Coniston Copper Mines, Cumbria

Conservation Management Plan

Prepared for

The Lake District National Park Authority

On behalf of the DSTC Commoners

Date: December 2010

Report no. 0091/1-10

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Summary

The Coniston Copper Mine valley is a complex and unique industrial landscape spanning some 400 years of historic development. As a heritage asset the site is considered to be of national, and possibly international significance for a broad range of reasons, not least the overall preservation and comprehensive nature of the surviving mine workings, many of which date back to the early 16th century, as well as the technological innovations employed on site and the long duration of continual use. Coniston was one of the largest of the Cumbrian mines in operation and, at its peak in the mid 19th century, produced over 100 tons of ore a month. The national importance of the site is recognised in its status as a Scheduled Monument, and it is almost certainly one of the most comprehensive examples of Victorian copper mining outside Devon and Cornwall, and one of the earliest instances of modern industrialism in the North West.

The historical and archaeological value of the site is matched by the geological significance of the area, considered to be of national significance. This status is reflected in its designation as a Site of Special Scientific Interest (SSSI). The mines and surrounding fells are also a key recreational facility and cherished by walkers, climbers, mine explorers and the more general visitor alike. However, the future of the site is threatened by a number of factors which could jeopardise its future as a cultural resource, placing it on English Heritage's Monuments at Risk register.

The valley and surrounding upland all form part of a working landscape. Burlington stone operate a slate quarry on the south western side of the valley and United Utilities have a Water Treatment Works on the site of the former Paddy End dressing floors. In addition, local farmers have Common Grazing Rights on the fells and the valley hosts a variety of holiday accommodation including a YHA youth hostel and commercially run holiday cottages. Consequently the valley is regularly being used by a large range of people and groups, each with a specific set of requirements and needs, many of which bring them into conflict with each other and the cultural heritage of the mines. Issues which can potentially conflict with the conservation of the site include; fencing regimes, tree planting, some forms of development and poor conservation. There are also unforeseen man-made disasters like the recent burst water pipe which damaged a large section of the Paddy End Mill. Further to this, the exposed nature of the site places it at risk from natural forces including weathering, bracken growth and erosion. Indeed, the greatest threat recently has been the extensive flooding during the winter of 2009/10 which washed away part of the Paddy End Incline, an important 19th century mining feature, and caused considerable damage across the site.

Despite such threats, the overall site is relatively stable but with a slow rate of gradual attrition. There are some standing structures which do require immediate attention, including the iconic New Engine Shaft wheel housing and a programme of remedial work is recommended. However, the majority of features simply require a programme of periodic monitoring. One of the greatest challenges facing future management of the site is achieving a balance between conservation intervention and the gradual process of decay which is part of the overall character of the mines. Like a number of the

country's upland industrial sites, part of Coniston's 'sense of place' is the feeling of abandon and the sense of decline which permeates the site. It is essential to preserve this but at the same time ensure that something remains for the appreciation of future generations.

This dichotomy arises again in considering the future of the site as a community resource. The mines have considerable potential as a tourist attraction and educational facility but any improvement could potentially threaten the cultural setting of the mine through an increase in visitor numbers, as well as insensitively designed and placed display material. Nevertheless, there are a number of opportunities to enhance the interpretation of the site without having an adverse impact. Suggestions include signage designed to integrate with the natural environment (maybe slate), downloadable 'virtual' tours which can be loaded on a personal MP3 player, and an improved online presence with information linked in with national curriculum. Approaches to increased user numbers could also be carefully managed by the introduction of guided site tours run on a commercial basis, although it is of paramount importance to retain free public access across the site for the enjoyment of all.

Perhaps the most important factor identified as influencing the successful future management of the mines is the need for co-operation between the various parties involved in both the day-to-day management and broader use of the site. In the past the majority of conflicts appear to have arisen from problems with communication and it is recommended that a steering group be established which would include representatives from each of the key stakeholder groups – both landowners, the planning authority (LDNPA), CATMHS, the mountaineering groups, YHA, Commoners Association, Burlington Quarry, United Utilities and the Ruskin Museum. The aim of this group would be to resolve conflicts, discuss any arising issues and opportunities, resolve funding issues (including any emergency funding for repairs) and work together towards ensuring the long-term management of the Copper Mines. It may not prove viable for all members to meet, but at the very least an online forum is recommended. In addition, sub-groups should be established to look at more focused issues such as improvements to site interpretation and the management of archives and collections.

Finally, throughout the production of this Plan, the levels of interest, enthusiasm and knowledge the Copper Mine seems to inspire has been quite remarkable. The site means a great deal to a large number of people, many of whom give up countless hours of their time to labour away, in often very poor weather, to clear blocked levels, restore adit entrances and inspire new generations of engineers, historians and geologists. The copper mines of the Coniston Fell are one of the most unique landscapes of the LDNP: the scarred and pitted industrial landscape providing a stark contract with lakes and pastures of the valley or heather strewn uplands usually depicted on many a postcard. Encapsulated by that landscape is a complex social, technological and economic history of both exceptional local, regional and national significance. This Plan culminates in a series of policies which aim to mitigate any potential risks to the future of this valuable asset and explore opportunities for its future enhancement. In this way it is hoped that Coniston Copper Mine can be preserved and continue to be a loved and cherished resource for the exploration and enjoyment of all.

Plate 1: *view south east from the Thriddle incline looking down the Red Dell Beck valley with the Old Engine Shaft wheel in the foreground and New Engine Shaft wheelhouse in the background. Consiton Water is in the distance.*

'' Scramble of the hill side, wind in your hair,
Water turns to ice, an old cart over there.
Coarse heather on the moor, bracken golden brown,
Everlasting memories of the old copper town."
(Extract from Coniston Copper Mine by Rebecca, Aged 12)[1]

[1] Citing online reference 'The Coniston Mines' > http://www.cleo.net.uk/consultants_resources//english/another_sense_of_place_t/page16.html, accessed 09/19/10

CONTENTS

LIST OF FIGURES

Note: None of the historic plans, maps and photographs in this report should be reproduced for publication or circulation.

TABLES

APPENDICES

1.0 INTRODUCTION

This Conservation Management Plan (the Plan) was commissioned by the Lake District National Parks Authority (LDNPA) as part of the broader assessment looking at the Environmentally Sensitive Area (ESA) of the Coniston Fell, Seathwaite Fell and Torver High Common (DSTC); the Coniston copper mines forming part of this area.

Although in a relatively good state of preservation, particularly given that some standing elements date back to the late 16th century, the mines are under threat from a number of factors and are on the English Heritage Monuments at Risk register. Like many of the country's industrial sites, Coniston is in a state of gradual decline, largely due to the exposed nature of the remains. The successful management of the site is, therefore, dependant on balancing this natural process of attrition with conservation needs in order to preserve the significance of the mines into the future. There are also a number of other external factors which potentially place the site at risk.

The aim of the document is to develop a strategy for the informed management and conservation of the Coniston Copper Mines, some of which might be developed through further agri-environmental funding. Such a strategy must be based on a sound understanding of the various aspects which contribute to the multi-faceted significance of the mines including visitor enjoyment, setting and educational potential, as well as their archaeological, historic and ecological importance. An assessment of factors which might potentially jeopardise any aspects of this significance are then considered and a strategy and management plan proposed to mitigate against any of these potential risks and ensure the future preservation, accessibility and enjoyment of the site for all.

Brief Description

The Coniston Copper Mines covers some 46 hectares of mineral rich fell land in an area aptly named 'Coppermine Valley', just to the northwest of the village of Coniston (Figure 1). The mines date back at least to the late 16th century when Queen Elizabeth I commissioned German miners to come to work the fells under the auspices of the 'Mines Royal'. Evidence of the Elizabethan workings can still clearly be seen today, in particular around the daunting 'Simon's Nick' where the open stopes extend deep into the hillside. The site was later worked in the 18th century by Charles Roe and the Macclesfield Copper Company. However, peak production was not reached until the 19th century when the venture was under the ownership of John Taylor and John Barratt. During this period the mine expanded to employ over 600 people in the extraction, preparation and transportation of the valuable copper ore, with thirteen waterwheels powering the various pumps, winches and processing equipment. Towards the end of the 19th century, as the demand for ore decreased and new and cheaper sources were found in South America, the price of copper plummeted and the mine slipped into decline, although some parts remained in use until the 1950s.

Structure of the Plan

The Plan has been prepared in stages in accordance with the Heritage Lottery Fund guidance on Conservation Management Planning (HLF 2005).

Stage 1 - Understanding the Site – This section is intended to provide a sound understanding of the Coniston Copper Mines and their environment. It includes a summary of the mine's history and how this relates to the surviving archaeology on site. It also includes an assessment of the ecological significance of Coniston, and a consideration of the cultural importance of the site to those who live, work and visit the area. This material is used to inform the second stage of the report. Where further research is needed to properly understand a certain area this is highlighted as 'Gaps in our Understanding' and listed at the end of each relevant section.

Stage 2 - Defining Significance – Based on the understanding of the heritage asset gained through Stage 1, a Statement of Significance has been prepared according to current guidance from English Heritage (English Heritage, 2008). This section aims to place the mines in their local, regional and national context but also to understand what it is that contributes to Coniston's particular significance. The purpose of this is to ensure that this is preserved into the future and to identify anything which might put the site at risk.

Stage 3 – Protecting Significance – Again, based on the information from site visits made during Stage 1, and through consultation with stakeholders, the key risks and issues facing Coniston have been identified, as well as any potential opportunities. The information in this section includes a preliminary assessment of condition; this also appears on a site-by-site basis in the accompanying site gazetteer (Appendix 1). A series of policies have been formulated to address the issues raised in this section. Although often included in a separate section, the current plan places proposed policy with the issue concerned so that the information is more immediate and apparent.

Stage 5 – Managing the Future – The Plan culminates in a management plan which proposes a short, mid and long term strategy for the conservation and renovation of the fabric of the site, as well as plan for the enhancement of the mines as a heritage asset.

Terminology

There are a number terms which are specific to the copper mining industry and glossary of these has been included in the appendices (Appendix 2). Proper names are referred to when they denote specific elements of the site such as Low Works and Upper Mill, but where such terms occur without capitalisation (i.e. works) then the term is used descriptively rather than referring to a specific structure. Similarly, the Copper Mines is capitalised when it refers to the site specifically. Copper Mines, as opposed to Coppermine, is used throughout except when referring to a specific place or venture e.g. Coppermine valley or Coppermine & Lakes Cottages. All other spellings and site names are after Holland (Holland 1981).

In general, the site is referred to in the plural 'Copper Mines' this is to stress that during much of its development the site has been worked as a number of separate ventures, only really unifying under one company in the 19th century. However, in most cases 'Mine' and 'Mines' is interchangeable.

Each of the main features has been ascribed a unique project identification number which is listed and detailed in the accompanying site gazetteer and illustrated. Imperial measurements have been used in the historic text as this is the system in which the equipment was designed; however, the measurements taken during the site survey are in metric, although conversions have been included where relevant (i.e. for wheel diameters)[2].

Scope of the project

The project covers an approximate 46 hectare area defined by the boundaries of the scheduling (SM No. 38773) (Figure 2). It includes all the above ground features but not any of the below ground archaeology; although this has been referred to where relevant. The focus on the scheduled area has meant that some important sites like God's Blessing and Brim Fell mines have not been considered in detail, although they are mentioned. Unfortunately, it was necessary to limit the project area in this manner but hopefully the recommendations made will be applicable to other sites across the fells in the longer term.

Consultation and Stakeholders

A number of official bodies, groups and individuals have an interest in the Coppermine Valley and in preparation of this plan all of these organisations and individuals were consulted (although not all responded). The following list of stakeholders is divided into two groups. The first are those who have some day-to-day involvement with the site, either in terms of management or as regular users. The second group includes interested parties contacted in the review and consultation exercise, this includes potential users of the site in the future.

Those stakeholders identified as playing a key role in the future of the mines were (in no specific order):

- The Lake District National Park Authority
- Rydal Estates (land owners)
- Mr. Philip Johnston (land owner)
- United Utilities (Paddy's End Water Treatment Works)
- Burlington Slate Quarries
- Cumbria Amenity Trust Mining History Society (CATMHS)
- The DSTC Commoners Association

[2] Basic conversions include: 1ft (12 inches) equals 0.31m; 1 fathom (6ft) equal 1.83m, and 1 ton equals 1.02 metric tonnes,

- Youth Hostel Association
- Barrow Mountaineering Club
- Yorkshire Mountaineering Club
- Natural England
- English Heritage
- The Ruskin Museum

Other parties consulted included:

- Mines of Lakelands Exploration Society (MOLES)
- Local schools
- Local outdoor groups
- The Coniston Local History Group
- The Parish Council

A general questionnaire (Appendix 3) was sent out to most of those listed above. People were also encouraged to telephone or email with their thoughts, concerns and issues. Those stakeholders who had a more direct association with the day-to-day management of the site were consulted directly and invited to comment on the draft report.

Plate 2: *view of Brandy Crag Quarry which lies to the south west of the Scheduled Area, but with lorry access through the site. Quarry run by Burlington Slate, one of the project stakeholders.*

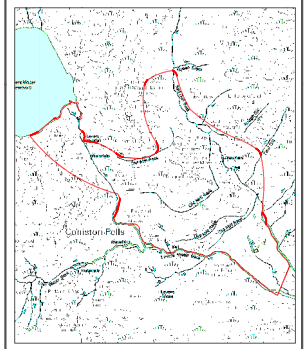
CONISTON COPPER MINES CONSERVATION MANAGEMENT PLAN

SITE:	Coniston Copper Mines

Title:

Figure 1: Site location

Notes:



North

Scale:	1:12,500

500m

Key:

SM Boundary

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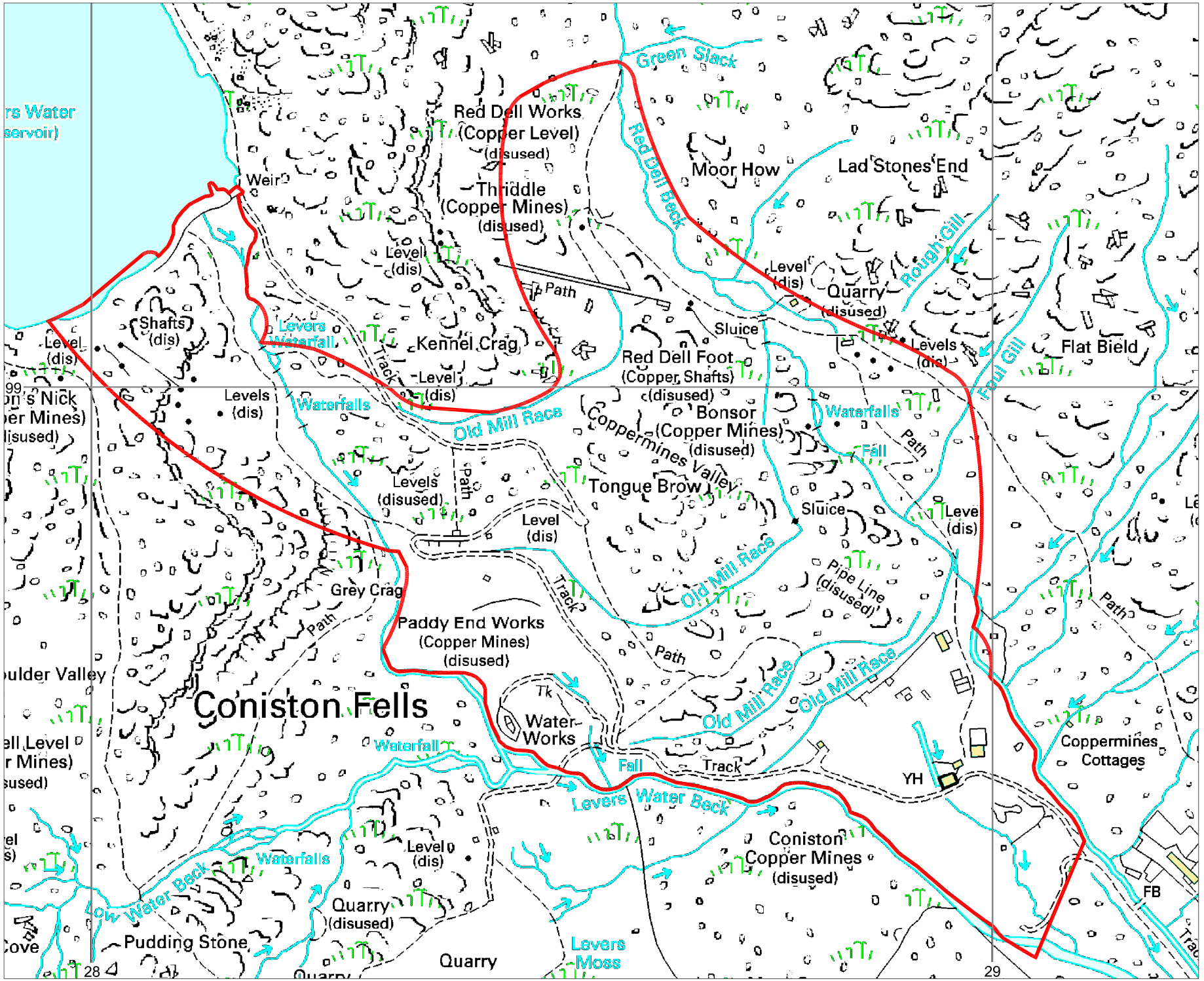


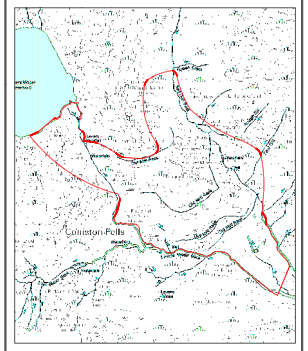
CONISTON COPPER MINES CONSERVATION MANAGEMENT PLAN

SITE:	Coniston Copper Mines

Title:

Figure 2: Project area

Notes:



Scale: 1:4000

200m

Key:

SM Boundary

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2.0 UNDERSTANDING THE SITE

2.1 BACKGROUND INFORMATION

Location

The Coniston Copper Mines (SD 28595 98874) are located approximately 1km north west of Coniston village in the southern Lake District (Figure 1). The village itself lies at the head of Coniston Water with the land rising sharply away from the lake to the north and west to form the western slopes of the fells. The highest point of the local fells is Coniston Old man, a popular destination for walkers, at a height of 801m OD.

