

ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
Atkins

Force Crag Mine
Allerdale
Cumbria

archaeological monitoring

report 3150
April 2013

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1. Summary

The project

- 1.1 This report presents the results of an archaeological watching brief conducted during groundworks associated with remediation works at Force Crag Mine, Allerdale, Cumbria. The objective of the monitoring programme was to identify and record any archaeological features or artefacts uncovered, as well as to ensure that restrictions in place due to the Scheduled status of the site were adhered to.
- 1.2 The works were commissioned by Atkins, and conducted by Archaeological Services Durham University.

Results

- 1.3 No significant archaeological deposits were uncovered within the monitored area, because of the depth of flood damage. A small assemblage of wooden and iron objects was recovered from disturbed material: these have been retained on site by the National Trust.

Recommendation

- 1.4 No further scheme of archaeological works is recommended in relation to this development.

2. Project background

Location (Figure 1)

- 2.1 The site is located at Force Crag Mine, Allerdale, Cumbria (NGR centre: NY 19648 21234). The site is located within the Lake District National Park at the head of the Coledale Valley, west of Braithwaite, Keswick and accessible via a 4km track off the B5292. The overall surface remains of the site cover an area of approximately 75 hectares.

Scheme of works

- 2.2 The site is owned by the National Trust and is a Scheduled Monument (SM 1019748) as well as a geological SSSI (Site of Special Scientific Interest). Significant erosion caused by water outfall from Level 1 of the mine has necessitated groundworks to prevent further erosion, by channelling the outfall water via a system of buried pipes down to the Coledale Beck.

Objective

- 2.3 The objective of the monitoring programme was to identify and record any archaeological features or artefacts uncovered during groundworks within the Scheduled Monument.

Written Scheme of Investigation

- 2.4 The works have been undertaken in accordance with a Written Scheme of Investigation provided by Archaeological Services Durham University (DS13.50).

Dates

- 2.5 The initial site meeting was attended on 27th February 2013 by Daniel Still, Project Manager. The site start-up meeting was attended on the 18th March by Tony Liddell, and monitoring fieldwork was undertaken between 25th of March and 8th April 2013 for a total of 9 days. This report was prepared for May 2013.

Personnel

- 2.6 Fieldwork was conducted by Tony Liddell. This report and its graphics was prepared by Tony Liddell, and edited by Peter Carne. The Project Manager was Daniel Still.

Archive/OASIS

- 2.7 The site code is **FCK13**, for **Force Crag Keswick 2013**. The archive is currently held by Archaeological Services Durham University and will be transferred to an appropriate repository in due course. Archaeological Services Durham University is registered with the **Online AccesS to the Index of archaeological investigationS project (OASIS)**. The OASIS ID number for this project is **archaeol3-149512**.

Acknowledgements

- 2.8 Archaeological Services Durham University is grateful for the assistance of George Coates and the groundworks team of J.N. Bentley, Michael Ohlson of The Coal Authority and John Malley and Jaime Lund of the National Trust in facilitating this scheme of works.

3. Landuse, topography and geology

- 3.1 The Force Crag Mine mill building stands at the head of the Coledale Valley, overlooked by the sheer cliff, Force Crag. The site stands at 271m OD, with Coledale Beck running east along the length of the valley to Newlands Beck, which then flows into Braithwaite Lake.
- 3.2 The Coledale Valley is glacial with steep sides, and follows the boundary between the Skiddaw Group Siltstones and the Crummock Water metamorphic aureole. This solid geology is overlain by boulder clay, with a layer of peat overlying this alongside Coledale Beck. The mineral vein worked by the mine cuts through the Skiddaw slates, and contains lead, barytes, zinc and silver, as well as other trace elements.

4. Archaeological and historical background

Previous archaeological works

- 4.1 English Heritage undertook a field investigation to identify the above-ground remains of the Force Crag Mine and Low Force Workings in 1999. This included a Level 3 survey, as well as a Level 2 documentary search. A further survey of the High Force workings was carried out in 2008 by English Heritage.

