



**The Coal
Authority**

Site Inspection Report

Pen y Graig Quarry, Ystalyfera



Client: Neath Port Talbot County Borough Council

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1.0 Introduction

The Coal Authority was instructed by Neath Port Talbot County Borough Council to undertake an inspection of Pen Y Graig Quarry, Ystalyfera.

The purpose of the inspection was to provide an assessment of stability and safety issues pertaining to the site and to supplement a previous inspection undertaken on the 3rd August 2017.

The site was inspected by Darren Bryant of the Coal Authority, on Monday 22nd January 2018.

Weather conditions at the time of inspection comprised occasional light drizzle. The preceding 48 hours had seen significant rainfall in the area.

The inspection has taken account of features observable at the time of inspection, and may not characterise all aspects of the site due to restrictions on access for safety reasons and vegetation coverage. It is possible that evidence of ground movement may be present that could not be observed at the time of inspection.

On-going vegetation clearance permitted a close inspection of the face and lower bench of the cliff immediately to the east of the quarry. Further vegetation clearance is understood to be planned to allow inspection of the lower bench and plateau.

2.0 Site Conditions

The site comprises a disused quarry, within private ownership, located on the western slopes of the Swansea valley, above the village of Ystalyfera. It extends from an elevation of around 190m AOD at the eastern edge of the site to 210m AOD at the crest of the former high wall. The quarry floor is elevated at approximately 205m AOD, with local mounds of spoil rising to 207m AOD. The quarry occupies an area of approximately 100m x 100m. The site location is shown on Figure 1.

The topography includes a vertical high wall along the north western boundary, with a partially infilled quarry floor. Numerous mounds of quarry spoil are situated within the site boundary.

The majority of the site is reasonably well vegetated with grass cover.

The south eastern perimeter is defined by a very steep, near vertical, cliff face, at the base of which are two benches (upper and lower) with a number of recorded mine entries (adits).

There are no significant drainage features on the site, and despite very heavy rain during the inspection, no areas of standing water were identified.

Inspection of the British Geological Survey sheet for the area indicates the strata at the site to comprise Llynfi Beds sandstones with interbedded siltstones, dipping south at relatively shallow angles. The stratigraphic boundary of this sandstone unit is identified on the geological plan as being approximately at the base of the cliff to the

eastern boundary, at the general outcrop position of the Lower Pinchin coal seam. The strata below the sandstone unit are indicated as comprising un-differentiated sandstone and mudstone units.

The geological plan indicates the site to be adjacent a large area of landslip deposits.

Other than clearance of vegetation, and the undertaking of ground investigation works, site conditions have not altered significantly since the August 2017 inspection.

3.0 History

The site history is set out within the August 2017 inspection report and is not repeated within this document.

4.0 Observations

Inspection on the 22nd January 2018 began at the northern boundary of the site, within the quarry floor, at the foot of the high wall. The inspection then took an anti-clockwise route along the perimeter, followed by an inspection of the various spoil mounds present. The approximate route taken is shown on Figure 6.

As outlined within the previous inspection, the quarry high wall is generally vertical, with the exposed strata comprising moderately weathered thin to thickly bedded sandstone units, with occasional subordinate siltstones.

There was no evidence of significant loose or overhanging blocks other than areas where fallen trees have disturbed the strata. Numerous seepages were noted from the high wall face, generally at the interface of sandstone / siltstone units (Photograph 3). An area of uprooted and fallen trees was observed at the mid-point just below the crest (Photograph 6). These features were observed during the previous inspection and have not altered significantly.

Post and wire fencing was observed along the high wall crest, although no warning notices were present.

A borehole has recently been sunk in the quarry floor, with a remote data logging apparatus evident at surface. It appears that other ground investigation works (trial pits) have been undertaken within the quarry floor as evidenced by areas of disturbed ground (Photographs 5 & 11).

The inspection proceeded to the southern eastern perimeter, where a vertical cliff forms the site boundary. The spoil mounds in this area are in close proximity (<2m in places) to the cliff edge.

Following recent vegetation clearance, a small shallow circular slip was evident at the south east corner, at the crest of the cliff face (Photographs 14 & 15). The slip appears to be fresh and is likely to be a consequence of surface water flows emanating from the toe of the adjacent rock tip. A minor flow of water from the toe was evident during inspection.

The inspection then viewed the various spoil mounds within the centre of the site. The mounds comprise quarry discard generally consisting of flat sandstone within a matrix of finer material.

As observed during the previous inspection, the mounds are generally set at the maximum angle of repose, having been end tipped with little or no compaction. Where the spoil is un-vegetated, the materials appeared relatively loose.

