industry was nationalised in 1947, there was no requirement for a mine operator to record mine entry treatment details when a mine was abandoned. Therefore, it is not unusual for there to be no treatment details for many of the 176,000 recorded mine entries on the Coal Authority database. Despite this, the fact that there are no treatment records does not necessarily mean that the mine entries were left untreated when abandoned.

## Shallow Coal Mining Risk Assessment

9.12.132 Based on review of the Coal Authority Report, there are four main identified risks from past coal mining activities to the development.

9.12.133 Firstly, relating to the potential for historical mine entries from coal mining activities in the development area, which may reflect localised disturbed ground or voids. A total of 19 mine shafts were recorded within the Site and up to 100m of W3, of which, nine are in array areas and two are in mitigation areas, the others lying outside W3. Eight of these have been reported as having no treatment details, and another three have likely been removed by opencast mining, including all three in the southern part of W3. With no treatment details available, therefore, the risk to the future development is considered to be medium.

9.12.134 Secondly, there have been two reported incidents of mine gas within 500m of the Site, with the nearest occurring 25m southwest of the western section of the Site. Although there have been no recorded incidents of mine gas within the Site boundaries, this does not mean that mine gas is not present within the vicinity. As ground works are expected with the installation of cables and foundations for solar arrays, there may be the potential for ground gases to be displaced. As

such, the risk from ground gases to the future development is considered to be medium.

9.12.135 Thirdly, there is a single coal subsidence claim within 50m of the southern and western sections of the Site. Although no current stop notice is in place, the claim does not relate to the Site, and the Coal Authority is not aware of any request having been made to carry out preventive works, there is still the possibility that subsidence from coal mining can/has occurred within the Site boundaries but has not been recorded. This is of a higher likelihood in the areas of the Site with mine entries and the potential of unknown voids. As such, the risk from subsidence is considered to be medium.

9.12.136 Finally, relating to the areas of unlicensed opencast mining within the Site, these are significant in the southern (12ha) and northern (7ha) sections, where the Wales coal outcrops are identified near the surface (2m and 12m BGL). These areas correspond to areas of artificial infilled land identified within W3 and areas considered High Risk for Development by the Mining Remediation Authority. The nature and extent of the backfilled material is currently unknown and could pose a contamination and subsidence risk.

## Conclusions

9.12.137 With regards to the development area, a review of available Coal Authority and BGS data has established the following risk ratings:

9.12.138 19 mine entries were identified within the Site and up to 100m of W3. 11 of these have no information regarding their current condition or their treatment, ERM considers this a risk to development as there could be the presence of contamination from backfilling material and unknown voids which could create a subsidence risk. ERM recommends that below ground installations, including foundations for solar panels and other permanent infrastructure, is avoided in the zones of influence around known mine entries. If this cannot be avoided, then further Phase 2 investigations to establish the geotechnical risk, or other mitigation will be required.

9.12.139 Mine gas incidents have been recorded within 25m of W3. Although there is no record of mine gas within W3, there is still the possibility that it is present. ERM recommends a further Phase 2 assessment to establish whether mine gas is present, especially in the vicinity of known mine entries present on the Site.

9.12.140 It is considered likely that shallow coal workings have occurred within W3. A review of Coal Authority and BGS data indicates the presence of shallow coal outcrops which were likely worked from opencast mines and subsequently infilled with mine spoil and other unknown material. BGS borehole logs identified coal measures and likely coal workings at depths of approximately 2m BGL.

9.12.141 If, during construction, disturbed ground or voids are identified it is expected that this could be managed during the construction in accordance with Coal Authority requirements. With the condition of the infilled land unknown, potential contamination could have the possibility of being migrated during construction activities.

9.12.142 ERM has not identified any significant risk to the development from past, current or future deep coal mining activities. Although there has been extensive underground coal mining beneath the Site, the last recorded activities occurred in 1981. It is likely that at this depth, there is little influencing of the surface and if

movement in the ground had occurred due to coal mining activity associated with these workings, it should have ceased by now.

9.12.143 There has been one subsidence claim within 50m of the western section of the Order Limits of W3. This indicates that there could be further subsidence issues within the Site due to past coal mining activities.

9.12.144 A site walkover and likely Phase 2 geotechnical assessment to assess the status of the infilled land due to shallow and opencast coal mining activities within the Proposed Development, as well as the condition and treatment of the mine entries, and the geotechnical stability of the Site to confirm the risk from subsidence are recommended.

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