A history of the mine (1541 to 1899)

- 4.2 The first documentary reference to mineral extraction in the vicinity of the site dates to 1578, when silver was recorded in crust ore within Coledale by Sir Thomas Percy, Earl of Northumberland.
- 4.3 A mining lease was signed in 1783 for the Coledale Valley, following further trials in 1755, though it is unknown whether this new lease included work at what is now Force Crag.
- 4.4 The leases to Force Crag were bought in 1819 by John Tebay, who then sub-let them to Airey and Cowper in 1839. This partnership began to exploit the site for lead, cutting the levels now known as Level 2 and 3 of the Low Force Workings. This period also saw the construction of a water wheel and processing area on the valley floor and a dam on Force Crag. The lease was renewed by Cowper, Cowper, Walton and Dowthwaite in 1848, and work started on Level 1 in 1849.
- 4.5 In 1854, a new water wheel and mill were built to take the extracted material from Level 1, but the ore was depleted within a few years and the level was abandoned in 1863. In 1865, the company went out of business, and the lease was taken on again two years later by Hall and Straughton. The new owners opened Levels 4 and 5 of the High Force Workings, as well as continuing to exploit Level 1, with the main goal of barytes extraction. The business was floated as a public company in 1871 under the name The New Force Crag Mining Company Limited, and in 1873 Level 6 was opened and work began on a tramway (horse-drawn) from Braithwaite. Operations began on Level 7 in 1874, and the company was wound up in 1881 due to harsh winters preventing extraction and a sudden drop in prices.
- 4.6 By 1885, the buildings were reported as being in a state of disrepair, and the site's lease wasn't taken up again until 1906, when the leases were taken by Cumberland Mines Limited. The new ownership began first by repairing the damage to Levels 1-3, with the main aim of extraction under the new regime being zinc ore. The sheer

amount of ore produced meant that the mill present at the time was deemed inadequate, so a new bigger mill was constructed.

The modern period (1900 to present)

- 4.7 The mill building (extant today) was built in 1908-9. The cost of building the new mill put Cumberland Mines Limited into a financial downward spiral, and the company went bankrupt in 1911.
- 4.8 In 1912, the Coledale Syndicate took on the site's leases and continued repair on Levels 1 and 2 of the Low Force Workings, as well as purchasing and constructing an Elmore Flotation Plant to aid in the separation of the minerals. The First World War saw an increase in demand for the minerals being produced by the site, so work began on Level 0 – a costly operation which ultimately put the company out of business in 1922 due to the level being unproductive.
- 4.9 The Derwent Fells Mining Company Limited took on the lease in 1928 and undertook exploratory work on Levels 4-6 of the High Force Workings before sinking two new adits, named the High Force Level and the Newbould Crosscut, primarily producing barytes. By 1933, the Company had ceased production.
- 4.10 In 1939, Tampimex Oil Products Limited took on the lease and invested a large amount of capital in bringing the equipment and buildings up to specification, possibly with the backing of the Ministry of Munitions: the Second World War had increased the need for barytes for the production of explosives. The mill building was reconstructed, incorporating many elements of the mill built by Cumberland Mines Limited, with new processing machinery installed. Production rose to a scale that an aerial ropeway was constructed to bring ore down to the mill from the higher levels, but when the war ceased the need for barytes dropped and a harsh winter in 1947 closed the mine for six weeks, ultimately forcing Tampimex Oil Products to abandon the site permanently.
- 4.11 In 1949, the La Porte Chemical Company began construction of an underground incline from Level 3 to the High Force Workings: construction continued until 1952, when it was abandoned. In 1960, McKechnie Brothers Limited took on the lease with the intention of continuing with the incline works, but due to difficulties with the project instead began extractions in Levels 0 and 1 again. However, production was never great and the operation closed in 1967 with the mill machinery being auctioned off.
- 4.12 Force Crag Mines (Toronto) Limited was formed a few months later with Canadian financial backing, with work concentrating again in Levels 0 and 1: little ore was produced and the operation closed in 1972. The mine was re-opened again in 1977 under a subsidiary company, Force Crag Mines (UK) Limited. The aim was to test for minerals beneath Level 0, but when mineral deposits were found to be not as rich as previously hoped, Force Crag Mines (Toronto) Limited withdrew funding. Braithwaite Mining Company was formed in 1978 by Robert Gunn, a director of Force Crag Mines (UK) Limited. The new company refitted the mill and began work on Level 1. However, once again harsh winters and poor ore deposits led to closure of the mine in 1982, a condition necessitated by a severe collapse in the entrance to Level 1.