There was no evidence of significant slope failures on any of the spoil mounds, with only localised scour and erosion, probably due to surface water erosion.

Despite the very heavy rainfall in the preceding 48 hours, there was no evidence of any standing water or obvious major surface water flow routes within the main quarry floor area, suggesting the quarry spoil is permeable, with any surface water infiltrating rapidly. An inspection of the bench at the foot of the cliff face did not observe any significant flows from the location of recorded mine adits.

The positions of adits along the second bench were not inspected as vegetation clearance work in the area has not yet permitted access. However, viewing from above, no significant flows of water appeared to be present.

The inspection then followed the route of an access track to the bench at the base of the cliff face. Neath Port Talbot CBC operatives were on site during the inspection clearing further vegetation.

A small issue of ground water was observed emanating at the northern edge of the recently cut access track, flowing over the track and disappearing to ground approximately 50m to the south (Photographs 18, 19 & 20).

A moderate to strong seepage of groundwater was observed emanating at the mid-point of the cliff face. Flows were disappearing to ground at the base of the cliff, with no ponding present (Photograph 22).

Minor recent slumping of rock debris was observed at the base of the cliff, with the majority of the cliff base being masked by historic scree material (Photograph 23).

Very little evidence of recent significant rock fall debris was present along the bench, with only occasional small boulders and very occasional larger boulders present.

There was no observable surface evidence of significant fissuring along the route of the recently cleared access track along the base of the cliff.

The position of a recorded adit at the base of the cliff was inspected, with the feature evidently having collapsed at some time in the past. There was no water discharging from the adit position (Photograph 27).

Further vegetation clearance of the next bench in the sequence is required to allow inspection of the remaining adit positions.

5.0 Consequences of Failure

The consequences of failure have not altered since the August 2017 inspection.

Localised spalling and surface erosion of the bare spoil mound sections adjacent the cliff edge may result in small amounts of spoil escaping over the cliff edge during extreme weather events. As described above, there was visual evidence of slumping at the south east corner at the crest of the cliff edge to support this scenario.

A significant failure of the eastern cliff edge would result in destabilising of the adjacent spoil mounds, leading to collapse and deposition onto the plateau area / bench at the base of the cliff. Based on a visual assessment this scenario is considered to present a low risk under current conditions.

The quarry location is in close proximity to a recorded landslide. Although there is no obvious visual evidence of active landslide activity affecting the quarry at present, it is recommended that the site should be inspected on an annual basis to monitor conditions and should also be visited following reports of instability in the general area and after periods of intense rainfall.

6.0 Recommendations

It is recommended that a further inspection of the second bench below the cliff face is undertaken on completion of vegetation clearance works. It is understood that these works are to be completed shortly.

This inspection should identify any seepages and surface water flow routes which may provide recharge to groundwater in the vicinity of the adjacent recorded landslip area, and provide information on the conditions of the mine adits present, along with identification of any ground fissuring.

Appendices

Figures

Photographs

Figure 1 – Site Location



Figure 2 – Google Earth Image



Figure 3 – Mine Entry Locations



Figure 4 – LIDAR Relief Map



Figure 5 – Geological Plan



Figure 6 – Inspection Route and Key Locations





Photograph 1 – Access to quarry floor



Photograph 2 – Quarry floor



Photograph 3 – Quarry high wall showing seepages



Photograph 4 – Quarry high wall showing vertical face



Photograph 5 – Ground disturbance from recent investigation works



Photograph 6 – Fallen trees at crest of high wall



Photograph 7 – General view of part vegetated spoil mounds



Photograph 8 – General view of part vegetated spoil mounds



Photograph 9 – General view of part vegetated spoil mounds



Photograph 10 – Bare spoil mounds at northern edge perimeter of site



Photograph 11 – Recently installed borehole and data logger installation



Photograph 12 – Part vegetated south east flank above cliff face



Photograph 13 – Toe of spoil mound along cliff edge



Photograph 14 – Minor slumping at crest of cliff to south east corner



Photograph 15 – Flow of water from toe causing cliff edge slumping



Photograph 16 – Access route cleared through bracken



Photograph 17 – Access track cleared to lower bench



Photograph 18 – Small issue of water alongside access track



Photograph 19 – Water flowing along route of access track



Photograph 20 – Surface water flows disappearing to ground



Photograph 21 – Base of cliff face along lower bench



Photograph 22 – Moderate seepage from cliff face



Photograph 23 – Slumping of debris from crest to toe



Photograph 24 – General view of lower bench



Photograph 25 – General view of lower bench



Photograph 26 – General view of lower bench



Photograph 27 – Location of adit ref: 276208-040