The mines themselves are scattered across a wide hanging valley down through which flows Church Beck towards Coniston Water. At the head of the valley are two smaller streams – the Red Dell and Levers Water becks - which converge to form Church beck just below the Youth Hostel. Red Dell beck has its source at Wetherlam, while Levers Water beck flows out of Levers Water, a natural glacial tarn. A dam across the tarn has existed at least since the Elizabethan period; the current facility being run and maintained by United Utilities.

The site is accessed via an un-surfaced road leading up from Dixons Ground. This is owned by Rydal estates but left intentionally in ill repair in order to limit vehicles accessing the site.

Ownership

Most of the 46 hectare site is under the ownership of the Le Fleming family and forms part of the Rydal Estate, administered by Carter Jonas LLP of Kendal. However, a 2 hectare area to the rear of the Youth Hostel is under private ownership and belongs to Mr. Philip Johnson.

On the valley floor to the west site of the site is an area of land currently leased by Rydal to United Utilities. It houses a Water Treatment Works, first constructed in 1972, and is situated on an area of the valley floor which formerly housed the Paddy End Dressing Floors. On the fell side to the northwest of the treatment works is the Brandy Crag Quarry, the royalties of which are leased by Rydal to Burlington Slate. This remains an active quarry, although only worked intermittently depending on demand. Access to both the quarry and the treatment works runs through the scheduled site.

Statutory Designations

Scheduled Monument

Coniston Copper Mines is a Scheduled Monument (No. 38773) and lies under the provisions of the

Ancient Monuments and Archaeological Areas Act of 1979[1]. Previously known as Scheduled Ancient Monuments (SAMs) these sites are monitored and identified by English Heritage but legislated by Secretary of State for Culture, Media and Sport. Scheduling is the only form of legal protection for archaeological sites and is applicable to sites **both above and below ground archaeology** including any subterranean mine workings.[2] Presently, Coniston Copper Mines appears on the English Heritage Register of Monuments at Risk.

Site of Special Scientific Interest

As well as the archaeological designation, the importance of Coniston's natural environment is reflected in its status as a Site of Special Scientific Interest (SSSI). This is primarily based on the geological significance of the site. As such the geology of the copper mines is protected under the Wildlife and Countryside Act 1987 as amended by the Countryside and Rights of Way Act 2000. This means that Natural England needs to be contacted before any activity is undertaken which could threaten the geological interest features both within the boundary of the site and potentially outside the site if it affects the geological integrity. This would include changes to drainage, or operations such as spraying with herbicides as well as any disturbance to ground or standing structures.

2.2 THE GEOLOGY OF THE SITE

The geology of the region comprises of rhyolitic and andesite lava flows interbedded with hardened volcaniclastic dust and ashes. This volcanic activity was the result of the closure of the Lapetus Ocean by subduction, some 500 million years ago. Subsequently this has given rise to a succession of deposits, some of which measures up to 8km thick in places, and is collectively known as the Borrowdale Volcanic Group. Later tectonic activity resulted in a cleaving and faulting of the sequence, and the folding and tilting of the rocks. Cleaving is manifest most clearly in slate deposits which occur across the fells and have been extensively quarried since the 18th century for building material and flooring slabs. In contrast, faulting has resulted in the formation of mineral rich fissures, concentrated and transported by hydrothermal fluids. These fissures, or veins, contain a complex mixture of different minerals which for mining purposes may be divided into two categories: ore and gangue (Fleming 2007, Adams 1988, Holland 1981).

Ore has been mined for its mineral content since the Bronze Age (*c.* 2300 – 700BC) while gangue minerals are those which are largely considered to be commercially worthless such as quartz, baryte, fluorite and calcite. Sometime large bodies of ore are found in a pure state, but often it is mixed with gangue, necessitating processing and dressing to extract the ore (Adams 1988, 12).

The primary suite of minerals found at Coniston are chalcopyrite, arsenopyrite and iron pyrites.

[1] Citing online reference 'Ancient Monuments and Archaeological Areas Act of 1979'>http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1979/plain/cukpga_19790046_en, accessed various.

[2] For further details on Scheduled sites see English Heritage > http://www.english-heritage.org.uk/server/show/nav.1369

Magnetite also occurs at depth along the Bonsor vein, at the expense of the copper, a factor which was to eventually make mining on the site untenable. The principal copper ore is a brass-yellow chalcopyrite, and over 3000 tons of this was mined and dressed per year when the mines were at their peak in the mid 19th century. At Paddy End, a small amount of the grey primary copper ores (tennantite and tetrahedrite) were also extracted, while at Levers Water secondary copper ores like malachite were raised in small quantities near to the surface. Cobalt, nickel, lead and iron pyrites were all also mined across the site (Holland 1981, Bridge 2000)

Plate 3: *ores from Coniston: to the right are two pieces rich in chalcopyrite, while to the left is malachite worked in the 16th century at the Back Strings. This green ore was preferred by the earlier miners as it was richer in copper and easier to smelt. © CATMHS*

Ore bearing veins, or lodes, will often occur in clusters with several appearing in one area; usually more or less parallel to each other. Branching off of a main vein may be numerous strings or 'veinlets' which are themselves rich in mineral deposits. Two major NW-SE mineral veins occur at Coniston - The Bonsor and Paddy End Veins - both of which have been extensively worked, although the latter carried the richer ore (Holland 1981, 19). Other veins at Coniston are the Thriddle (sometimes Fleming), which is believed to actually be a section of the Bonsor, and the Kernal.

The Bonsor Vein has been worked since the 16th century, eventually reaching an impressive depth of 205 fathoms (375m). It is located on the east side of the valley, cutting across the upper Red Dell and continuing to the north-west where it becomes the Thriddle (or Fleming) Vein. This is after a shift of nearly 80m caused by the interception of the Great Cross Course. This cross-fault is a vein which follows a different orientation form the main sequence; they are sometimes referred to as a cross-vein or counter. There are two such cross-faults known from Coniston - the Great Cross-course (also known as the Kernal, or Thriddle Cross-course) and the Levers Water Cross-course. Mineral rich deposits can often be located where a cross-fault intercepts with a main load, a factor which led mining companies to invest large amount of money in driving tunnels to access these junction points. There is a third fault, the Great Sulphur Lode, which carries iron-pyrites but this does not appear to have had any great impact on the main vein pattern.

Paddy End runs north-west to south-east along the western side of the site. The main vein actually comprises a stockwork of several parallel loads, known collectively in the 19th century as the 'Back

Strings' (*ibid*). The 16th and 17th century workings in this location are clearly visible as a dramatic cleft of rock on the skyline - an area known as Simon's Nick. However the vein pattern at this outcrop bears little resemblance to the main Paddy End Vein at depth. To the south of Simon's Nick, at Hospital Level, the main vein is thrown 180ft west by Levers Water Cross-fault.

The pattern of the below ground mineral deposits have greatly influenced the nature of the various mine working across the site and level entrances follow a sinuous path down the valley following the course of the vein. Therefore, although the underground excavations do not form part of the Conservation Management Plan, they are important in forming an understanding of the mine's development. The purity, thickness and accessibility of the loads across the area has had a great influence on the present layout of the site, not only obvious features like the location of adits and levels, but also transport routes, dressing and processing floors, power sources (i.e. water wheels) and water/drainage systems.

2.3 HISTORIC LANDSCAPE CHARACTER AND SETTING

The Coppermines valley lies on the southern edge of the Cumbrian High Fells (NCA 8) .[3] This is a landscape characterised by rugged mountains, radiating ridges, steep scarps and glaciated valleys, all contrasting with the green dales containing lakes, rivers, woods and forests. The wild exposed open fells are covered with rough grassland, dwarf shrub heaths, peatlands and bracken, with large areas of outcropping rock and screes. In the south the harder Borrowdale Volcanics result in rugged scenery of exposed crags, ridges and the dramatic vertical rock exposures characteristic of the Helvellyn, Sca Fell, Buttermere and Langdale ranges. The presence of rock basins, gills, tarns, waterfalls and fast-flowing streams form distinctive elements in the landscape, many of which can be seen across the project area.

The exposed hillsides provide upland grazing, drained by narrow gills and streams, while the lower fells and gently sloping valleys support semi-improved and improved grasslands. In some areas this has resulted in a mosaic of semi-improved grasslands, woodland blocks and scrubby vegetation characteristic of marginal farmland. However, intensive mining in the 19th century has largely removed evidence of a small scale mining landscape and what predominately survives today are the remains of intensive commercial extraction.

The exposed and remote nature of the fells, coupled with the eroding remains of the industrial past, all contribute to make the Coppermine Valley an evocative and haunting place. There is a feeling of entropy and decay which seems to permeate the site: a sense of a crumbling industrial empire gradually reverting back to nature. Abandoned structures loom out of the bracken and a network of paths and tracks criss-cross the wasteland leading to intriguing adit entrances and derelict workings.

[3] Citing online reference 'The Cumbrian Fells, National Character Area 8' > http://www.naturalengland.org.uk/Images/jca08_tcm6-4982.pdf, accessed 23/08/10

One of the key appeals of the place is the sense of discovery that the visitor experiences in exploring the site, which will have major ramifications in terms of any planned improvements to site interpretation. Similarly, the slow decay of the site is central to its character and one of the challenges will be to balance preservation with a degree of natural decline.

Plate 4: *crumbling ruins in a wild and barren landscape is part of the intrinsic character of Coniston Copper Mines and it will be difficult to balance this with the need for preservation.*

Views

Even on a fine day, views across the site convey something of the harsh reality of the industrial landscape and stands in marked contrast to the green pastures and lake views of the valley bottom. The combined forces of the elements and man-made ravages of the mineral extraction have resulted in a bleakly beautiful site. It is barren landscape except for the standing structures dotted about the hillside and the ragged cleft of Simon's Nick which towers high above the valley, fracturing the skyline. There are no trees, except for those which have been planted on the Bonsor Upper Mill site, and all the vegetation is low. Similarly there are few boundaries and their absence creates a feeling of unfettered expanse and open space. In recent years some fences have been added as a health and safety measure around some of the most hazardous openworks. These have had a detrimental impact on the setting of the site, particularly at Simon's Nick where they can be clearly seen for miles around, silhouetted against the sky.

The main view towards the site is from the approach road leading up the valley from Coniston. This meanders up the hillside before opening out to provide an impressive view up the valley with the Red Dell Beck cascading down the hillside. From here the eye is immediately drawn up the valley by the remains of the Old Engine Shaft Wheel Pit Launder Tower which is possibly one of the most iconic

structures of the site. The launder tower remains a focal point along the access road but gradually the buildings of the Bonsor Upper Mill (including the YHA and old Saw Mill) come into view.

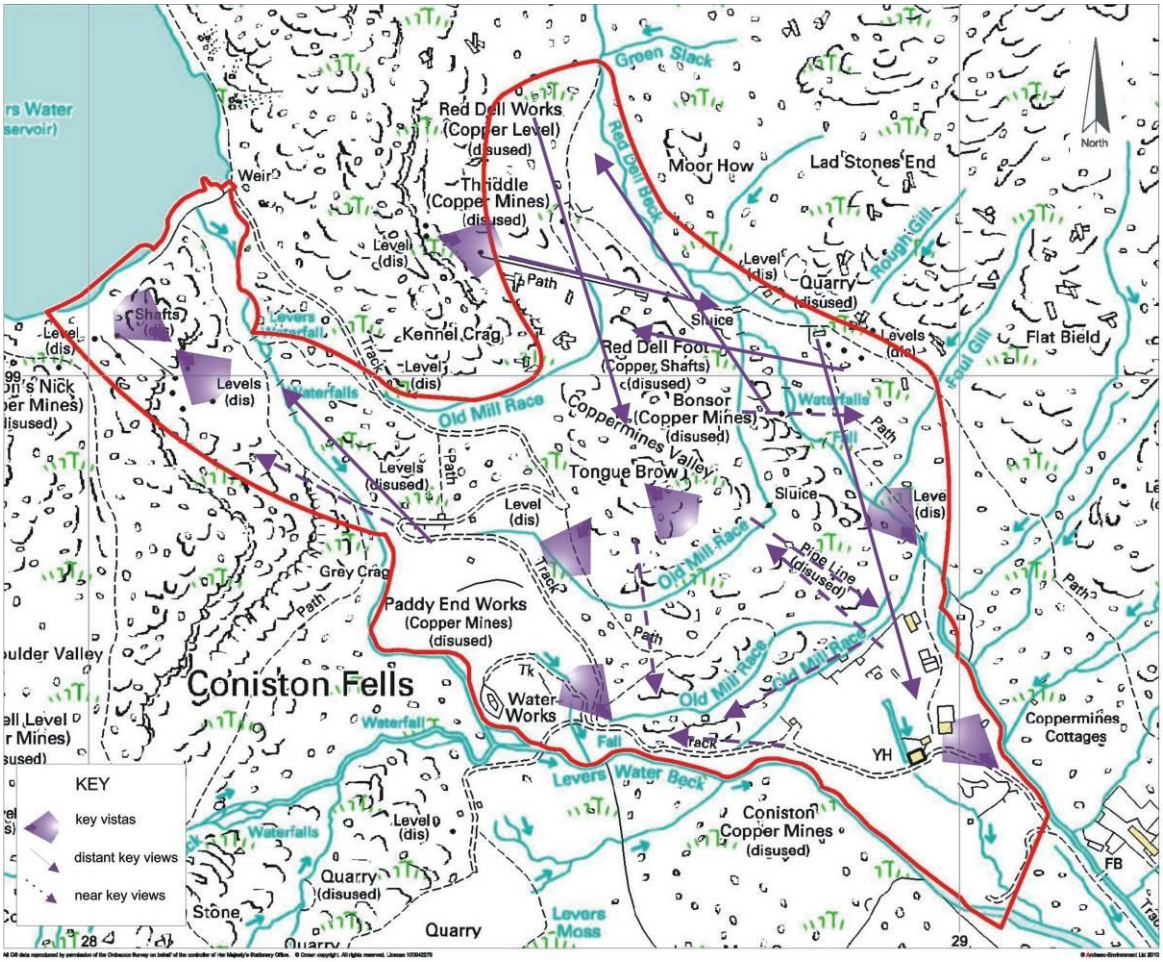


Figure 3: *some of the key views and visas within and around the Coniston Copper Mine Site, although this does not take account of views into the site from the surrounding area. However, it should be remembered that issues of setting in regards the Scheduled Monument will include such a much broader area and, therefore, any development within this wider catchment may be said to impact upon the setting of the site.*

On the west side of the site, the view up the hillside from the Paddy End Mill is arguably the most important. It draws the eye up from the remains of the dressing floor to follow the course of the Levers Water Beck, towards the rugged crags of Simon's Nick. The character of this side of the valley is very different from that along the Red Dell Beck. Paddy End seems to be far more exposed, with higher percentages of scree slopes. This provides an interesting contrast as the visitor moves around the site. However, it also makes the task of management on this side of the valley much more difficult, with the spoil tips and exposed screes liable to erosion and flood damage.

Views out from the site are best from the higher vantage points. South-east from Simon's Nick there are wonderful views out across the site towards Paddy End Mill and down the valley to Church beck as well as cross to Brim Fell to the south, while to the north-west there are views across Levers Water

to the uplands beyond. On the east side of the valley there are impressive views from the base of Kernal Crag, down along the Red Dell Beck and out towards Coniston Water, while to the north, up the valley, lies God's Gift mine, although this is often shrouded in mist.

Plate 5: *the rocky slopes of Paddy End, there is a greater concentration on this side of the valley of worked spoil and scree making the area prone to erosion.*

2.4 THE HISTORY AND ARCHAEOLOGY OF CONISTON COPPER MINES

A detailed description of the historic development of the Coniston Copper Mines is available through a number of different sources. There are several excellent books on the area including Eric Holland's '*A History*' (1986) and '*Field Guide*' (1981), John Adamson's '*Mines of the Lake District'* (1988), and John Postlethwaite's '*Mines and Mining in the English Lake District*' (1975). Since its foundation in 1979, CATMHS have also undertaken important research into various aspects of the site, both above and below ground and produced an accompanying CD-Rom (Bridge 2000). In addition there have been a series of archaeological surveys, most significantly that by the RCHME in 1997 (RCHME 1997). It is not intended to re-iterate that work in the following section, but instead to provide a broad overview which will place the surviving archaeology within a historic context. It looks at how the mine has operated throughout its history and how different factors have influenced the layout and development of the site. This information is intended to inform the later preservation and management of the mines and provide a good baseline from which to assess significance.

The archaeological sites identified across the project area are detailed in the accompanying gazetteer (Appendix 1) and illustrated on Figure 4. Each site is referred to in this section by its gazetteer ID number which is placed in brackets e.g. Taylor's Level (1001). It should be noted that this is just a project identification number and not an HER number. At present the whole of the scheduled area is

covered by one HER entry (HER No. 4154). One of the recommendations of the plan is the expansion of the current HER entries to include some, if not all, of those features detailed in the gazetteer.

Prehistoric, Roman and Medieval copper mining

Copper ores are found throughout the British Isles and are known to have been exploited from the Bronze Age (*c.* 2300 – 700BC) onwards. Recent research has identified a number of Bronze Age copper mines in southern Ireland, mid and north Wales and the English Midlands. Most of these are comparatively small opencast workings although there are examples (Great Orme, Gwynedd and Mount Gabriel, Cork) of underground operations. However, no prehistoric copper mines have yet been identified in Cumbria or northern England although recent metallurgical evidence would suggest that material was coming from these areas.[4]

Roman mineral extraction was concentrated on the lead and silver-lead deposits of the Mendip, north-east Wales, Derbyshire and the Central Pennines, as well as the gold deposits at Dolaucothi in Carmarthenshire. These operations are likely to have been under military control or licensed by the state. The only known examples of Roman period copper mining are at Llanymynech in the Welsh borders, Alderley Edge in Cheshire and, on the evidence of stamped copper ingots, Parys Mountain in Anglesey. No Roman period copper mines have been identified in Cumbria or northern England.