- 4.13 The final attempt to work the mineral deposits at Force Crag Mine began in 1984, under the New Coledale Mining Company. The new owners utilised a small workforce and concentrated on zinc extraction from Levels 0 and 1. However, an underground collapse in 1991 coupled with the end of the lease saw mining at Force Crag come to a close. The National Trust took ownership of the site, and has embarked on several schemes to alleviate damage to the site via flooding.

5. The archaeological monitoring

Introduction

- 5.1 A continuous watching brief was maintained during all groundworks; these covered the removal and disposal of the existing tank outside Level 1 (and subsequently the excavation of Chamber 1), all excavations for the installation of the new pipe including its chambers, and the removal of material from the old roadstone quarry in the western part of the site to be used to fill the erosion scar left in the hillside from the outflow from Level 1.

Chamber 1 (Figure 4)

- 5.2 Chamber 1 is situated outside of the new entrance to Level 1, and is designed to replace the tank put in place by the Environment Agency in 2012. The tank installed in 2012 was itself a replacement for an earlier, smaller tank installed in 2009, again installed by the Environment Agency. The original entrance to Level 1, was abandoned in 1967 and is now completely blocked. The new entrance was cut in 1967 and lies 33m to the north-east of the original entrance. The adit portal was rebuilt in 1977 with breeze block walls roofed with railway sleepers: this entrance in turn became mostly blocked by loose scree but a clearance scheme in 1982 removed the majority of the debris, and work by the National Trust has kept the entrance clear since. In 1999, it was reported by English Heritage that the remains of a breeze block sump of the same construction as the portal existed 8m outside of the entrance, into which the considerable outflow from the level was fed: from this, the water was transported to the extant mill building for washing the ore. The remains of the breeze block sump, believed to be contemporary with the rebuilding of the portal in 1977, was removed by the Environment Agency to accommodate a new tank in 2009. Part of the justification for this was to enable the water entering the new tank to be captured in a plastic flume and transported down the steep slope below Level 1 to prevent further erosion. The work to install the plastic flume was undertaken by the National Trust. The tank itself replaced a larger, more substantial tank in 2012 which was present at the start of the current project.
- 5.3 The excavation of Chamber 1 was monitored to see if evidence of the track from the locomotive shed to the south-west of the entrance (no longer standing) into the adit still remained in any form, and also to see if any of the 1977 sump still existed.
- 5.4 The excavation of the chamber was undertaken by mechanical excavator after the Environment Agency tank was removed. The excavation area measured 6m long by 3.2m wide, and was 1m deep. The excavation revealed the remains of a cast iron pipe at its south-eastern extent, but otherwise was cut through scree. While small chunks of breeze block were observed in the scree matrix, no structural remains were found, indicating that the 1977 sump had been completely removed during the construction of the Environment Agency tank. No evidence of the locomotive track was observed within the excavation area.

Chamber 2 (Figure 5)

- 5.5 Chamber 2 was situated at the base of the main erosion scar, just to the north of the main track from Braithwaite leading west to the roadstone quarries. The chamber was located in order to prevent damage to existing spoil heaps not eroded by the flood damage within the scar.
- 5.6 The excavation for the chamber was 4m wide by 4m long and 1.4m deep. The deposits noted were loose shale to 0.40m deep, beneath which was mixed sandy silts in gravel and shale to the extent of the dig depth. No archaeological remains were noted during the excavation.

Chamber 3 (Figure 6)

- 5.7 Chamber 3 was situated on the south side of the main track, connecting to Chamber 2 by a stretch of piping cut through the track surface. The chamber was cut to the west of an extant spoil heap, through ground thought to be relatively untouched by industrial activity.
- 5.8 The excavation for the chamber was 3m wide by 4.5m long and 1.7m deep, through wet mixed silts, clays and gravels, topped with rough turf and topsoil approximately 0.2m thick. No archaeological remains were noted during the excavation.

Pipe cut (Figure 7)

- 5.9 The outflow from the 1967 Level 1 entrance scored a deep gulley down the hillside during periods of flooding, cutting through a pre-1967 tramway at its northern extent and spoil heaps between the Mill and machinery platforms for the aerial ropeway to the south-west.
- 5.10 The main pipe cut was approximately 70m in length and ran the course of the main gulley through the slope to the west of the Mill. The gulley was initially filled with stone from the quarry to the west of the site to allow the 21 tonne excavator to track up and down the slope: the pipe cut was then excavated 1m down from the surface between Chambers 1 and 2: where excavations of this depth cut into original surface material, the pipe cutting was monitored.
- 5.11 No strata of archaeological significance was revealed during the course of the pipe cut excavation: iron and wood debris was recovered from the hillwash material, but no *in situ* deposits or remains were observed, barring cut-off cast iron piping; the past flooding from the Level 1 entrance may have removed the archaeological material in its entirety within the path of the water outflow.

Track (Figure 8)

- 5.12 A trench was cut across Track 1, joining Chambers 2 and 3. The trench was 1.8m wide and 12m long. The trench was excavated to 0.8m deep: the upper 0.2m comprised compacted stones and gravel, forming the surface of the track, with loose scree below. Beyond the presence of a lead water pipe, no archaeological deposits were observed.

Lower pipe cut and outlet (Figure 9)

- 5.13 The lower pipe cut was excavated to the west of standing spoil heaps through ground thought to be untouched, sloping down to the Coledale Beck.

- 5.14 The excavation measured approximately 21m long and between 1.2-1.8m wide, and ran from Chamber 3 down to a northern branch of the Coledale Beck. The trench was excavated to 0.9m deep, with mixed sandy clays at 0.6m deep covered by a wet silty turf and topsoil. The southern end of the pipe drained into a gabion basket, and was built around with rocks to help the outlet blend into the surroundings. No significant archaeological features or deposits were uncovered during the excavation of the trench.

Quarry (Figure 10)

- 5.15 The old roadstone quarry at the western end of the site was used for backfill material, with at least 350 tonnes of material being transported from the quarry area to the main landscaping site. The material used was hillwash collected at the base of a large gully, originating as material washed down from the crags, spoil heaps and hillsides.
- 5.16 During the removal of the material, wooden sleepers were uncovered, presumably having washed down from the levels above. No extant building remains or *in situ* archaeological deposits were uncovered. Once the necessary material was removed, the area was graded and shelved to allow for natural weathering to blend away the excavation scar.

6. The artefacts

Iron objects

- 6.1 Iron objects were uncovered, including sections of iron rail track (previously used by the National Trust as support props), small iron plates and a large iron ring. At the request of the National Trust, all items have remained on site to be potentially used as display items.

Wooden objects

- 6.2 Four fragments of wooden sleeper were uncovered during the course of the monitoring works, as well as one large wooden beam. All are likely remains washed down from the upper levels of the site: as per the request of the National Trust, all have remained on site to be used as display items.

7. The palaeoenvironmental evidence

- 7.1 No material suitable for palaeoenvironmental assessment was recovered.

8. The archaeological resource

- 8.1 No significant archaeological deposits were uncovered during the works.