Lead and silver-lead continued to be the main non-ferrous ores exploited during the Middle Ages. There are few records of medieval copper mining and it is assumed that most copper was imported from continental Europe. No medieval copper mines have been identified in Cumbria but there is a 13th reference to a copper, lead and gold mine in the Derwent Fells near Keswick (Adams 1988, 26).

Evidence for Pre-Elizabethan Activity at Coniston

The earliest records of mining at Coniston on a commercial basis date to the 1590s. There has been suggestion of earlier mining activity on the site, possibly even dating to the Bronze Age, but no datable material evidence has as yet been found. Some parallels have been drawn between the mortar stones found on Simon's Nick (1047) and East Bonsor (1003-4) and those known from the prehistoric copper mines at Great Orme in North Wales. Over 25 such stones have been found at Great Orme but these have been found in association with other dated deposits. They are also often found with hard igneous rock pestle stones used for grinding ore, [5] but no such evidence has been forthcoming from Coniston. Mortars are utilitarian objects which have remained relatively unchanged in design for thousands of years. As such, unless found in relation with other datable material they could be prehistoric or post medieval in date - it is impossible to tell. In reality the level of mining

[4] Citing online reference 'Seeking the origins of bronze tools by Paul Budd' > http://www.britarch.ac.uk/ba/ba36/ba36feat.html, accessed 10/09/10

[5] Citing online reference 'Prehistoric mining at great Orme Copper Mine by A. Lewis', accessed 23/06/10

activity across the site has been so intense, and prolonged, that it would be extremely unlikely for any prehistoric material to survive, although the possibility cannot be ruled out.

Plate 6: *mortar stones (1047) at Simon's Nick. Is this evidence of prehistoric activity? More than likely they are associated with a late medieval or earlier post-medieval phase of working. This example was found built into one of the 17th century structures associated with the Lever Water Back Strings.*

Similarly, there is no evidence of Roman mineral extraction across the Coniston Fells and little anywhere across the Lake District, although some potential sites in Cumbria have been recently identified (Brennand 2007, 69). Neither is there evidence of medieval workings, although smaller ventures were in operation prior to the establishment of the Mines Royal. In the late 16th century, Sir Daniel Fleming, the lord of the manor, noted that '*The Germans opened new working beside the old mine'*, suggesting that there was an earlier concern at Coniston (Fleming 2002, 2), although the date of such works is not clear. Such earlier surface workings are thought to have been around Levers Water, and that these were subsequently expanded and extended by the Germans (*ibid*). This might account for the number of mortar stones (1047) concentrated in this area. Two of these (1046) are found re-used in the construction of what are thought to be 17th century structures. This would suggest that the stones do pre-date the Mine's Royal operation; however, at present the date of these structures is far from secure.

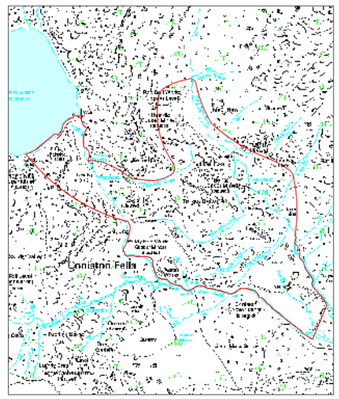
CONISTON COPPER MINES CONSERVATION MANAGEMENT PLAN

SITE: Coniston Copper Mines

Title:

Figure 4 : Archaeological sites identified at Coniston Copper Mines overlaid on RCHME Survey (Key to Gazetteer)

Notes:



North

Scale: 1:4000

200m

Key:

- SM Boundary
- Sites in Gazetteer

Archaeo-Environment Ltd
Marian Cottage, Lartington, Barnard Castle, County Durham, DL12 9BP
Tel/Fax: (01833) 650573 Web: www.aenvironment.co.uk

Coniston Phase I: 16th and 17th century – the advent of the modern copper mining industry

Background

During the 16th century England began to develop its native metal industries. This was due to a combination of wartime needs, expanding demand, and an over reliance on European imports. In the 1560s Sir William Cecil, Secretary of State, invited a group of leading German miners and entrepreneurs to expand and develop the British metal mining and smelting industries. The technologies and skills of the German engineers was renowned across Europe and by the late medieval period they were already using waterwheels to pump water from the mines, grind ore, run blast furnace bellows and operate forge hammers (Holland 1986, 16).

In 1563 Daniel Hechestetter Snr (sometimes Hochstetter), a master miner, was approached by the Crown to oversee the search, extraction and smelting of copper and other ores in Cumberland, Westmorland and Lancashire (Fleming 2002, 1). Hechstetter was an agent of the Haug Company, a successful consortium of merchants who had established links with London. Under the auspices of the newly formed 'Company of the Mines Royal', Hechstetter set about establishing a number of mines across the area, one of the largest and most successful of which was the Goldscope Mine in the Newland Valley. Ore from these mines was transported across the Fells by pack horse and brought to the new smelter on the Greta River at Brigham, near Keswick.

Initially copper mining formed an important part of the Mines Royal but by the early 1600s the company began to concentrate increasingly on more profitable lead mining operations. Further to this, by the middle of the seventeenth century cheap supplies of Swedish copper began to dominate the European metal markets. The net result was that by the end of the 17th century the first wave of copper mining in this country had all but ceased with little production being conducted in either England or Wales.

Mining at Coniston - The Mines Royal 1590s – 1640s

The date of the first operations at Coniston is not known, but ore was certainly being produced by the end of the 16th century. In 1599 a survey, led by Lord Scrope, was ordered by the Crown to evaluate the Mine's Royal operations. Although in fact delayed until the following year by bad weather, the survey specifically mentions workings at both Tilberthwaite and Coniston. Both of these mines were noted as being in poor production with dilapidated workings (Holland 1986, 24), a factor which points towards them having already been worked for sometime prior to this date. In the same year as the survey, 100 kibbles[1] of sorted ore was recorded as being produced at Coniston and sent to the Brigham smelter, yielding 13 cwt 2 qtr of good copper (Fleming 2002, 2).

[1] A kibble of ore could vary according to a number of factors but was the equivalent of roughly 175lbs, and a quintal being approx. 1 cwt of metal.

By 1600 there is also considerable evidence of the German miners, brought over from Schwaz and Innsbruck districts of the German Tyrol, making their homes in Coniston. Surnames such as Clocker, Moyer and Puchberger appeared in the birth, deaths and marriages records of the parish (Bridge 2000). These men opened a number of excavations, or 'Works', at Coniston along both the Bonsor and Paddy End Veins and a second survey undertaken by the Crown in 1602 provides a detailed and compelling insight into their work and lives.

The survey, compiled by George Bowes and Francis Needham, lists the names of the men that worked the mines, how and where they worked, the nature and depth of the mineral, and the logistic problems they encountered, as well as various social details.[2]

Location of the Elizabethan Works

The location of the Elizabethan works can be partially deduced from the information in the 1602 survey, but a later letter written following the closure of the mine provides a clearer picture of the extent of the earlier workings. Written on 13th April 1684, the letter is a report by David Davies addressing certain issues raised by a Dr Lister SRS regarding the feasibility of re-opening the mines. It provides an account of several of the 'Copperworks' across the Coniston Fells based on the testimony of three 'Old Men', or former miners, named as George Towers, William Towers and Henry Dover (Fleming 2002).

Based on the information in the letter, five main 'Works' were reported as being in operation at the time of the mines closure *c.*1648; although those later known as the 'Back Strings' were actually a collection of interconnected openworks being run by separate teams. The Elizabethan excavations were divided between those following the Great Bosnor Vein on the east side of the site and those following the Paddy End Vein at Levers Water, although these names were not used until the 18th century.

Low Works *(First Works) (1005)* - Working the Bonsor vein, this was located just to the east of Red Dell Beck (on the east side of the project area) and was one of the oldest lodes worked on the site. It was known initially simply as 'Coniston Mine' but later became 'Low Works' (1005) to distinguish it from the newer works opening further up the Fell. Eventually it was to become the largest and most profitable mine the Germans operated at Coniston, reaching a depth of over 180ft and covering some considerable distance (Fleming 2002, 9). It was initially divided by the Germans into three partnerships and the 1602 survey provides precise details of the men running each section. The 'West' was worked by Fabian and four English pickmen, while the 'Midle worke' was under the supervision of Hawkins Gibson (an English miner?) with two pickmen and to the east was 'Clocker's

[2] A reproduction of the commissioner's report, and analysis of the information it contained was first undertaken by W.G. Collinwood in his article 'Elizabethan Keswick' for the Cumberland & Westmorland Ant. & Arch. Society Tract in 1912 (Series VIII) and later by Eric Holland in his book, 'Coniston: A History) published in 1986. An extract of the latter is included as an appendix to this report.

worke' (possibly after Christopher Clocker) where an addition 8 pickmen laboured. The survey noted how much ore was raised from each section and how much each man was paid as well as sundry other information (*ibid,* 11).

The letter of 1684 provides further details of Low Work, referring to the existence by this time of a 'Stulm or Shaft'. This was a 'stollen' or adit, a tunnel driven into the rock to drain excess water out and away from the open stope, and was almost certainly 'Cobblers Level' (1000) located further down the slope, on the east side of the beck. Started in 1614, Cobbler's was the first hand-driven tunnel on the site. Hacked out through solid rock without the aid of gunpowder (not used on site until 1694) it took three years to complete.

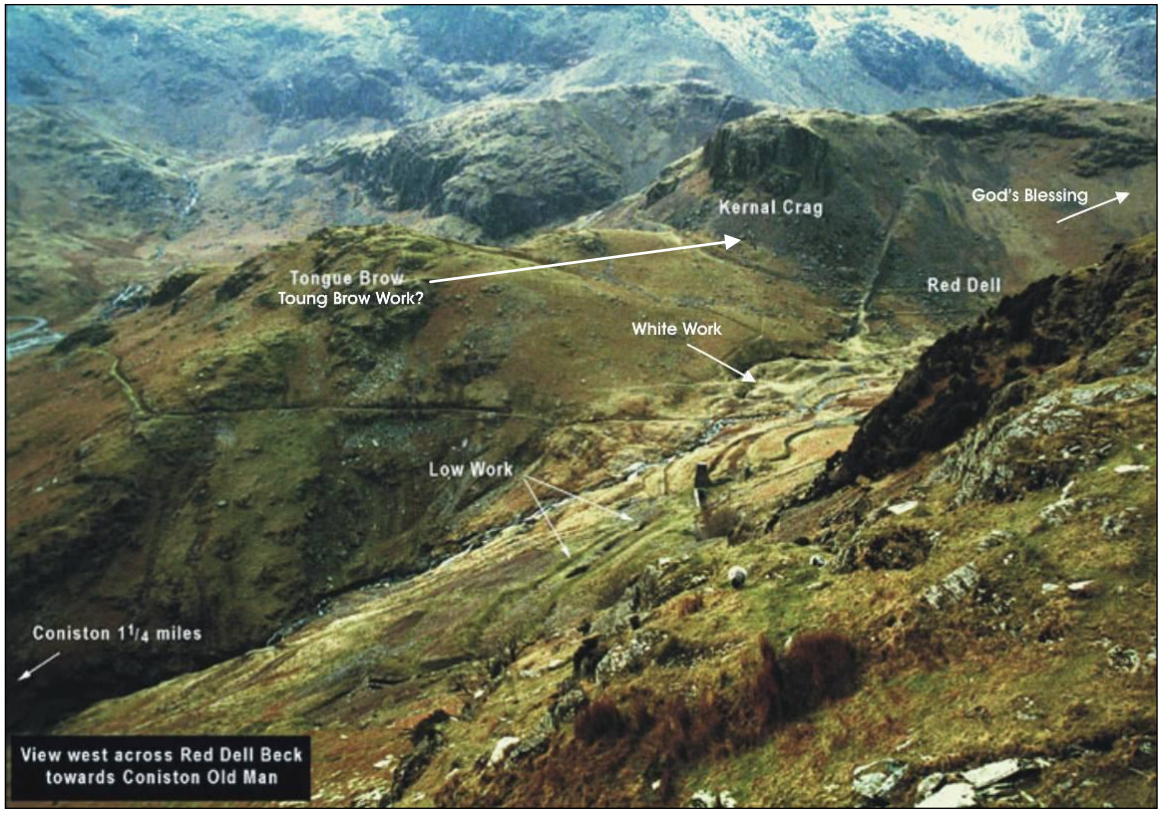


Figure 5: *location of the Elizabethan Works at Red Dell working the Great Bonsor Vein. (Illustration based on image by CATMHS, © CATMHS)*

By the time work ceased at Coniston at the start of the Civil War, Low-work had reached a depth of Forty Fathoms with a working seam of *'above three quarters of a yard thick of good Ore'*. Today, considerable evidence of the Works still survives above (1005), although several of the exposed openworks have been partially backfilled. These lie adjacent to the later 18th century Bonsor East mine, as well as the 19th century Old Engine Shaft, both of which have damaged and backfilled some of the earlier workings. Below the surface, the eastern end of the German excavations survives in a very good state of preservation (Fleming *pers. com.*).

Despite the poorer preservation of the openworks at Low Works, compared with those of the Back Strings or White Works, there are numerous other archaeological features in the vicinity relating to this period. Surrounding the open stopes are remnants of the original spoil tips, the dark, orange-brown spoil from the Elizabethan mines being very different from the dark grey bedrock blasted out from the later 18th and 19th century workings. There are also two mortar stones known from the vicinity (1003-4), used for crushing and dressing ore by hand.

White Work (New Work or Second Work) (1024) – this lay across the Red Dell Beck on the higher ground to the west. Like Low Work it was working the Bonsor Vein and was begun soon before the closure of the mines in the 1640s. It was described by Davies in his letter of 1684 as being *'about Forty Fathoms from the first* (Low Works)*…being wrought about Ten Fathom deep; the Seam then left was about 22 inches of Good Copper Ore'* (Fleming 2002, 4). Today the White Works reaches depths of nearly 100m in places and the area has been fenced off for safety reasons for a following a fatal accident and another near fatal one (Fleming *pers. com*).

Plate 7 & 8: *the remains of the Elizabethan openworks at Low Works (1005) and the entrance to Cobblers Level (1000), the first drainage adit tunnelled on the site and the finest example of a Coffin Level within easy public access*

Toung (Tongue) Brow Work (Third Work) (1069) – describes by Davies as at *'a little distant from the last, being wrought about Thirty fathoms, and the Seam about two foot thick'*; this old working lies 200m north west of the peak of Tongue Brow. The Vein here was subsequently worked in the 19th century from Kernal Level (1051) which lies just below the old works. Today, the working is known as Kernal Vein which was worked from Kernal Level (1051) in the 19th century (Fleming 2004, 19)

Levers Water - (Sixth Work) (1050) – later referred to as 'the Back Strings' this was a collection of openworks up on Simon's Nick. These remain exposed today, although a number have been subsequently re-worked and expanded in later periods. Several 16th century Works are detailed in this location in Davies's letter; each named after the miner responsible for supervising the work (many still

with German surnames) including: Hanch Clocker's Work, Richard Tower's Work, George Tower's and William Dixon's Work, Bartle Clocker's Work, John Sackloc's Work and Hanch Mire's Work, as well as the Sumy-work near the Water-side. All of these are described as lying together '*and wrought about 10 or 12 fathom, the Seam of Ore about 16 inches thick, the Stone very soft, and the Ore very rich, and much of the said Ore green, and was much prized by the Head Masters at Keswick'* (Fleming 2002, 5). This collection of openworks remains a dominant feature of the landscape, and perhaps more than any other area provides a clear picture of the scale and extent of the Elizabethan mines.

The Sumy-work (or semi work) described in Davies letter almost certainly lies beneath the tarn which, although a natural feature, is known to have been raised at least twice since the 16th century (*ibid,* 6). The German engineers had planned to drain the tarn to access the supply of ore underneath it, but such ambitious plans never came to fruition (Bridge 2000)

Plate 9 & 10: *the remains of the Elizabethan openworks at White Works (1024) and adjacent spoil tips showing the classic yellow orange mineral rich debris associated with the 16th and 17th century workings.*

The legend of Simon's Nick

Simon's Nick is supposedly so named because of a lone miner who fell to his death there after selling his soul to the devil, who in return promised to guide the urstwhile lad to the richest source of ore to make his fortune. Similar legends are found across the fells, but the local parish records do list a Simon Puchberger whose father had been one of the first German miners to settle in Keswick parish and who had indeed met an untimely death at the age of 32.

Another story, quoted in Adam, tells how a miner named Simon was directed by fairies to where a vast treasure in copper could be found. However, Simon foolishly divulged the location of his works and 'vexed at his own folly became reckless in following his dangerous occupation, and soon fell victim to one of the casualties of which incautious copper miners are so liable' (Adams 1975, 118)

Gray-Crag Beck (Seventh Work) (1042) – this Work lay a little south of Levers Water, and has recently been identified lying hard against the left bank of the beck, just north of the Grey Crag (Fleming 2002, 6). This work was opened, probably in the late 1630s or early 1640s by William Dixon who '*wrought but a little, the Seam about Eighteen inches thick'*. Excavations were soon abandoned due to the Civil War but the ore was recorded as being of good quality.

The 1864 letter details a number of other mines outside the immediate project area, most notably the highly prized 'Gold Ore' Seam at God's Blessing, further up the fell near the head of Red Dell Beck. Ore from this mine was '*highly prized by the Masters at Keswick*'. Comparable to God's Blessing was '*John Dixon's Work at Brumfell…wrought about two Fathoms, the Seam 24 Inches thick and esteemed the best ore, except God's Blessing*'. Brumfell, is the modern Brim Fell just to the south west of Simon's Nick. Other mines at Tilberthwaithe are also described in detailed.

Working the Elizabethan mines

Gaining the Ore

The majority of work undertaken across the mine during this period would have been done by hand. Gunpowder was not employed at Coniston until sometime around 1693 when we know it claimed its first victim, a Michael Nolan who was *'slayne when bursting a crag with gunpowder*[3].