9. Recommendation

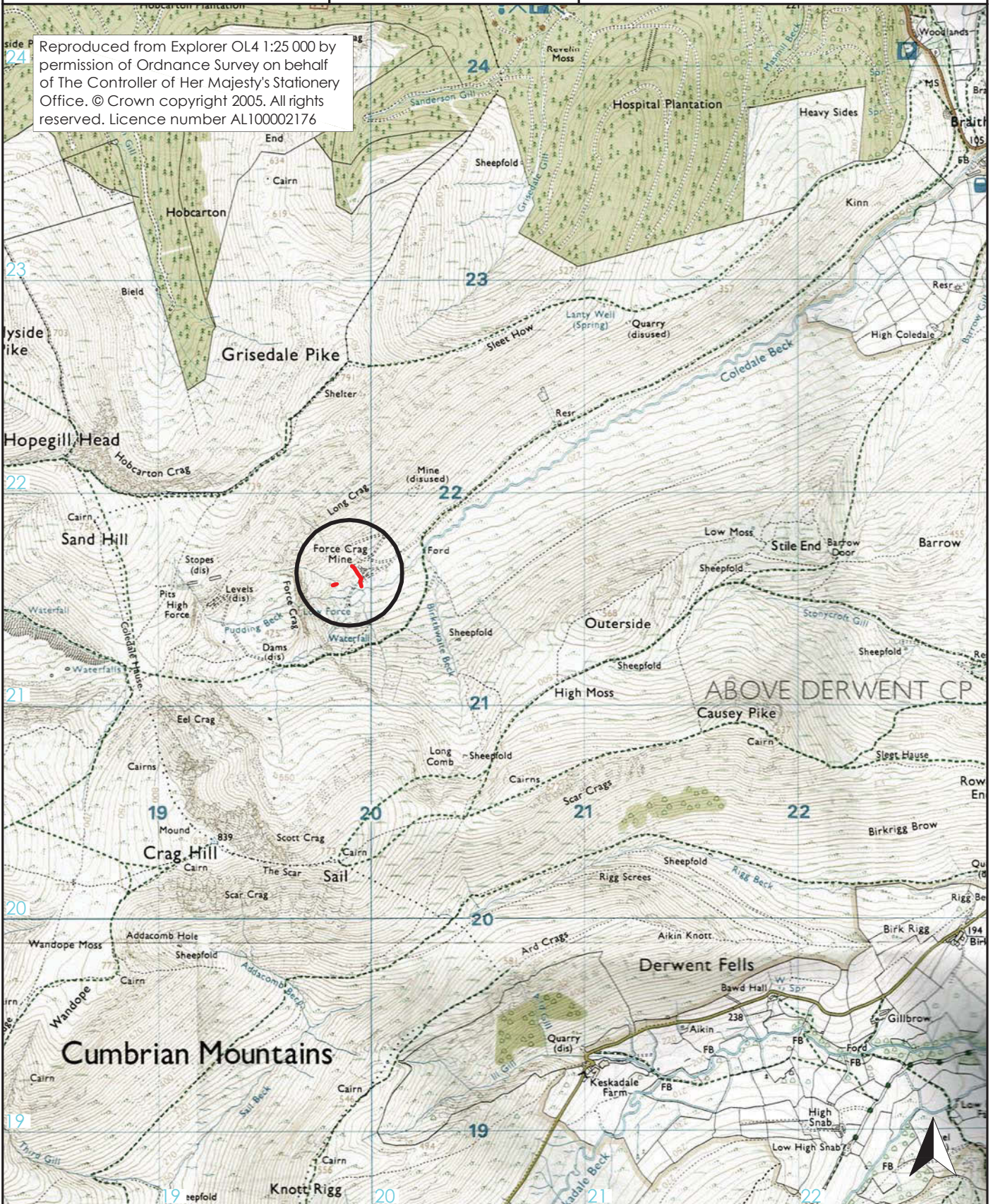
- 9.1 No further scheme of archaeological works is recommended in relation to this development.

10. Sources

English Heritage 1999 *Force Crag Mine, Cumbria: survey report*. Archaeological Investigation Report A1/1/1999

English Heritage 2008 *Force Crag Mine, Above Derwent, Cumbria: Archaeological survey of the High Force Workings, survey report*. Research Department Report Series no.21-2008

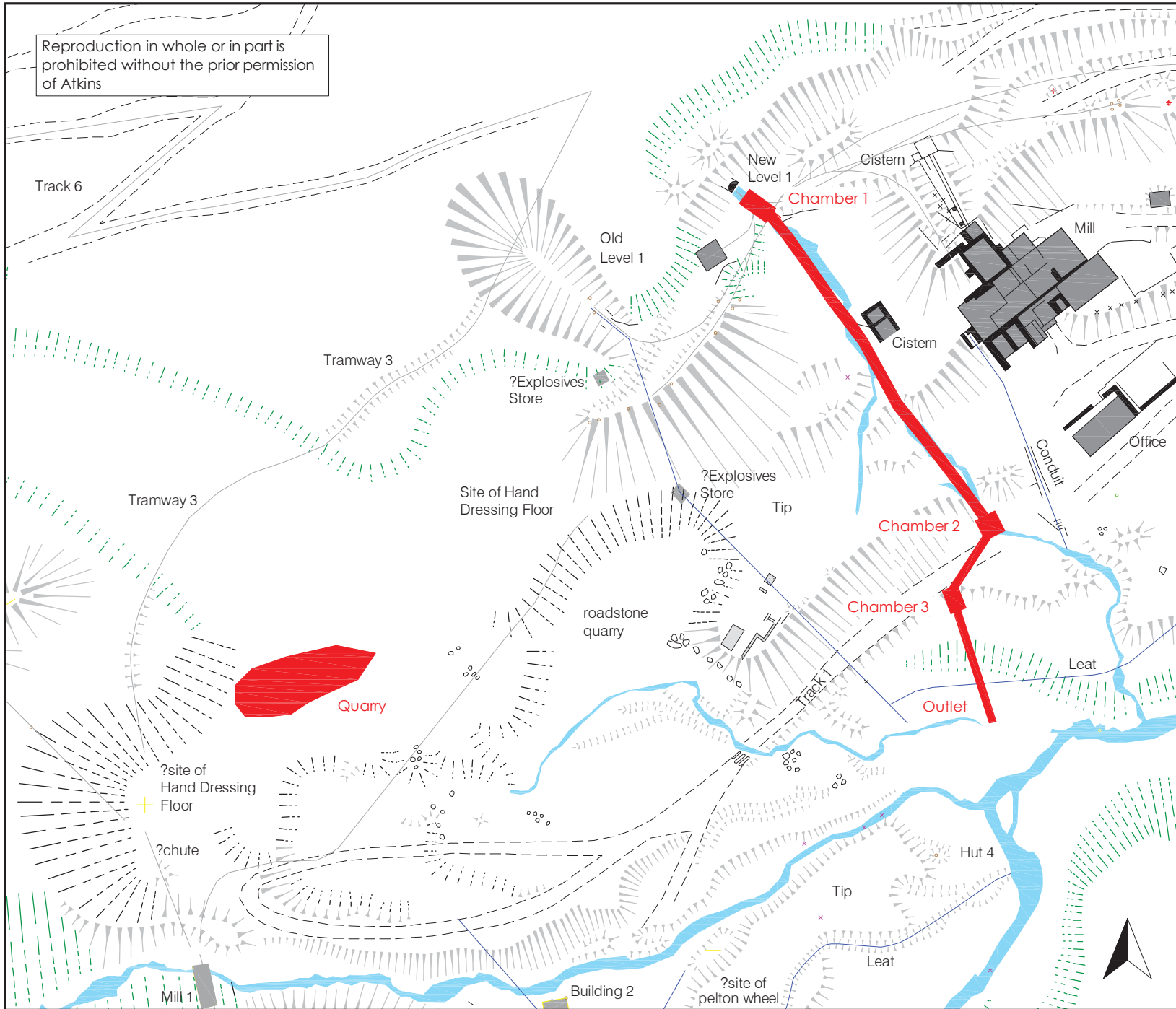
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monitored areas