There are frequent references throughout the documentary evidence to the extremely hard nature of the rock at Coniston, and excavation must have been a laborious and back breaking task. One common method used was known as 'stope and feather' excavation which entailed the use of two small, flat pieces of iron ('the feathers') and a thin tapering wedge, or stope. The two feathers were inserted into cracks in the rock or hand drilled holes, and then the stope was inserted between these and hit with a hammer to spilt the rock (Adams 1975, 70). Progress by such a measure was very slow, with a skilled miner only managing to drive forward about 1 ft a week (Bridge 2000). Sometimes fire-setting was used whereby an area of rock was super-heated and then cooled suddenly by the application of cold water (some say mixed with vinegar). This would loosen a few centimeters of rock which was then smashed and removed with a hammer. This technique is known to have been used at Clocker's works and is referred to in the 1602 Commissioner's report (Holland 1986, 29).

However, most techniques simply relied on the brute strength of the workmen and evidence of pick marks can be clearly seen on the walls of Cobblers Level (1000), a classic 'coffin level'. The distinct profile of these early tunnels is directly linked to the way in which they were wrought, being narrow at the head and then widening out for the shoulders before tapering again at the feet - the pragmatic German miners not removing any more rock than was necessary. Even with such careful excavation, Cobbler's took three years to complete. The second hand driven tunnel 'Sebastian' (1044) was started in 1617 to drain the works at Levers Water; it also took three years to complete. This second

[3] Hawkshead Parish register, quoted in Fleming 2002, 9

tunnel is now lost from the surface, although its location has recently was re-discovered in 2006 by the University College London using a ground penetrating radar survey (Fleming, *pers.com*).

The majority of the old hand-driven workings are, by their nature, deep and too dangerous to investigate without proper equipment and guidance. As such Cobbler is probably one of the most easily accessible examples of hand wrought excavation, although there are also other sections preserved at Low Work. White Work appears superficially to be in good condition, but was too dangerous for further investigation. The Elizabethan works along Simon's Nick are by far the most dramatic of the surviving 17th century Works, but they have been considerably altered over subsequent periods, with evidence of gunpowder blasting clearly visible across the rock face.

Plate 11 & 12: *the possible entrance to the Elizabethan tunnel 'Sebastian' (1044) (now blocked) and one of the openworks which make up the Back Strings (1050).*

The 1602 report provides some indication of the amount of ore being produced by the 17th century works citing approximately 27 kibbles of ore being raised from Coniston (Low Works) every week (Fleming 2002, 12). Over 140 men worked the site, including the German engineers and their descendants, as well as trained local pickmen.

Draining and Pumping

Sebastian and Cobbler were both undertaken to provide drainage for the working stope and would have marked a huge investment in the mine. Drainage is a perpetual problem in any mine and Coniston was no exception. From the 18th century onwards, water wheels were employed to drive pump rods but, although wheels were employed during this period at the stamp mills, there is no archaeological or documentary evidence that they were being used for pumping at this stage. Instead, the early miners may have used a 'rag-and-chain' pump known to have been used in the Tryrol during the 16th century and used widely across Europe (Holland, E 1981). A slightly simpler form of drainage was a windlass or jack-roll fixed above an open stope on which buckets of water could be winched to

the surface. There is some possible evidence of this (1080) at Simon's Nick, but in general such activities left very little archeological evidence.

Flooding was also a constant threat to the open stopes. The 1602 survey records that during heavy rains the Rough Gill, which ran above Low Works, was a continual problem and would *'cause the overthrowing of the whole work and suddenly destroy as many men as shall be there and lose the work forever'* (Fleming 2001, 11). The solution at the time appears to have been the construction of a series of revetment walls to divert the water. The gill continued to be a problem to the mines in this area and the Elizabethan defences were subsequently replaced by more substantial walling (1006) in the 1830s.

Ventilation

Ventilation was not a considerable problem for the Elizabethan copper miner given that the majority of the mineral was wrought from open stopes. In contrast with most mining, too much ventilation may have been the main problem during this phase with the openworks exposing the miners constantly to the appalling weather conditions across the Fells. At Low Work, on the eastern end of the Bonsor Vein, an area known to have been worked by the German supervisor Clocker[4] appears never to have been open to the elements but instead the lode was worked under a solid roof of rock, possibly to keep out the weather, and every pick mark and scratch of the hand driven works remains clearly visible (Fleming 2007).

Transporting the Ore

Ore would have been transported to the surface using a jack-roll winch (1080), or a horse gin might have been employed on deeper workings, although no evidence of this has been seen. In the 19th century horses were driven directly into Deep Level to load the ore, but until the introduction of gunpowder the narrow coffin levels made this impossible and it would have proved too costly to widen them. Once on the surface, ore could be transported across the site by wheelbarrow, pack horse or small cart, depending on the time of year and nature of the ground surface. However, given the drainage of water from the stopes and proximity to the beck, conditions would have almost always been wet. The need to minimise the transport of ore, especially unprocessed ore, around the site would have been one of the major factors influencing the layout of the mine not just during this period but during all subsequent phases of use. Similarly, transport would have also been a factor influencing the location of the dressing floors and stamp mills.

Once processed, the prepared ore was loaded into leather bags for transport by packhorse on the 20 mile journey over the fells to the smelters at Keswick. A number of packhorse tracks can still be traced crossing over the site (1054, 1010 & 1009). In some areas these simple paths are consolidated with stone to provide better traction in bad weather. There is a possible path (1010) which rose over

[4] Maybe Christopher Clocker known from the parish records

Tongue Brow, connecting the Back Strings with the Cobblers Dressing Floors (1011) and another running up along the edge of the hill leading from Low Work (1054). Running along the base of the hillside was another route (1009) which followed the path of the Red Dell Beck. In this location a section of the track was cut through the exposed rock (NGR 328910, 498861). The path at this point also features a narrow channel, similar to that known to be employed by the German workmen to drain the underground working. Interestingly, this section of path is now much higher than the surrounding ground level, the adjacent stone being blasted away during the 19th century.

Plate 13 & 14: *two packhorse tracks; the first (1009) runs along Red Dell Beck and the second (1010) runs up the valley side to Low Works*

Poor weather conditions would have made transportation during the winter months almost impossible, and ore would have only been sent to the mill at Keswick during the summer months when the ground was firm and the route passable. Mining may have continued, at least partially, through the winter with process ore being stock piled till the spring. The 1602 survey refers to an influx of local people (500 are mentioned) being employed in the spring to transport the stored ore over to the smelt mills.

Processing the ore

At Simon's Nick, veins or ribs of solid chalcopyrite were found which were suitable for marketing without any additional treatment except crushing. As a result, ore was dressed by hand in the area immediately adjacent to the mine. In this area a number of small semi-circular shelters (1050), or crushing huts, are known as well as a number of mortar stones (1047) (Holland 1981, 19). These occur largely on the east side of the open stopes where at least four separate structures are known. These are penannular in shape and approximately 2m in diameter with an interior space just large enough to accommodate a sitting figure. The walls are constructed of dry stone and stand only two or three courses high. It is unclear whether these were ever little more than impromptu shelters, built to provide some protection from the elements for those individuals crushing and sorting the ore; the surrounding, semi-circle of orange brown waste being the material rejected during this process. There are also two more substantial structures associated with the Back Strings (1046 & 1077) but these may be slightly later in date.

Also within this area, a circular depression (1049) was excavated by CATMHS prior to the site being

scheduled. This feature proved to contain the base of a wooden tub which may have been a jigging sieve, similar to that shown in use in Agricola's treatise on Copper mining 'De Re Metallica' published in 1556.[5] However, there was a fitting at the base of the tub which may have been for a paddle, and associated with a 'dolly tub' known to be used in mining in the 18th and 19th centuries (Fleming*, pers com*).

Plate 14 & 15: *the base of the wooden feature (1048) excavated by CATMHS, possibly a 'Dolly Tub' shown in use in Agricola's* De Re Metallica.

Poorer quality ore required further dressing and crushing, undertaken at a stamp mill. A stamp mill comprised a battery of four iron shod timber beams, or 'stamps', which were attached by cams to the revolving axle of a water wheel and then dropped alternately to crush the ore loaded from a hopper below. Such a mill is known from the documentary sources to have been in operation at Coniston by 1619, although there is considerable discussion about its location (Hollands 1986, 37; Fleming 2002). Davies, in his letter of 1684, refers to a stamp house '*near the first work'* and this has been taken to mean the site on the west bank of Red Dell Beck (1060-61). This is known to be the site of an early 19th century mill and dressing floor but may have also housed both an 18th and 17th century mill on the same location (Holland 1981). However, recently Fleming has argued that given that the 'first work' referred to in Davies' letter is Low Work (1005), it would be far more likely that a mill would be located further down stream, close to Cobblers Level (1000). There is certain evidence for a possible dressing floors adjacent to the adit here, where a series of terraces covered with ore waste are clearly visible (1011). At both Red Dell and Cobblers no structural evidence survives of the stamp mill itself, but this is not surprising given that such structures would have been constructed of wood, and given the extensive later re-use of the area. Another potential site for a 17th century mill is over on Lever Water Beck (1037) where a rock cut wheel pit can just be made out in the stream bed (1036). However, it is not possible to determine the date of this structure, although it would seem likely that there was a mill on this side of the site, serving the works at Levers Water and at Grey Crag further

[5] Citing online reference 'Copper mining in the Renaissence and Middle Ages ' > http://www.unr.edu/sb204/geology/middleag.html, accessed 05/07/10

down stream.

Plate 16 & 17: *the Dressing Floors (1011) adjacent to Cobblers Level and an illustration of a stamp mill from Agricola's 'De Re Metallica'*

Once crushed, the ore was separated from the gangue and the processed material transported to the smelt mills at Keswick. There was no smelting undertaken on site.

The Pollution of Church Beck

Coniston mine is associated with possibly the earliest examples of litigation being brought against a company for the pollution of the natural environment of the Lake District. In May 1620, John Fleming Esq of Coniston Hall and a collection of local tenant farmers issued a complaint regarding damage to meadows and corn land around the Coniston stamp house claiming that 'copper ore and other rubbish at the said stamp house and then so muddie and corrupte the water which overflowing the aforesaid ground leaveth such corruptione upon them, there is utterlie decayed and wasted of the hay and the aftergrass' (1619). There were also complaints about the death of fish in the beck and the corruption of water coming down from the stamp house. The tenants won their case and the compensation awarded was some £145 which was quite a considerable sum. (Fleming 2002, 13-14)

Workers' Housing

One of the lesser known aspects of this phase of the site's history is where the 140 or so miners and pickmen, known to have worked at the mines in this period, actually lived. Presumably many lived in Coniston village, and the parish records seem to confirm this, but it would also seem likely that some of those employed lived on the site. There are two structures just above Cobbler's level (1012 & 1013) which may be 17th century in date. Certainly, the structure closest to the Old Engine Shaft Wheel (1013) appears to have been partially blocked by spoil from the construction of the Bonsor East Leat (1014) in the 18th century (Fleming 2002, 15). There is also no evidence of shot holes in the stone used in the building's construction. However, without excavation it is impossible to provide a reliable date for these buildings. Similarly, at Levers Water, another structure (1046) might also be a dwelling dating to this period, possibly belonging to the supervisors on the site, although it could equally be a

workshop or storage hut for tools and candles. The small circular crushing 'hutts' have also been mooted as being temporary dwellings for miners (Holland 1986, 26) but they would seem far too small for any sort of occupation.

In fact, there is very little evidence of worker's housing at Coniston Copper Mines until the 19th century when Irish Row was built. In the early period, such housing may have been little more than small temporarily built rubble or wooden huts, which have left either no traces or been subsumed by later development. One of the most likely places for any such accommodation would have been down off of the fell on the relatively protected ground around the youth hostel, but this area has been extensively disturbed by the later Bonsor and Paddy End dressing floors. However, potentially domestic elements could survive below the later processing works.

Production during the early 17th century seemed to have varied considerably, undoubtedly due to issues like weather as well as the problems of gaining the ore, and the quality of the ore extracted. In 1616, Daniel Hechstetter was asked again to submit an account of the mines and at this stage Coniston appeared to be doing relatively well, warranting the construction of the stamp mill. However, by 1627 the venture was in trouble and an appeal was made directly to Charles I for a release from moeity payments until the mine was once more running profitably. This seemed to have been granted, and by 1633 Coniston was once again a viable concern and remained so until the outbreak of the Civil War in 1648. The vacillating fortune of Coniston is some indication of the capricious nature of early mining which was dependant on so many different factors remaining in balance. A year of poor weather, an accident or error in the excavation strategy could result in a dramatic fall in production which could jeopardise the whole operation.

The Civil War and late 17th century operations

The full extent of the impact of the Civil War on the operations around Coniston is not fully known, and the documentary evidence for this period appears to be sparse with sequestration material possibly destroyed by later landowners. Obviously the mines were seen as a Royalist enterprise but it is unclear whether they were ever actively destroyed or simply fell out of production, being too precarious and uneconomical to run at such a time, particularly given the destruction of the Keswick smelt mill by Parliamentary forces. In addition, much of the labour force would have been lost to the war. An account by Fuller written 20 years after the event describes the mines surrounding Coniston as *'wholly discontinued, and not for want of metal, but mining it. Sad that the industry of our age could not keep what the ingenuity of the former found out. And I would willingly put it on another account that the dumping of so much steel in the bowels of men, during our Civil Wars, hath hindered their digging of copper out of the entrails of the earth'* (quoted in Holland 1989, 45).

However, some small scale production may have continued during the Interregnum as presumably copper for batteries and ordnance would have remained a valuable commodity during the Commonwealth. However, where such ore would have been smelted is unknown unless smaller scale

smelting was being conducted outside Keswick, or ore was being transported greater distances.

On his restoration, Charles II took a personal interest in reviving the English mining industry and united the old 'Mines Royal Company' with the 'Society of Mineral & Battery Works' (Holland 1989, 45). But it was not until 1678 that the local land owner, Sir Daniel Fleming, and his son, William, applied for a lease to re-open the mineral workings across Westmorland, Cumberland and Lancaster. Despite the lease being granted there is no evidence of a restoration of works at Coniston.

In June 1684, Sir John Lowther of Stockbridge made enquiries of Sir Daniel Fleming regarding the possibility of re-opening the mines and it was this which almost certainly prompted the review of the surviving works detailed in David Davies' letter quoted earlier. Once more, nothing appears to have come out of this enquiry, but two years later, in May 1686, John Blackwell of Patterdale approached Fleming and offered to re-open the mines *'if terms could be agreed on'* (Holland 1986, 51). However, again nothing appears to have happened. One stumbling block may have been that the mineral rights still belonged to the Mines Royal Company because of the potential that the lode might also carry gold and silver which remained under the control of the Crown. It was not until 1688 that this was rescinded by the passing of the Royal Mines Act. This made it much easier to mine lead, tin, iron and copper and saw a resurgence of interest and investment in mining operations.

There followed a series of new mining leases which seem to indicate that small scale extraction was being undertaken across the fells. In 1691 Roger Fleming, brother of Sir Daniel, records how much he, and other partners made from '*ye mynes in Coniston Fell* (*ibid,* 55), and in 1692 he signed a further 21 year lease to continue work. Roger Fleming's accounts provide some details as to the size and nature of the operations around Coniston at this time, although little specific detail. One factor worthy of note, however, was the first direct evidence of the use of gunpowder on the site. This appears in the list of mine's expenditure for 1694 where it is noted as costing £2:5s:9d; quite some considerable sum at this time. Further evidence of the size of the late 17th century enterprise can be deduced from a later lease, signed by Sir William Fleming (Sir Daniel's son) in 1703. This stipulated that four workmen had to be employed for a minimum of 6 months each year which was in stark contrast to the 140 workmen being employed at the beginning of the century.

Phase 1: Gaps in Our Understanding

17th century Dating Evidence - *This is one of the most interesting periods of the mine's history and an aspect for which there is considerable documentary material. However, apart from the small CATMHS excavation at Simon's Nick, there has been no modern, controlled excavation of any of the 17th century works. As such, there is no archaeological dating evidence available for the 17th century works. While the issue of dating is a problem which is applicable across all periods, it is a particular problem with regards the evidence from this period because there are so very few other sites of this*

date in the region, as well as that the evidence from Coniston is so comprehensive and well preserved.

The key questions which remain unanswered are:
1) The relationship of the various elements at Levers Water – is there any evidence of earlier mining activity?
2) The area of the potential 17th century stamp mill at Cobbler's Level
3) Where did the workers live? Are the buildings up slope from Cobblers Level dwellings? Is there any evidence of miners living at Simon's Nick?
4) Does surface evidence of the Sebastian tunnel survive?

***Post Civil War Period** – there is a gap in our understanding of the site following the collapse of the Mines Royal during the Civil War.*

Coniston Phase II: 18th century – Charles Roe and the Macclesfield Copper Company

Background

The Mines Royal Act, passed in 1689, ended royal monopoly on metals and encouraged private investment in the mining industry. This subsequently led to a revival of copper mining in Devon and Cornwall, the rise of the copper smelting industry in South Wales, and the growth of the Bristol brass foundries. Copper mines were also opened in the Midlands (Ecton, Staffordshire; Alderley Edge, Cheshire) and northern England, although these were never on the scale of the mines in the South West. In 1768 a huge deposit of easily worked copper was discovered at Parys Mountain on Anglesey. It was so rich that the output from this one mine was to dominate and control the world market for copper for the next twenty years. By the end of the century, Britain was not only self sufficient in copper but had become a net exporter of copper metal to the rest of Europe. The main use for copper at this time was in brass manufacture and copper sheathing for ships.

The principal eighteenth century copper mines in Cumbria were at Roughton Gill (Caldbeck), Goldscope (Newlands Valley) and Coniston. There were no local smelters and copper ore was taken to Macclesfield, Cheshire for smelting.

Charles Roe and the Macclesfield Copper Company

In 1758, Charles Roe, a wealthy silk manufacturer, formed the Macclesfield Copper Company having obtained the mineral right to Coniston from Sir William Fleming two years earlier. The company already had interests in Alderley Edge, where over 40 men were employed and later, in 1763, opened the Parys Mountains Mine in Anglesey. Together with Dr. Rowland Atkinson, Roe agreed a royalty payment to Fleming of one twelfth of production and took out a 21 year lease to work the Bonsor vein. As part of the lease, Roe inherited the 17th century Low and White Works (1005 & 1058) which in some areas had been taken down to the depth of Cobblers Level (Holland 1986, 61).

Location of the 18th Century Works

Bonsor Vein - Roe worked the Bonsor lode in two areas: the first, at Bonsor East (1055), located at the eastern end of the former Low Works, and the second, known as Bonsor West (1058), at the northern end of White Works. At both sites a shaft was dug to extend working to a point well below the level of the Elizabeth excavations. The floor of Cobblers Level (1000) was also lowered in order to improve access and provide an immediate source of ore to fund the mines expansion (*ibid*).

Plate 18 & 19: *Bonsor East, one of the two mines worked by Roe on the Bonsor vein. The first photograph shows the shaft vent (1055) and surrounding spoil heaps, while the second shows the remains of the Bonsor East Wheel House (1007).*

Paddy End Vein - The western side of the site, working the Paddy End lode, was leased by Anthony Tissington of Alfreton in Derbyshire who had taken on the lease in October 1756; the same year as Roe. However, whether the ore proved too difficult to work, or whether Roe made him an offer he could not turn down, Tissington sold his venture to the Macclesfield Copper Company in 1760.

A later survey conducted in 1833, during Taylor's expansion of the site, detailed three principal levels as being in operation at Paddy End. All ran down the Levers Water Beck valley, the highest being Top Level (1045), below which was Middle Level (1041) and finally Low or Grey Crag Level (1042), close to the old Elizabethan workings. By the early 19th century Grey Crag, or Low Level (1042) had been extended along the vein as far as Simon's Nick, while Middle Level was taken well below Levers Water. Top Level ran under the former 16th and 17th century workings at Simon's Nick which by this stage had become known as the Back Strings. Here a series of cross-faults or 'bunches', contained a rich supply of mineral ore which continued to be worked through the 18th and into the 19th century.

After a period of some uncertainty in the 1770s, Roe eventually signed a 26 year lease in 1778 granting him the '*mines and veins of lead ore and copper ore whatsoever lies within the manor of Coniston'* (Holland 1986, 71). The terms of this lease included the provision to make *'such engine or*

engine buildings or buildings for the better and more effectual discovery, working and conveying on of such mines and veins'. (ibid, 71), and it is during this period that the mine began its modern expansion, seeing the first of the great Coniston water wheels erected.

Working the 18th Century mines

Gaining the ore

The introduction of gunpowder at the end of the 17th century had transformed the old methods of excavation. It enabled work to proceed at a much faster pace and allowed shafts and stopes to be driven deep below the levels of the former openworks. Charges were laid by drilling a hole into the rock using a jumper, a slender iron rod with a chiseled end which was forged on site. Later these were replaced by compressed air mechanical drills, but hand driven shot holes can be seen in association with both the 18th and early 19th century works.

Plate 20: *Hand driven shot hole, different from the later circular boring of the mechanised drills*

The location of each shot hole was obviously very important, and they were carefully planned to allow maximum impact to be achieved. Sometimes the hole was drilled wet to cut down the amount of dust particles in the air, but generally this would not be the case, and there was a marked increase in respiratory diseases with the introduction of gunpowder in mining in the 18th century (Holland 1986, 97). Once drilled, the shot hole was filled with a gunpowder cartridge and then sealed with clay. Finally, a slow match or fuse was fitted to allow the miner enough time to vacate the area, although inevitably accidents were common and devastating.

Gunpowder remained in use until the introduction of dynamite in 1877. Both hand driven and mechanised shot holes are a common feature across the site and provide a useful method of dating some of the earliest work. Along with pick marks, they are also one of the most visible and distinct features connected with the physical process of gaining the ore.

Draining and Pumping

The increased depth of the mines, made possible by blasting, brought with it an increased problem of drainage. At Bonsor East, the expansion of Cobblers Level, which had previously served to drain the adjacent 17th century works, necessitated the introduction of a new pumping system driven by a large waterwheel adjacent to the shaft (1007). The wheel was connected to a series of pumping rods which ran directly down the timber lined shaft to drain the below ground works. The wheel also operated winding gear for lifting ore up to the surface. However, men and equipment would access the mine through the old stopes (RCHME 1997, 4).

The wheel was served by a feeder leat (1014) which extended 120m across the hillside from Red Dell

Beck, widening out into a storage lagoon (1018) from which it was delivered to the top of the wheel by a wooden launder. The former wheel was located 15m from the adit entrance and revetted on the east and west sides by a drystone wall. The pit itself survives as a rectangular, stone-lined depression measuring 9.1m x 2.3m and is 2.9m deep. This gives some indication of the wheel size, which was probably somewhere in the region of 30ft in diameter. At the southern end of the pit was a culvert which discharged into the tailrace which extended to the south, flowing naturally down the hillside into Red Dell Beck.

A similar arrangement would have existed at Bonsor West. Here, the water wheel would have been located in a direct line north of the shaft to provide for the laying of the pump rods; a shallow cutting in this location may have served to ensure the necessary clearance. However, the later 1850 New Engine shaft wheel (1052), and the Millican wheel before this, has destroyed much of the evidence of the former Bonsor West wheel, although it is believed to have been on the same alignment (Holland 1986, 144). The recent RCHME survey suggests that the wheel might have been perhaps two or three metres further south of the later wheel, and that a large block, which still bears the traces of lubricant, might mark the location of the former wheel pit which has been subsequently backfilled (RCHME 1997, 26). The leat and tailrace for the 18th century wheel remains an issue, although it was probably served by the leat running from Red Dell Beck (1063), making this feature not 19th but actually 18th century in origin (RCHME 1997, 26), although extensively modified when Fleming level (1062) was sunk in the 1830s.

Ventilation

Copper mining was not prone to the same dangers of flammable and toxic gases which beset the coal mining industry. Nevertheless, a good flow of fresh air was essential, not only to allow the miners to breathe, but also to clear the stopes from dust caused by drilling and blasting which would prevent visibility. However, complex systems of furnaces, fans and vents were not generally necessary, and instead a ventilation shaft would simply be driven up to the surface. A number of these have been identified at Coniston, running along the path of the vein.

Transporting the ore

Ore was winched in kibbles to the surface via the shaft. There is some evidence at Bonsor East of the footings of a possible winding house (RCHME 1997, 7) adjacent to the wheel. By this stage, the wider tunnels, provisioned by blasting, allowed for the construction of wooden tracks, enabling wagons to be used underground. Waste material was not generally transported to the surface but used to backfill the old stopes, or 'deads'. This meant that there were fewer of the tell-tale spoil tips associated with the earlier workings. Where spoil does occur it is generally the dark grey natural stone which is the result of blasting, rather than the yellow-brown hand excavated, mineral rich rock.

Once on the surface, material was transported to the dressing floor by waggon, although no evidence of waggonways have yet been indentified. Alternatively, barrows and horse would have been used, as was the case in the 17th century. Once processed, the ore was transported off site by packhorse to Coniston Water where it was boated down to Nibthwaite. From here it was carted to Penny Bridge or Greenodd where it was shipped to the Macclesfield Company smelters in Liverpool (Holland 1986, 62).

Processing the ore

Between 1758 and 1767 a total of 904 tons of ore was processed at Coniston (Holland 1986, 62). The location of the 18th century dressing floors, like those of the 17th century, remains an issue of much debate. One theory is that they lay under the later 19th century Bonsor Upper Mill (1025) floors, situated behind the Youth Hostel (Holland 1987, 62). However, there is now a considerable body of evidence which would suggest that Red Dell Mill (1060-61) may in fact date to this period (RCHME 1997, 20; Fleming 2002). The location of the mill would have seen it suitably placed to serve both the East and West Bonsor shafts. In addition, in January 1824, John Taylor gave instruction for his new level – Fleming Level (1062) - to be driven from a point '*adjacent to the old mill'*. This would seem to suggest that there was a crushing mill in this location, although such a description might equally be applicable to the 17th century stamp mill also mooted to be situated in this area.

Worker's Housing

Once more, there is little indication of any of the social aspects of life on site during this period. Some of those buildings noted in association with Phase I might actually prove later in date, but any sort of evidence for worker's housing and accommodation is sparse.

Gaps in Our Understanding

The location of the 18th century stamp mill – *As with the 17th century mill, the location of Roe's stamp mill remains a contentious issue, although the general consensus appears to be that the Red Dell Beck site is 18th and not 17th century in origin. Again, the absence of dating evidence is an issue and targeted excavation in this area is recommended.*

Domestic arrangements of the 18th century miners – *Another theme in common with the 17th century is the lack of information about the lives of the miners on site. Did they all live in Coniston and travel daily? Presumably there must have been some accommodation on site. Do some of those buildings attributed to the 19th century have earlier 18th century origins?*

In 1768 the Macclesfield Copper Company's mine in Angelsey hit a rich new vein of copper and it would appear that interests in Coniston soon waned in favour of this more successful enterprise. When Charles Roe died in May 1781, his eldest son, William, inherited the business but by 1795, the company had a new head, Abraham Mills, who wrote to the local agent, Thomas Harrison, informing him that '*the Coniston Mine has for some time been so unproductive that it has been determined to discontinue working*' (Holland 1986, 73). Subsequently, Roe's 18th century mine was closed, having reached a depth of 372ft (*ibid*).

Coniston Phase III: the 19th century copper mining; a story of boom and bust.

Background

Copper mining continued to be an important industry during the first half of the 19th century. Production was centred on Cornwall, Devon and to a lesser degree Anglesey but there was also extensive copper prospection and mining throughout the British Isles. Many of the smaller copper mines in Ireland, mid and north Wales and south-west Scotland date from this period. The nineteenth century also saw major advances in mining technology – high pressure steam pumping engines, compressed air drills, mechanised ore crushing and concentration - which allowed the exploitation of previously unworkable ore reserves. This was coupled with major changes in the capital organisation of the industry which favoured larger mines operating as joint stock companies.

The financial crisis of the 1860s and the opening up of huge copper deposits in Chile, Australia and North America caused a dramatic fall in world copper prices and many of the British mines were forced to close. A few mines continued to work on – often by using new ore dressing techniques to reprocess the old mine dumps - but by the end of the century the British copper industry was all but dead.

The principal copper mines in nineteenth century Cumbria were at Coniston, Roughton Gill, Goldscope and Greenburn. Many of the smaller copper deposits at sites like Longlands, Glendaterra and Birkside Gill, were reworked during the first half of the century.

Taylor and Barratt and the Coniston Copper Mining Company

The documentary evidence indicates that following the closure of Roe's mine there was some intermittent extraction at Coniston, but it was not until 1824 that the next major phase of development began. On the 24th September 1824 John Taylor, a Cornishman who was acting as the resident agent at the lead mines in Grassington, took out a 21 year lease on the old Coniston mines - appointing John Barratt as mine's manager. This was to mark the most successful and innovative period of Coniston's history.

Plate 21. John Barratt mine owner and manager at Coniston

Barratt rapidly saw the opportunity of accessing the lode to the north of cross-cut which had effectively blocked the Bonsor vein beyond the Bonsor West shaft. However, the lode could be seen emerging further north where it became the Kernal vein seen in the line of old working and trial pits visible across the hillside. The result was the excavation of a whole series of new levels starting with Flemings Level (1062) originally known as 'Her Ladyship' in honour of Lady Fleming. A second level, Taylors Level (1001), was then driven below the old White Works which lay to the south, on the western edge of Red Dell Beck. Taylors Level struck the vein in December 1825, but Flemings Level was temporarily suspended, and did not in fact hit the load until 1830 (Holland 1986, 107).

Work also began in January 1825 on the Deep Level (1071), an ambitious and costly venture located on the eastern bank of the beck. This was intended to explore the vein below the anticipated depth of Taylors Level which lay upstream. It eventually proved to be very successful, but Deep Level, also known as Horse Level, was the deepest level which could conveniently be dug along the Bonsor vein and required continuous pumping below this depth. The intention was also to eventually break through into Roe's Bonsor East works which were flooded by this stage up to a depth of some 84ft (*ibid*).

In September 1834, Taylor signed a new 21 year lease despite apparently having expended a large sum of money without deriving '*any profit whatsoever'* (*ibid,* 115). Despite such grave concerns, and problems with the lease, Taylor and Barratt decided to press on with plans to drain the old Roe works and a new shaft was sunk a short distance north of the old Bonsor East Shaft (1055). The spoil from this excavation was dumped out onto the fellside and can be clearly seen overlaying the earlier 17th

and 18th century waste.

Plate 22: *a historic photograph of Bonsor Low Mill (1071) showing the crushing mills, settling tanks and buddles in operation*

The Bonsor shaft eventually became known as the Old Engine Shaft (1017) to distinguish it from the New Engine Shaft which was dug into the vein at the western end of the Bonsor vein, adjacent to the old Bonsor West works (1063). This had already reached a depth of 70ft by 1850, with both New and Old Engine shafts progressing approximately 10ft per annum (Holland 1986, 140). Barratt's foresight in the introduction of new extraction regimes, processing facilities, and water power technologies, saw the mine returning between £30,000 and £36,000 per annum by 1851. By 1858 it was employing around 700 men working underground. However, by this stage Taylor was no longer associated with the company. He resigned his involvement in 1841, selling his shares to Barratt who remained a driving force at Coniston until his death when his son, Joseph took over operations (Adams, 147).

The first edition OS map (Figure 6), published in 1851, was the first detailed map of the mines. Unfortunately, only the 6 inch map is available[6] which provides only limited detail, but key elements are nevertheless depicted. Deep Level (1071) is shown as well as the Bonsor Upper (1025) and Low Mill (1070) accessed by a bridge (1008) across the beck. The bridge has since disappeared, although the footings still remain visible today. Further north, Taylors Level (1001) is illustrated and to the east the 'Great Wheel' of the Old Engine Shaft (1015). A second water wheel is shown to the north at New Engine Shaft (1052) - referred on the map as 'The Red Dell Works' and above this Flemings Level (1062), but the Thriddle Incline (1059) is not shown. At Paddy End, Top (1045), Middle (1041) and Grey Level (1042) are all indicated as is the Paddy End Incline (1034) running from middle Level to the new Paddy End Mill (1032). In addition Kernal Level (1051) was also open by this stage; located on the brow of the hill, below the Kernal Crag. The map also provides some detail of the buildings and layout of the Bonsor Mill's and dressing floors, showing all three to be in use.

[6] According to the Lancashire and Cumbria record offices the 25 inch edition was produced but neither had copies of the map and it has not proved possible to track down a copy anywhere else.

By 1864 the Coniston mine had reached its peak and was comparable in depth to any copper mine in the country. Deep Level was being pushed through to connect with the Paddy End vein, reaching depths of 140 to 160 fathoms. Two additional levels had also been opened, Hospital Level (1033) on the east bank of Levers Water Beck, and Courteneys Cross Cut (1029) (sometimes known as the South Vein Day Level) to the east. Further up the beck, and associated with Hospital Level, was a shaft which extended up to the surface on the east bank of the beck. Known as Hospital Shaft (1038), this is now largely buried by scree and mining debris. Just below the shaft is the housing for a water wheel (1036) cut into the rock below a small cascade, possibly associated with a pump or winch. Alternatively, this might be associated with earlier workings.

The heyday of the mine was short lived and already by the mid 1870s the fortunes of the company had begun to deteriorate and production fell. John Barratt had died, the mine being taken over by his son, Francis, who in 1874 formed part of a consortium of share holders. Despite initial promising returns the venture continued to fail and within a year the mine was being sold off by auction. The rental value was estimated to be £250 a year for houses and property with 'unlimited waterpower' (Holland 1986, 171). The mines were described as raising about 100 tons of ore a month producing 1,373 tons of dressed or in 1875 (although this included the holdings at Tilberthwaite).

Coniston was sold to Thomas Wynne of Staffordshire, one of H.M. Inspectors of Mines, for £3,000 (Adam, 147). Wynne continued to invest in improving the mines, expanding the skip haulage system, driving excavations down to new depths and introducing compressed-air drilling, but ultimately the venture proved unsuccessful. In 1881 the Bonsor works hit magnetite - a magnetic iron ore - but this was at the expense of the copper ore. Magnetite was much more difficult to dress and extract, and was in low demand given the nearby Furness ore-field. Eventually magnetite excavation was abandon with much of the mineral left on the Bonsor dressing floors.

In 1889 Copper prices reached an all time low as competition from Chile brought about the collapse of the English copper market. Two years later, in 1891, Wynne finally relinquished his shares to Thomas Warsop. Warsop was an engineer and entrepreneur who had initially become involved with the mine in 1883 as a specialist in air-compressed drilling. He had remained an influential figure in the subsequent development of operations throughout the latter part of the century and together with his partner, Charles Edwin Day, set about trying to restore the failing fortunes of the mine. However, gradually the unpractical and uneconomical elements of the mine were closed down and dismantled (Holland 1986, 217). The earliest material to be scrapped was the abandoned Millican wheel and the Paddy End Mill and Low Mill wheels. Eventually, in 1897 the huge New Engine Shaft wheel was finally stopped.

The second edition OS map (Figure 7), published soon after the closure in 1890, shows the Copper Mine at its full extent. All of the main levels are shown in operation, although some have alternative

names – Bouncy Shaft (1067) is marked as Fleming Level for example. There is also a marked expansion of the Paddy End Mill in contrast with the earlier first edition map, although the Paddy End Mill (1028-32) had actually closed some years beforehand. Both the Thriddle and the Paddy End Incline were also depicted, although not the aerial haulage system between Paddy End and the New Engine Wheel.

Despite the closure of Deep Level, some work continued. In 1907 the old trial level at Thriddle Scar, just above Bouncy Level, was re-opened and extended with the aim of accessing the Thriddle (or Kernal) vein. The new level was christened 'the Glory Hole' but never progressed much beyond 40ft although it did yield some ore (*ibid,* 232). Around this time a great deal of fossicking was undertaken, the picking through of the old 17th and 18th century spoil tips in search of useable ore. This occurred particularly around the Back Strings at Levers Water and Top Level, but also elsewhere across the site. Such an activity would have had a marked impact on the archaeology in these areas.

In 1908 Charles Day withdrew from Coniston, after having lost an estimated £12,000 of his own money. Work continued in a piecemeal fashion on site but with the cessation of pumping many of the mines were flooded.