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Figure 2: Location of monitored areas



 monitored areas



Figure 3: The site with the mill in the background and the roadstone quarry in the foreground, looking east



Figure 4: Chamber 1, looking north



Figure 5: Chamber 2, looking south-east



Figure 6: Excavating Chamber 3, looking north

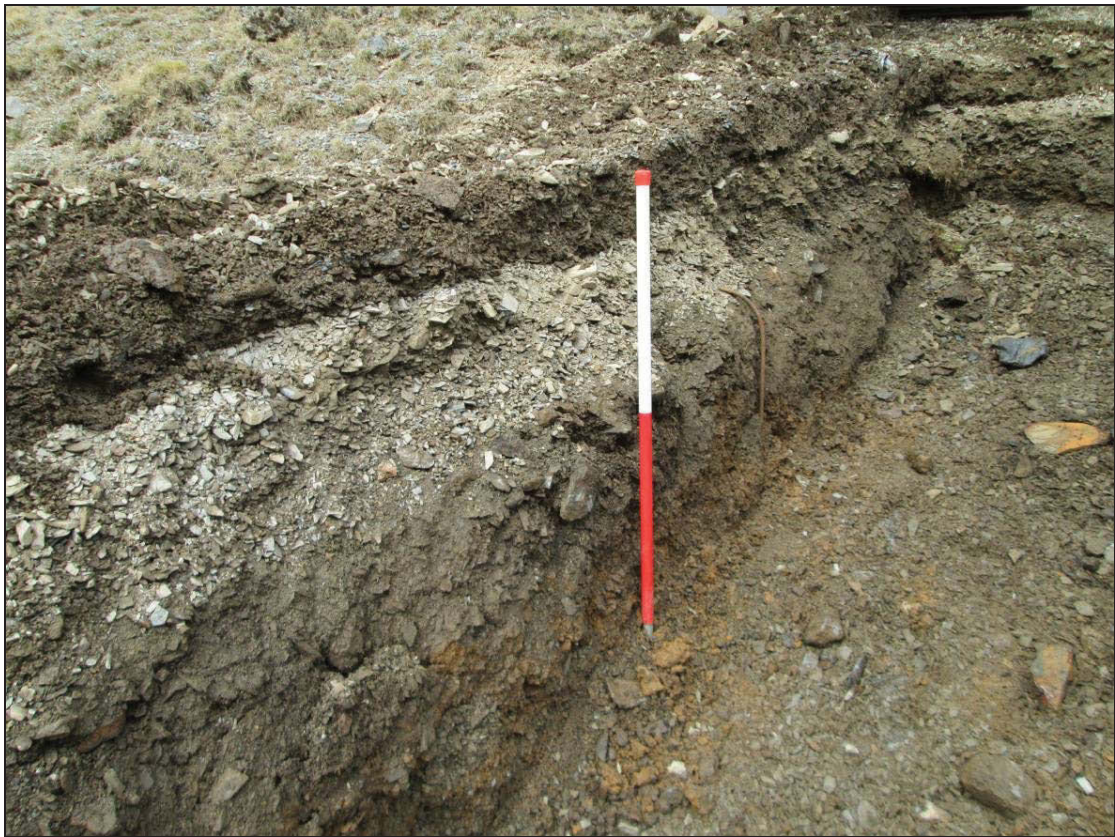


Figure 7: Example section of the pipe trench cut



Figure 8: Section across road (Track 1), looking east



Figure 9: Excavation for the gabion basket



Figure 10: The roadstone quarry in the foreground, looking east