Working the 19th century mines

Gaining the ore

Gunpowder remained in use for blasting until the introduction of the more stable dynamite in 1877. In 1858 John Barratt had visited the copper mines in Cornwall and Devon and had returned eager to employ the new technologies he had observed, including steel drilling chisels or 'jumpers'. These proved far stronger than the old iron jumpers and required much less sharpening.

In 1883 Thomas Warsop brought compressed-air rock drills to the mine. These could achieve a rate of between 500 and 1000 blows per minute. The first hole driven by such means at Coniston was on September 17th 1883. The Schram compressor driving the equipment was attached to the New Engine Shaft wheel. Four drills in total were used on site, each being taken down the New Engine shaft and supplied with air by some 2,300ft of pipe (Holland 1986, 211).

Draining and Pumping

During the 19th century levels and shafts were being sunk to access the lode at previously unprecedented levels; these extended deep below the former 17th and 18th century workings. In order to operate at such depths considerable investment was made in new pumps and drainage systems. One of the earliest was the Thriddle or Bouncy shaft (1067), associated with the drainage of the Fleming level. The shaft was located approx 42ft along Bouncy Level, on the rocky hillside above Red Dell Beck and was served by the Thriddle incline (1058), a large ramped building constructed of roughly shaped local stone and in-filled with a rubble core. Along the incline ran a series of pumping rods attached by a crank to the New Engine Wheel (1063) at the base. The rods were carried on a

series of rollers up to the shaft where they were attached to a balance bob, a contraption which provided the rocking motion to draw up the water. The incline also accommodated a winding chain, attached to the wheel, which fed through a sheave wheel at the head of the shaft. The water wheel which powered the system was initially a 30ft diameter iron wheel known as Millican's wheel, although this was later replaced in the 1850s by the New Engine Shaft wheel (Holland 1986, 112)

The Millican Wheel

Thomas Millican was believed to have been the engineman working the old 30ft diameter wheel at the base of the Thriddle incline. In 1849, just before the new wheel was erected, he apparently got his arm caught in the gearing while oiling the wheel and was dragged into the wheel-pit and mangled. Apparently, all that survived this terrible accident was his watch and his thumb!

By the 1850s, the Deep Level workings had reached considerable depths. The Old Engine Shaft remained the main pumping shaft and had reached a depth of 140 fathoms. A new water wheel had been erected to replace the old 30ft diameter wheel. This new wheel was 44ft in diameter by 9ft wide and could reach speeds of up to 100 horsepower. It was a feature which would dominate the Coppermines Valley landscape for generations; the wheel housing still remains an iconic feature of the site. Alongside the wheel was a wooden building housing the winch, and adjacent the compressor house installed in 1883 to power the new air-compressed drills.

Plates 23 & 24: *the Old Engine Shaft water wheel before it was dismantled, and the remains of the wheel housing today – still a dominant feature of the site.*

A new wheel was also erected at New Engine shaft (1052) at an estimated cost of £1,500, replacing the old Millican Wheel (*ibid,* 144). Water was still being drawn from the Bouncy shaft until some time after 1867. By this stage the shaft had been extended down below Deep Level.

As well as pumping and winching, water wheels were used to drive the crushers and other machinery associated with the three mills. The 1875 sale audit lists 13 water wheels as being in operation at Coniston, ranging in size from 12ft to 45 ft in diameter - these provided virtually all of the power on site. The wheels were fed by a complex system of leats which ran across the site, often carrying water huge distances. In some areas the leats are stone lined, and in other areas wooden troughs carried water over difficult terrain. Associated with the leats were a series of lagoons and ponds as well as

stone damns and sluices. Many of these features survive today, although their paths and interconnections are not fully understood. However, they are a key feature of the landscape and serve to connect the two sides of the valley together.


Plates 25 & 26: *the impressive stone lined leat (1063) associated with New Engine Shaft Wheel (and previously Bonsor West Wheel) - fed by run off from the Red Dell Stamp Mill, and the Old Engine Shaft Wheel leat (1016).*

Transportation

Ore from the Bonsor vein was hauled up the shafts to Deep Level and then trammed directly to the mills. At Old Engine Shaft and Bouncy, evidence of the old sheave wheel running the chains, still remains in-situ. The weight of a loaded kibble was approximately 8cwt, with the hoisting chain bearing a combined weight of some 4.5 tons - breakages were frequent. A chain breakage would have a devastating effect, not only on any poor soul within the vicinity, but also in terms of stopping production till a new chain could be sourced or the old one repaired. Eventually wire rope and later cable was introduced.

Between the two sides of the valley, ore is thought to have been transported via an aerial haulage system. New Engine wheel is believed to have wound ore from the Paddy End Middle Shaft (1041) by means of an rope spanning over the valley, carried by a series of stone pylons, one of which can be seen on the east bank of the Levers Water Beck (1039). This type of system was sometimes used in the Pennine lead mines, but it was also employed at Coniston, where it would have been the longest continuous winding rope in the country (Davies-Shiel & Marshall 1969, 147).

In 1875, despite falling production, Francis Barratt made the decision to convert New Engine Shaft to a skip-winding mechanism, commonly used in the Cornish tin and copper mines at this time. The skip was a long metal box with wheels which was hauled along rails, with guides keeping it in position. The installation was a costly and complicated endeavour but it improved haulage up to Deep Level which had previous been wrought with problems. The system was later improved under the ownership of Thomas Wynne.


Plates 27 & 28: *sheave wheel prior to restoration © CATMHS and the remains of a pylon (1039) believed to be associated with the aerial rope haulage system.*

To reduce the transportation of unprocessed ore around the site a new dressing mill was established at Paddy End to serve the mines along the Levers Water Beck. This can be clearly seen on the second edition OS map (Figure 7). Ore was brought here direct from Grey Crag Level and Courtney's Cross Cut, or carted down from Top Level via the bridge across the beck. Middle Level was served by a self-acting incline (1034), with ore being moved out of the level on a gantry and tipped into a chute feeding a hopper. The loaded waggons then descended down the incline to the mill below.

Eventually, as work progressed at Paddy End, ore was transported underground via shafts down from Top and Middle Level and taken out at Grey Crag Level, removing the need for the incline which was then closed. Later still, Deep Level was finally extended to connect with the Paddy End mines. This meant that all the ore could be transported by horse drawn waggon to the Bonsor Mills – subsequently, the Paddy End Mill was shut down. From the surface, the complexity of the interconnected mine workings cannot be fully appreciated but a plan of the underground tunnels and shafts produced by CATMHS (Figure 8) goes some way towards illustrating the extent of the network and the various depth achieved by the mid 19th century.

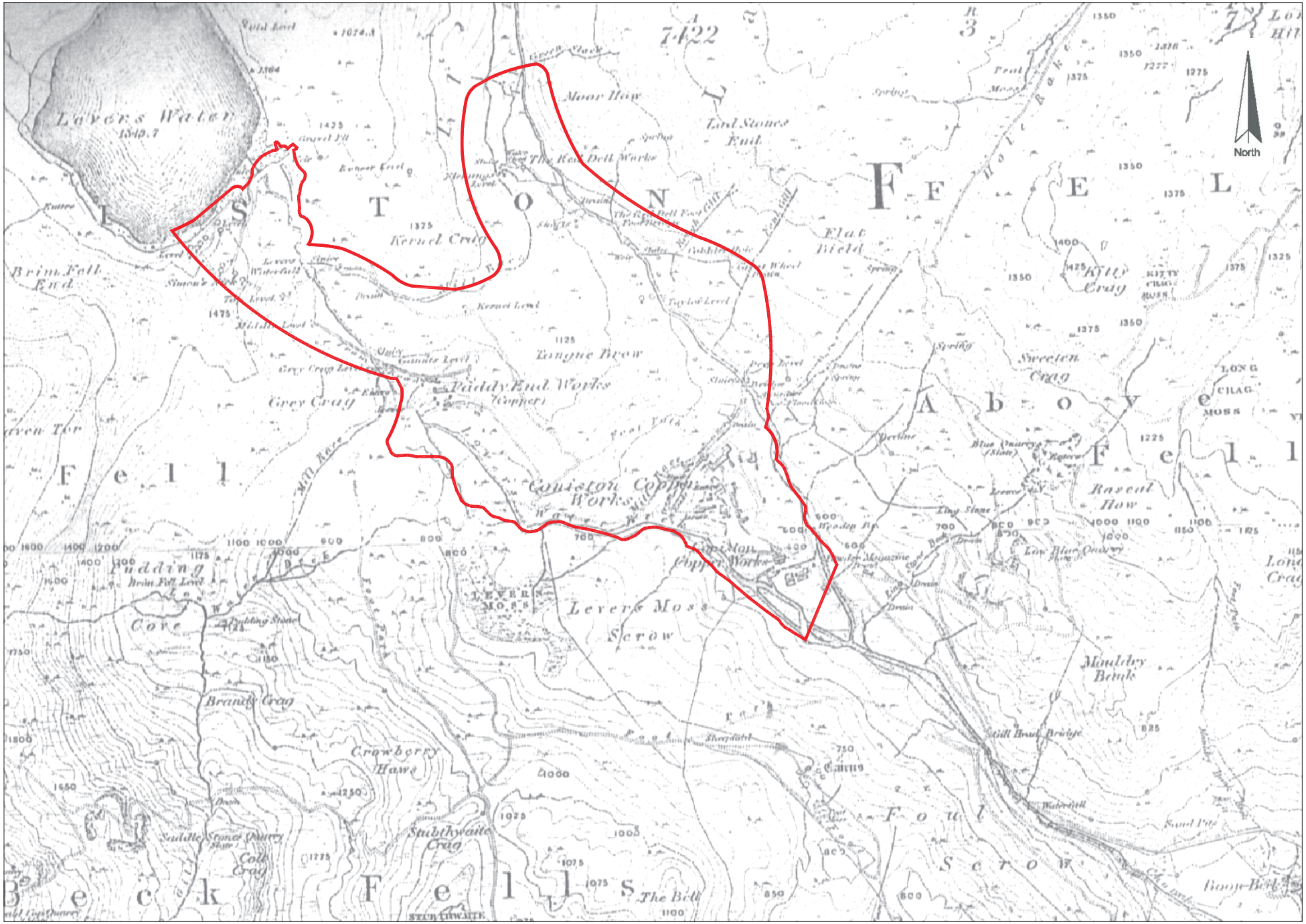


Figure 6 *Coniston Copper Mines: Six inch First Edition Ordnance Survey map (c.1847) overlaid with site boundary*

Figure 7 *Coniston Copper Mines: Six inch Second Edition Ordnance Survey map (1890) overlaid with site boundary*

The processed ore was carted down to the company quay on Coniston Lake, and loaded into barges and taken to Nibthwaite Quay where the company had erected a copper warehouse in 1843. From Nibthwaite, the ore was carted the 8 miles to the Ulverston canal and down to the copper yard where a suitable buyer would be found and a price agreed (Holland 1986, 136). Until a dispute in 1842, much of the copper went to St Helen's where it was smelted and rolled to be used for the copper sheathing of ships hulls (Davies-Shiel & Marshall 1969, 146). Subsequently, Barratt secured a contract with Messrs Wivian & Sons sending ore instead to the Hafod Copper Works in Swansea.

In 1859 the railway, a sub-division of the Furness Railway, was brought to Coniston enabling copper to be transported by rail. A cart road ran down Levers Water Beck to cross the water at the specially constructed Miner's bridge where it joined the old track down to the copper depot at the base of the hill. It was then transported by the railway company to the station.

The sale documentation of 1875 indicates something of the extent of the transport network around the site, noting two gravity inclines, as well as miles of tracks laid (both above and below ground) along which the iconic mining waggons would have been hauled both by men and horses. The sale records make some mention of horses, all of which would have presumably been stabled on site, although not necessarily below ground as in coal mines with much haulage taking place above, as well as below, ground.

Processing the ore

There were three main processing mills working at Coniston by the mid 19th century, all situated on the relatively level ground at the bottom of the valley, where there was a good source of fast flowing water to drive the wheels and wash the ore. Serving the levels along the Levers Water Beck was the Paddy End Mill and dressing floors (1028-32), located in the area now partially occupied by the United Utilities Water Treatment Works. However, the main ore-processing area was over on the eastern side of the valley in the open space surrounding the former mine's offices, now the Coniston Coppermines Youth Hostel. This was divided into two mills – the Upper and Low Bonsor Mills. The Upper Mill (1025) undertook the primary dressing of the ore, before it was transported to Low Mill (1070) for final washing and settling.

All sites comprised a series of terraces with ore being moved down hill with each process. Initially the unprocessed ore would be transported to the top terraces by waggon and then dumped down onto screens to be sorted into grades, with larger pieces being broken up by the stronger boys and women using heavy hammers. The three grades of ore were: solid chalcopyrite ore, seconds or 'douse', and finally the low-grade material. The high grade material was sent to be broken down into thumbnail sized pieces by the mine 'maidens' using a broad headed hammer or 'bucker' which was brought down on an iron plate. This material was then sent straight for marketing. The second-grade material was 'cobbled' by women breaking up the ore on anvils and then sending it onto the buckers. Any low

grade material was broken down into small pieces by the crushing mill and then sent to the battery of stamps which pounded the ore into a fine dust. This was then passed through a series of tubs or jigs where the heavier ore was retained with the lighter gangue washed through. Barratt soon introduced semi-mechanical jigs, and later fully mechanised equipment powered by water wheel. The waste from the jigs then flowed off into a series of settling lagoons which were periodically emptied by the 'vanners' who panned the ore using special shovels. This process was later improved by passing the fine silts several times through a sloping trough or buddle.

The 1875 audit describes Bonsor Mill site as including the main mine offices (the youth hostel) (1072) as well as the mine manager's house (1073), a large smith's shop with seven hearths essential for sharpening the jumpers, a carpenter's workshop and saw-mill (1074), various sheds for machinery and for sorting and picking. However, the site was extensively modified during operations in the early 20th century, although the Upper Mill area remains one of the more evocative areas of the site, despite the fact that many of the structures are in a poor state of repair.

Initially all of the processing was undertaken at Bonsor Mill, but in 1830, once production reached full capacity along the Paddy End vein, the second mill was opened to serve this side of the mine. Paddy End remained in use until the 1870s when the site was abandoned, all ore then being transported below ground by horse drawn waggon to the Bonsor floors.

In the latter half of the century, as copper production began to decline, sand and quartz - a by-product of the crushing process - was sold in ever increasing amounts. Gradually as copper continued to slump in price, sand and gravel became more commercially viable and by 1899 was the greatest source of income to the mine (Holland 1987, 220).

Power for the mills was provided by water wheel. An 18ft wheel powered the Paddy End Mill and a similar sized structure powered the two sets of stamps at Bonsor Low Mill; all of which were scrapped in 1896 (*ibid,* 218). At the Upper Mill a powerful Pelton Wheel (1081) was erected in the 1880s which was fed by a pipeline which can still be seen stretching along the hillside from Levers Water. This drove a turbine housed in the old saw-mill and connected to the air-compressor machinery which had been abandoned when the New Engine shaft was closed. Using this equipment, Warsop set up a small plant manufacturing concrete blocks, paving slabs and roof tiles. An iron ring set in the ground close to the saw mill is related to an aerial cable way which brought slate down from the quarry above directly to the new mill for processing. This venture continued until Warsop left the site in 1907.

One of Warsop's slightly less successful attempts to diversify was the construction of the Coniston Smelter (1077). Ore had always been removed off site for smelting but in 1893, Warsop decided to erect a smelter adjacent to the lower Bonsor dressing floors. This was a last ditched attempt to prop up the failing finances of the company and facilitate further production. However, the venture never

proved successful and the process encountered a number of initial problems. Finally, in December 1894, the whole structure blew down during a severe gale and the plant was wrecked. Considerable damage was also incurred across the site, and the overall cost of repairs meant that the smelter was never re-built. Evidence of its location can still be seen in the curious cones of slag piled up on the east side of the Low Mill dressing floor.

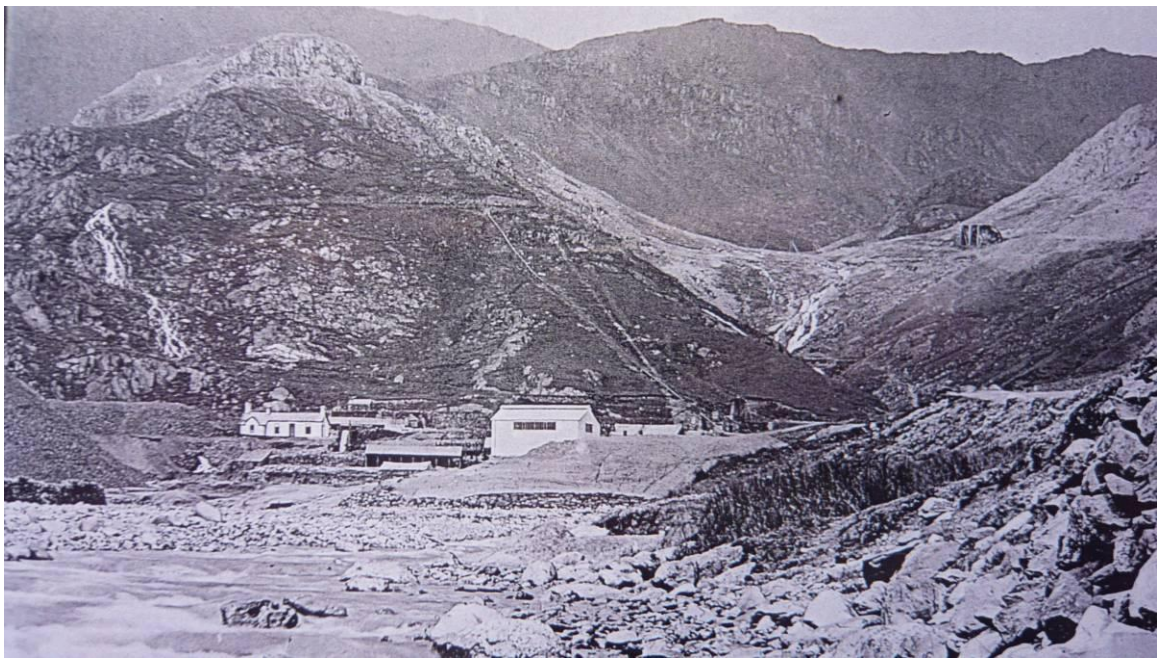


Plate 29: *the ill-fated Smelter at Low Mill (the large white building). In the background the Pelton wheel pipeline can be seen running up the hill, and the Old Engine Shaft Wheel stands overlooking the valley on the right of the picture.*

Worker's Housing

The expansion of the mine in the 19th century had a considerable impact on Coniston village and the surrounding area. In the early 1840s around 240 adult males were employed at the mine, 174 of which were underground workers, this had expanded to over 700 by 1858 (Matheson 1994, 9). In addition there were numerous women and children under the age of ten employed until the passing of the 1842 Mines Welfare Act. Some 50 women and girls worked as mine's 'maidens' on the dressing floors, employed to break up the ore for crushing. Younger children were employed on tasks like shovelling up any wasted ore and transporting material around the site (Holland 1986, 124).

Many of the workers would have lived in the village, and the expansion of the mine would have lead to an increase demand on housing and all of the associated issues of overcrowding. The 1875 sale audit of the mine lists 41 cottages held in free-hold by the Coniston Copper Company within Coniston village. There were a further 13 lease hold cottages up on the mine site, including the 9 cottages known as Irish Row (*ibid*).

The mines also had a considerable impact on the local economy not only in terms of the money brought in by the influx of miners, but also in terms of merchants supplying the operation. Iron,

gunpowder, candles, timber and coal would all have been sourced, with much of it coming from the immediate vicinity. In addition, agricultural produce would also have been needed to feed the expanding workforce.

Phase IV: The 20th century – a final flurry of industry

In 1911 the Coniston Electrolytic Copper Company was established, a joint Anglo-French venture. The new company intended to extract copper from the dumps of rejected ore surrounding the old dressing floors by the means of the newly developed electrolytic recover process. In September 1913, the French mining engineer, Count Henri de Bonnifonte de Varinay came to oversee this work. He constructed a new laboratory on the Bonsor Upper Mill, site powered by a 25 hp. Pelton turbine. The laboratory, which included the electrolysing room, is shown on the third edition OS map published in 1919 (Figure 9); they have since been demolished and only survive as footings. However, various other elements around the site do remain relating to this phase of activity including the sluice gate on the old Kernal water-race (1023).

Henri de Varinay also gave some consideration to the opening of the below ground works, but before work could really progress the whole operation was brought to a close by the First World War, and the Frenchman was dispatched home. The operation eventually closed in 1915, although there was some interest in 1917 in opening the mines to support the war effort, but this never progressed further than an initial investigation (Holland 1986, 264)

In 1954, W.T. Shaw of Keswick, on behalf of the McKechnie brothers, obtained the mine lease with the intention of accessing the Paddy End works via Hospital shaft, and to drain these by pumping water up into the Deep Level. However, after various failed attempts the task proved impossible and the venture abandoned. This marked the last attempt to re-work the old mine.

Phase V: Current use

Despite the closure of the mines, interest in Coniston continued. The lake and surrounding area was a popular holiday and tourist destination after the war and during in the 1960s and 70s pot holing and mine exploration began to grow as a popular pastime. In 1979, a group of experience enthusiasts formed the Cumbria Amenity Trust Mining History Society (CATMHS) and embarked on a long term programme of surveying and recording the Coniston mines, and others in the district, both below and above ground. This work continues today and is an unparalleled resource regarding all aspects of the mine's development and history.

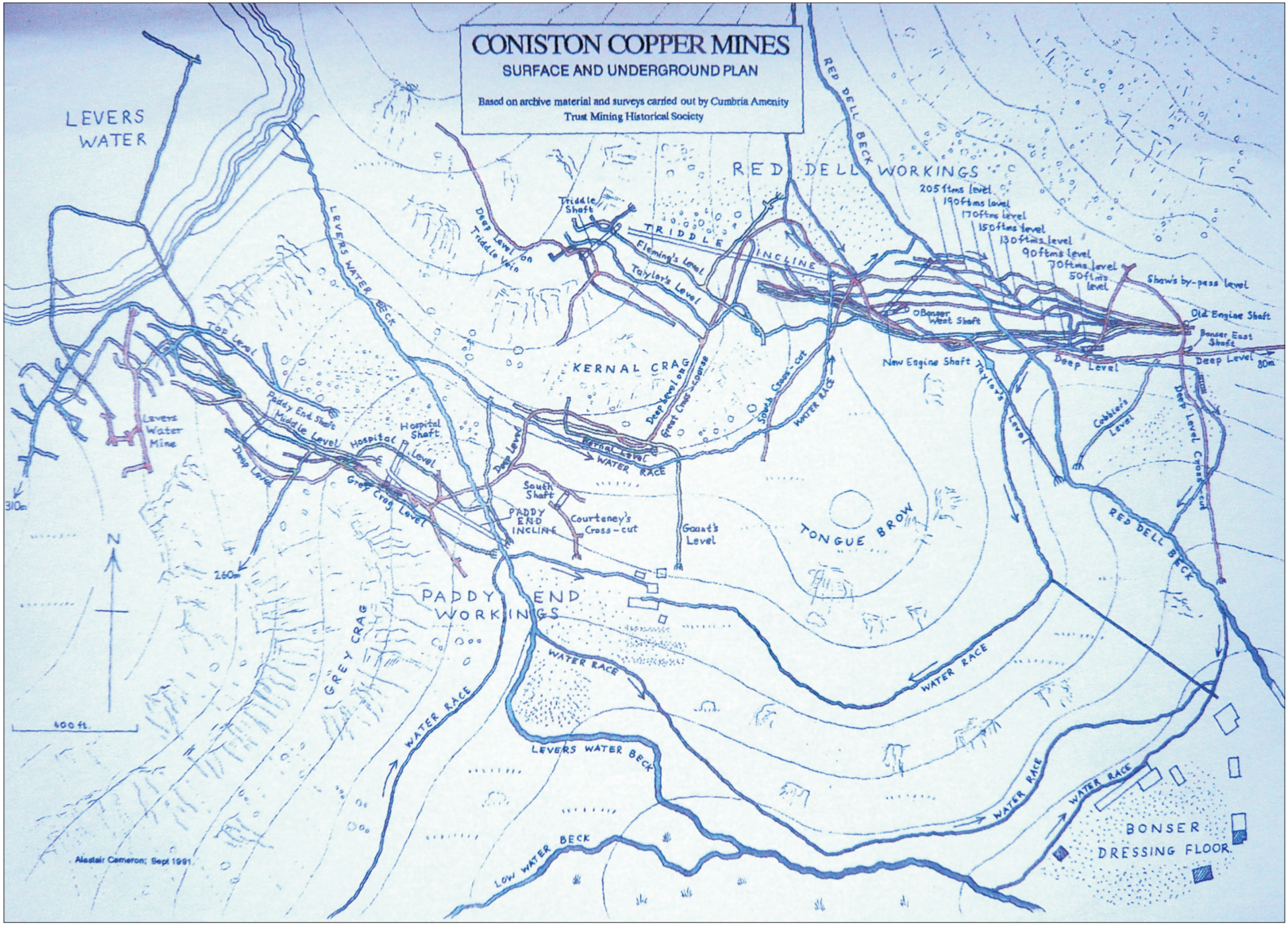


Figure 8 *Coniston Copper Mines: plan of the underground mine workings in relation to the surface evidence. Image reproduced by kind permission of CATHMS © CATHMS*

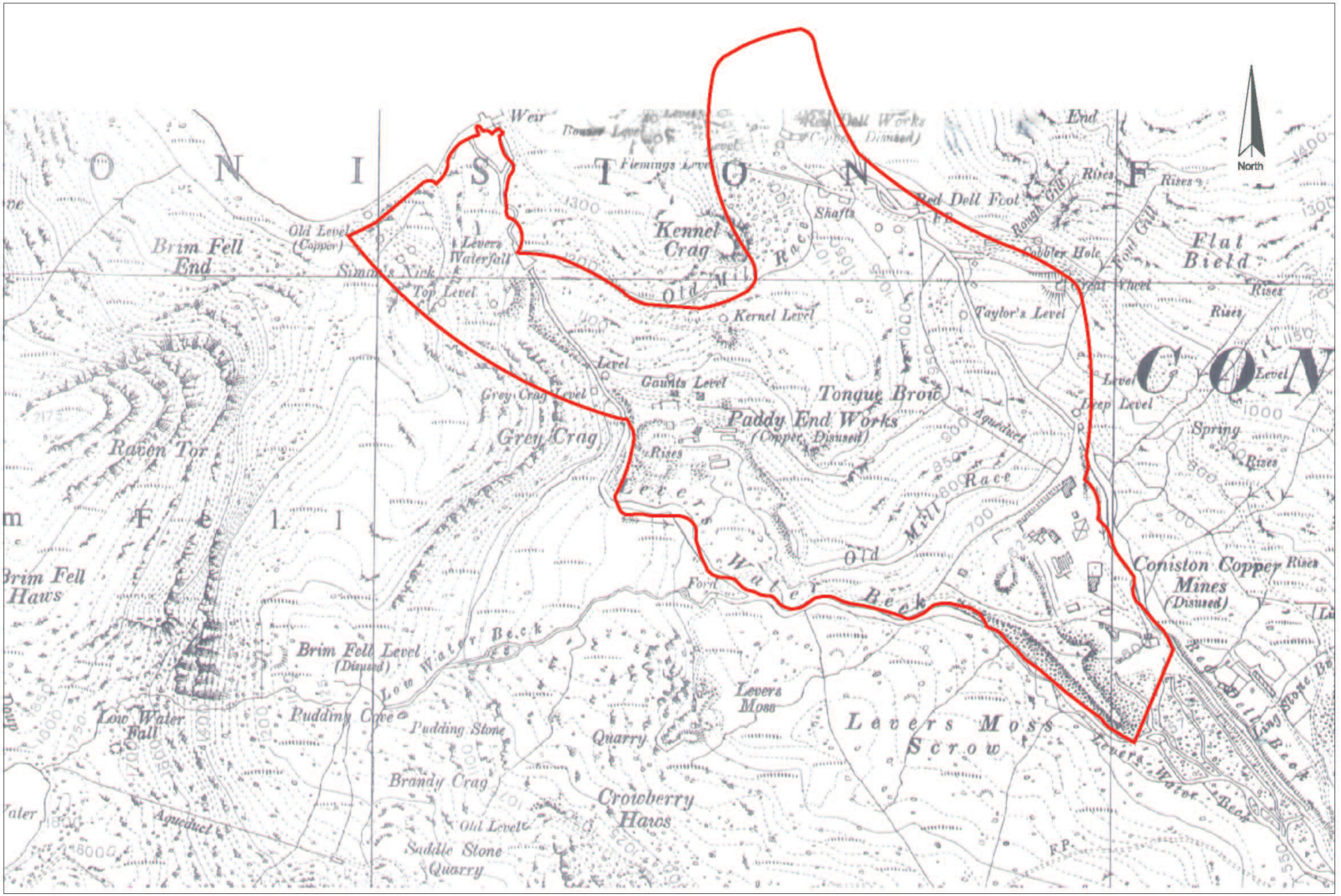


Figure 9 *Coniston Copper Mines: Six inch Third Edition Ordnance Survey map (1919) overlaid with site boundary*

In July 1985, in recognition of their national importance, a 5km area of the Coniston Copper Mines were Scheduled. And today, the site remains popular with mine's enthusiasts, walkers and sightseers. The Youth Hostel (1072), located in the former mine offices, was opened in 1928 and was one of the first hostels to open in the region. It became affiliated with the Youth Hostel Association in 1931, and was the first YHA acquisition in the Lake District. Just south-east of the hostel, the old mine manager's house (1073) is used by the Barrow and District Mountaineer and Ski Club, and three of the cottages (Nos. 3-7) on Irish Row belong to the Yorkshire Mountaineering Club.

Gaps in Our Understanding

There is much written and research about Phases III and IV, however one or two questions remain:

How the various leat systems connect:- *further research could potentially be undertaken to understand how the various water management systems operated across the site. Some work has been done on this already but the site would benefit from a more comprehensive study. This would in turn inform future management of these features.*

The Red Dell Mill *– the development of this area remains complex and not fully understood. Detailed recording, coupled with targeted excavation may go someway into resolving the various issues.*

The absence of trackways *– there seems to be no surviving evidence of tracks or waggonways above ground. Presumably such features where in use at the site and further documentary research, coupled with target excavation might shed some light on the issue.*

The survival of the Electrolytic Copper Company Laboratories *– Further recording, and possibly target excavation, of these features would help to extend our understanding of this rather unique phase in the mine's history.*

Previous Archaeological and Historical Research

Table 1: *previous archaeological work and research undertaken on Coniston Copper Mines*

Date	Organisation	Work undertaken
1983	Cumbria and Lancashire Archaeological Unit	In August 1983, the Cumbria and Lancashire Archaeological Unit were commissioned by Philip Johnston to undertake a survey of the Bonsor Upper Mill Site in advance of restoration and conversion work (Middleton 1985). Results published in 'A Survey of the Old Copper Works, Coppermines Valley, Coniston' CW2 volume LXXXV, pages 273-275
1995-97	RCHME	Detailed survey of the site undertaken by the then Royal Commission covering a 5.5km square area. The whole area was surveyed at a scale of 1:2500 with three 1:500 enlargements (Red Dell, Old Engine Shaft and the Back Strings). The 1:2500 survey was based on an air-

		photograph transcription done by Simon Crutchley of the Aerial Photographic Unit at the National Monuments Record Centre Swindon. This was then later enhanced in the field using ground based survey techniques. Subsequently, four interpretative reports were produced to accompany the plans but unfortunately none of the features referenced in the reports are numbered on the plans making use quite difficult.
1997 - Ongoing	British Geological Society and CATMHS	An ongoing survey of the below ground workings. This has also included considerable conservation work such as the restoration of the entrance to Flemings Level (1062) and the Back Strings (1050). Restoration and consolidation work has also been undertaken by CATMHS on above ground features, including the stone arch below the Thriddle Incline and the Old Engine Wheel House; although the latter now needs further attention.
2006	North Pennines Archaeology Ltd	North Pennines Archaeology Ltd undertook a rapid archaeological desk based assessment and watching brief on behalf of United Water Utilities as part of archaeological recording of works in advance of the extension of the Paddy End Water Treatment Works. Unpublished report 'Archaeological Rapid Desk-Based Assessment And Watching Brief Report' NPA Report No. No. CP/339/06
2007	Oxford Archaeology North	An archaeological Survey was undertaken of Paddy End Dressing Floors following damage caused by a burst water main above the site. Unpublished report 'Paddy End Dressing Floors – Archaeological Survey Report' OAN Report 2007-2008/695.

2.5 THE COLLECTIONS

On Site Material

Very few artefacts survive in-situ above ground. Those that do survive include the early 20th century sluice gate (1023) associated with the Paddy End Leat (1022), as well as various fragments of iron work found connected with some of the mine entrances like the hopper braces (1041) at Middle Level (1040) and the iron roller fittings at Bouncy Level (1067) and Old Engine Shaft (1017). Other features are preserved below ground, or at the shaft entrances, including the balance bob at Bouncy and the sheave wheel at the Old Engine Shaft, the latter of which owes its preservation to the work of CATMHS.

The Coniston Collection (CATMHS)

Over the thirty years or so that CATMHS have been exploring the mine, a number of tools and pieces of equipment have been found by the society. One of the most evocative was a kibble discovered in 1988 deep down in the Red Dell stopes; this has now been restored and preserved. The kibble, and many other of the mine artefacts found during CATMHS explorations, now form part of the Coniston Collection stored at the Ruskin Museum.


Plates 30 & 31: *a winch still preserved in one of the underground tunnels and the discovery of the kibble, now preserved and forming part of the Coniston Collection at the Ruskin Museum. © CATMHS.*

The Coniston Coppermines Collection (P. Johnston)

On site there are a number of pieces of mining equipment displayed as part of the Coniston Coppermine Museum, owned by Mr Johnston. These pieces form part of a wider collection amassed by the owner, which includes various pieces of mining and farming equipment and a series of period film props. It also includes the 'Peter Appleyard Collection', a collection of 'sheep related' artefacts first started in 1970, as well as a number of 19th century carts and gigs. At present the collection is closed to the general public, although various tools, bits of gearing and waggons can be seen positioned across the Upper Bonsor Mill area. However, these were all brought onto the site from other mines and were not found at Coniston, although they do serve to evoke something of the site's mining heritage.

The Archive (CATMHS)

In addition to the artefact collection, CATMHS also have a great deal of primary and secondary reference material which is stored as part of the Ruskin Museum library this includes: a Lease, two cost books (which CATMHS members have digitised), a file of letters belonging to the French Electrolytic Company, various photographs, theses/dissertations, and mineral specimens including a section of the Bonsor Vein collected by the BGS (Brian Young & Dave Millward) when researching the Coniston geology map. The collection also includes two watercolours of the Copper Mines valley painted by W. G. Collingwood.

"There is still so much unknown, unexplored and some possibly lost forever in history at the site
Response to questionnaire - Derek Cutmore, Lindal.

2.6 THE ECOLOGY AND GEOLOGY OF THE SITE

Geology

The geology of Coniston has not only influenced the history of the mines but also the unique ecology of the site. The volcanic activity and resulting mineralogy, which has had such a marked impact on the industrial development of the fells, is considered to be of national importance and has led to the site being designated a geological Site of Special Scientific Interest (SSSI).

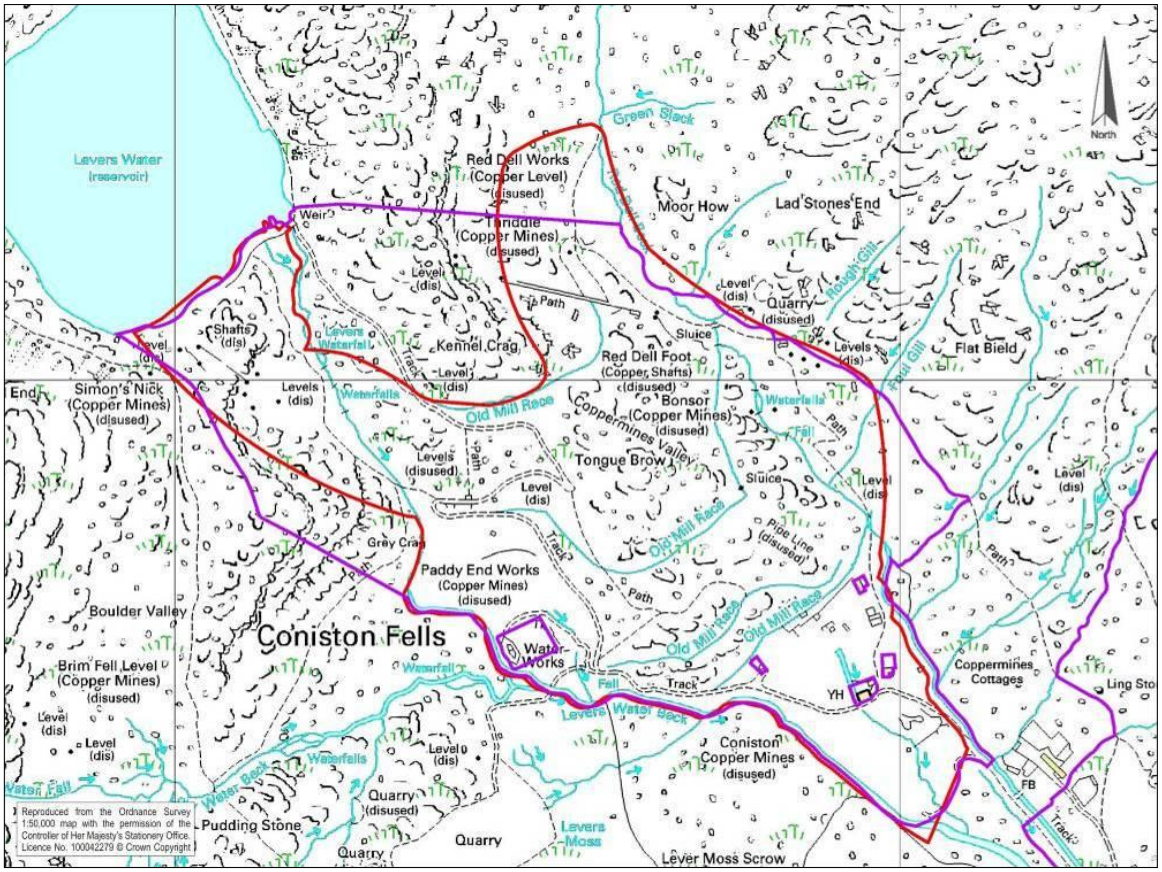


Figure 10: *the boundary of the Coniston Mines and Quarries SSSI (shown in purple).*

The SSSI stipulates four areas of particular interest:

1) Inland Outcrops (These outcrops demonstrate the character of the mid Ordovician Borrowdale Volcanic Group in the Southern Lake District – including many characteristic features of the last volcanic phase in this area.
2) Finite Mineral, Fossil and or other geology and
3) Finite Underground Mines and Tunnels (The abandoned workings and deposits are fine examples of the major primary vein mineralisation of the Lake District chalcopyrite-pyrite-arsenopyrite suite)
4) Mine Dumps (The mine dumps, especially those derived from the Paddy End Vein and The Bonser Vein provide access to the mineralisation exposed from the workings)

The citation for this site, list of Operations Liable to Damage (OLD's) the site and the Conservation Objectives are included in Appendix 6. Currently the site is assessed as being in favourable condition.

Ecology

The present flora and fauna of the Coniston copper mines clearly reflects the combined industrial and agricultural history which has dominated the site for at least five centuries. Prior to the development of the mines, the native post glacial vegetation would have comprised Atlantic dry upland heath with pockets of blanket mire and, depending on the extent of grazing on the site at any time in history, a variable amount of upland scrub and woodland. Since the 16th century, and possibly even before that, the impact of mining on the site began to take effect and continued to increase over the following centuries eventually becoming the dominant factor influencing the ecology of the vast majority of the site. This resulted in considerable ground disturbance, the erection of new structures, changes in drainage and the creation of cavernous mines and slag heaps, all of which were to have a profound effect on the wildlife of the area.

On top of this, the upland heath communities have been replaced by bracken dominated acid grasslands due to a combination of high grazing levels and disturbance. Woodland species are still apparent but confined mostly to the rock, boulder and ledges which are a striking common feature of the area and caused by both natural geology and the result of mining operations.

The overall result is a highly modified but interesting flora and fauna some of which are now permanent features and some of which are transient as the communities gradually revert back to their original character as time goes by. The now ruinous standing structures and adit entrances also provide valuable habitat for bats and birds, and the highly metalliferous rocks and open ground support rare lichen communities.

Rare lichen community

Rare lichen communities are a feature of highly metalliferous rocks and open ground. They are often able to exploit habitats poisonous to other species. In 1985 Purvis and James published a paper in the Lichenologist identifying 5 lichen species new to Britain (Purvis & James 1984). This includes the only British specimen of *Lecidea inops* (Copper lichen) above Levers Water (Black Scar Workings) - this makes it a potentially highly significant feature of this site. The lichen is one of a genus which is known to have various colour morphs depending on the reaction with the host minerals and is very difficult to identify. This species is protected under Schedule 8 of the Wildlife and Countryside Act and is also a UK BAP priority species.

Although *Lecidea inops* has not yet been found within the boundaries of the site Purvis & James (1985) have identified it at Black Scar workings 827m away; this is important because it is a copper specific species and its presence cannot be ruled out at Coniston. Purvis and James also

explored three other sites within the boundary at Coniston and found a diverse and varied assemblage of lichens, but they are not specific to copper, but included 4 species new to Britain some of which hold specialised mineralogical affinities (*ibid*). The consultation process has confirmed that the lichens are of particular significance at Coniston (Sue Evans, Natural England *pers comm*.).

Bats

The legacy of the industrial archaeology has led to enormous potential for bats. This includes the opportunities for hibernacula within the mines themselves as well as roosting and hibernation opportunities in some of the structures and buildings. Most of the mines, and enclosed structures or buildings, or buildings with enclosed recesses, should all be classified as high risk for bat disturbance, should work be undertaken to restore or modify. This is the case even at the highest altitudes of the site as local observers have reported findings at Simon's Nick and the Back Strings.[1]

Plate 32: *entrance to Deep Level, close to where Foul Gill joins Red Dell Beck. One of the many high risk bat hibernation opportunities on the site*

Post Industrial Habitats

The overwhelming nature of the landscape at the Coniston shows evidence of redundant mining activities spanning many centuries of use; this has resulted in a highly specialised ecology.

Calaminarian grasslands occur on soils that have high levels of heavy metals, such as lead, zinc, chromium and copper, which are toxic to most plant species. They typically occur on artificial

[1] There is also a bat survey dating to 1995

sites associated with past mining activities. This type of grassland habitat is best identified by an examination of the bryophytes and lichens. There was little evidence of the classical OV37 higher plant indicator species which are generally found on spoil of lead mines (e.g. alpine pennycress *(Thlaspi caerulescens),* Spring sandwort *(Minuta verna),* Thrift *(Armeria maritima)*). However, some species of this community were present occasionally, or commonly, on the site. These include Northern rock cress *(Arabis petraeae),* Flea sedge *(Carex pulicaris),* Eyebright *(Euphrasia spp)*. Lesser clubmoss *(Seliginella selaeginoides),* fairy flax *(Linum cartharticum)* and wild thyme *(Thymus polytrichus).* Copper concentrates tend to be characterised by poorly grown stands of heather *(Calluna vulgaris)* and bent *(Agrostis capillaris)* and the former was abundant across the site. All these species, however, can also be found on acid grassland and rock communities. The Paddy End site perhaps showed the most characteristic Calaminarian species assemblage with a single specimen of spring sandwort *(Minuta verna)* and more abundant fairy flax *(Linum cartharticum)* found.

Plate 33: *the unstable deposits and spoil tips at Paddy End which have an interesting calaminarian type grassland developing.*

Without further identification of the lower plants and lichens, beyond the scope of this survey, the predominant associations can be described as 'Early pioneer communities on skeletal substrates often associated with quarries and other 'brownfield' land' These vary enormously depending on the age of deposits, the composition of the deposits and the coarseness of the deposits.

In some cases there has been little or no colonisation of the deposits by species other than lichens even on spoil heaps which have been *in-situ* for centuries. This is particularly apparent on

the large spoil tips and dressing floors south of the Youth Hostel, and on the older deposits adjacent to the Back Strings. Highly toxic and unstable deposits are likely to remain bare of vegetation or sparsely vegetated with ruderal species such as lichens, bryophytes, ferns - especially the locally abundant parsley fern *(Cryptogramma crispa),* suppressed heather *(Calluna vulgaris)* herb-robert *(Geranium robertianum),* English Stonecrop *(Sedum anglicum)* and other acid tolerant plant species. Where initial or established plant communities have developed, however, local conditions have provided for a variety of species associations. Some are species rich such as that developing on the deposits north and west of the Youth Hostel, Paddy End and the slopes to the east of the Red Dell Beck, with a wide variety of species such as thyme leaved speedwell *(Veronica serpyllifolia),* germander speedwell *(V. Chamaedrys),* trailing St Johns wort *(Hypericium humifusum),* in addition to the ubiquitous English stonecrop, *(Sedum anglicum),* sheeps sorrel *(Rumex acetosa)*, tormentil *(Potentilla erecta),* herb-robert *(Geranium robertianum),* sheeps fescue *(Festuca ovina),* mosses and lichens. Others, such as the courser deposits at Red Dell and along the Thriddle Incline, and the older deposits at the Back Strings, show much less diversity and a more direct reversion to acid grassland; although the first two have species characteristic of open stony habitats such as lesser clubmoss *(Selaginella selaginoides)* and parsley fern *(Cryptogramma crispa).*

Plates 34 & 35 *coarse steep stone slag, barely vegetated but lichen rich at Red Dell Beck behind the Youth Hostel. The short grass developing in the forefront of the picture is species rich, elsewhere there is little sign of regeneration of grassland on the surface of the deposits.*

The extant archaeology has also resulted in the creation of a characteristic range of wetland habitats. In some cases these have resulted from depressions created directly due to works (such as those across the dressing floors of Low Mill) or they have been created by structures impeding waterflow. The mill races in particular have resulted in pockets of mire habitat. This is particularly so in the silted up race associated with the remains of the Old Engine Shaft Wheel.

The wetland communities created are dependent on the surrounding environment, with strong acid influences apparent, especially on the dressing floors where there is a blanket mire with species such as common cotton grass *(Eriophorum angustifolium),* sphagnum *(Sphagnum spp.),*

sundew *(Drosera spp.),* common butterwort *(Pinguicula vulgaris)*, star sedge *(Carex echinata),* bog asphodel *(Narthecium ossifragum)* and heather *(Calluna vulgaris).* In the more neutral mires, marsh violet *(Viola palustris),* marsh pearlwort *(Sagina subulata),* flea sedge *(Carex pulicaris)*, marsh lousewort *(Pedicularis palustris)* and bottle sedge *(Carex rostrata)* are more apparent. It is possible that some of the more acid bogs were influenced by past industrial processes (acid extraction of metals, for instance) but generally there is little to distinguish them from the natural flushes and bogs of open moor.


Plates 36 & 37: *small area of acid bog vegetation on the once industrialised floor below the Youth Hostel and beautiful sphagnum rich seepage habitat below the aquifer structure leading to the water wheel*

Bryophyte rich seepage habitats occur at the base of some of the structures as well as within the mine entrances.

Few permanent ponds have been created at the Coniston site, the small pond south of the Youth hostel showing very little signs of life!

Chasmophytic vegetation (plant communities that colonise the cracks and fissures of rock faces)
The natural chasmophytic vegetation at the site has been significantly supplemented by man-made features associated with the adit entrances, quarried rock faces, exposed rock outcrops and other man-made structures at the site. These range from a macro scale (trees and shrubs on large ledges) to the micro scale (mosses and plants on small fissures).

Trees and shrubs, which have survived grazing on inaccessible rock ledges, are a feature on both natural and man-made ledges and particularly a feature on the rocks and boulders where shrubs such as juniper, hawthorn, broom and holly and plants such as heather *(Caluna vulgaris),* foxglove *(Digitalis purpurea)* and ferns survive the intensive grazing.

Within the wet adit and level entrances, or in cavernous structures, where seepage habitats occur, abundant mosses, liverworts, and many ferns survive (e.g. male and broad buckler ferns *(Dryopteris spp.),* lemon scented fern *(Oreopteris limbosperma),* hard fern *(Blechnum spicant),*

maidenhair spleenwort *(Asplenium trichomanes).* In addition, plants such as hawksbeards *(Crepis spp.)*, mint *(Mentha spp.)* and St John's-wort *(Hypericum spp.)*, hang on to the fissures and cracks. These are exceptionally attractive habitats. All these macro and micro habitats will support other wildlife, in particular invertebrates and birds.

Plate 38: *New Engine Shaft (within the grazing enclosure) –Rich chasmophytic fern laden habitats*

Exposed river sediments

In recent years the conservation value of exposed riverine sediments has begun to be recognised, particularly for invertebrates. They can support rare species especially beetles *(Coleoptera Spp).* They may also support bird species such as the yellow wagtail and common sandpiper. These are important, largely natural habitats within some river corridors, although they are also vulnerable to disturbance and damage from a number of activities.

The river sediments at Coniston may be particularly important due to the potential influence of metaliferous material and due to the interaction of the in-situ deposits with the flooding river shingles which, in effect, creates additional habitat for the characteristic river shingle species.


Plates 39 & 40: *Leat showing chasmophytic trees and man-made rocky habitats and shifting river shingles at the extreme south of the site, here showing opportunistic butterworts. These are insectivorous species which supply their own nutrients.*

Natural Moorland Habitats

The natural moorland habitats (mostly heather dominated dry heath and blanket mire) which would have provided the main features, alongside woodlands, in post glacial times have been highly modified by industry and grazing animals. The fabric of the site is now composed mainly of bracken dominated acid grasslands. Except where industry has disturbed the ground beyond repair, there is potential to restore this habitat. The influence of fencing out farming stock on the structure of heather *(Calluna vulgaris)* and bilberry *(Vaccinium myrtillus)* and other moorland species can clearly be seen within the fenced enclosure of White Works.

The barriers to regeneration (grazing and bracken invasion) could, in theory, be lifted but the implications of this to other habitats considered of higher priority would suggest this would not be sensible management; it has therefore not been recommended in this report.

Other protected species

Other protected species at this site may include breeding birds and reptiles (especially adders).

Gaps in Our Understanding of the Ecology

The Lichens *- It is recognised that the survey of lichens on mineral rich sites such as this are underworked. Further studies into this site could reveal much about the behaviour of lichens in this sort of habitat. Furthermore, additional survey at this site would reveal the most sensitive lichen areas which should be undisturbed. Any developments within this site should be preceded by discussions with Natural England to assess the need for a specialist lichen survey in order to avoid inadvertent destruction of rare species or assemblages.*

The interpretation of grasslands and wetlands on industrial landscapes including on metaliferous

spoil is difficult at this site and survey by a lichenologist and bryologist would allow for a better interpretation to fully appreciate the significance of these habitats at this site. This is also the case with Chasmophytic vegetation. These habitats are often inaccessible and difficult to survey. A fuller survey, especially of cave entrance, seepage, fissures and ledges however may reveal specialised and rare species. Furthermore a survey of shingle areas and adjacent in-situ deposits may identify rare assemblages of invertebrates.

2.7 THE COMMUNITY AND THE MINES

There are a number of communities within the immediate vicinity of the mines, the largest of which is Coniston village with a population in the region of 1860, but others include Bowmanstead, Hawkshead Hill and Torver, all located along the valley bottom. The majority of these settlements have been influenced in some way by the development of the mines, and there remains amongst the residents a strong interest in the area's industrial heritage.

Today, the population of Coniston is relatively evenly spread in terms of age groups with the highest percentage of the population falling into the 45-59 age bracket. Many people in this group have taken early retirement and settled in the region from elsewhere, with over 16% or the population recorded as retired in the 2001 census. However, there are also a large number of small businesses in the area, with nearly 10% of the population listed as self-employed and by far the largest number (37%) employed in part-time work[2]. The majority of these are employed in the hospitality and tourist industry which today is the primary economic focus of the area; although agricultural production, particularly sheep and cattle farming, remains important.

Coniston lies within the Lake District National Park which attracts some 8 million visitors each year.[3] Many of these come for the beautiful scenery and the peace and quiet offered by the area, but increasingly there is more demand for outdoor activity holidays including mountain biking, hiking, kayaking, climbing, orienteering, as well as more specialist activities such as cave and mine exploration. The landscape around Coniston offers many of these activities and is a particular favourite with walkers who come to climb Coniston Old Man, as well as boat users on Coniston Water. In addition, there are a large range of attractions within the immediate vicinity, most notably Ruskin's house at Brantwood and the Ruskin Museum in the village, as well as the Beatrix Potter estate at Monk Coniston. People also visit the area because of its associations with Donald Campbell who was killed trying to regain the water speed record on Lake Coniston in 1967.

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[2] Citing online reference 'Coniston Ward Profile' > http://www.cumbria.police.uk/Admin/uploads/attachment/files/Performance/Southlakes_Ward/16UGHG.pdf, accessed 31/08/10

[3] Citing online reference 'The Lake District National Park – Tourism' > http://www.lakedistrict.gov.uk/index/learning/posters/poster7_tourists.htm, accessed 31/08/10

Visitors to Coniston stay in a mixture of self-catering and serviced accommodation. Philip Johnston, who owns part of the Copper Mines site, has converted a small number of his properties into holiday cottages which are managed through his company 'The Coppermines and Lakes Cottages'[4]. There are five properties in total - Pelton Wheel Cottages, The Sawyer's Cottage, The Carpenter's Cottage and the Mill Race Cottage - which form part of the old Saw Mill as well as one property (No.4) on Irish Row. All of these properties are let for public use throughout the year. They are also used for weddings and other celebrations and a marquee is erected adjacent to the Saw Mill on these occasions. Accommodation is also available on site at the Coniston Coppermines YHA, open from November to March each year and regularly fully booked throughout the summer months. In addition, accommodation is available for members of the Barrow Mountaineering and Ski club in the former Mine Manager's House, and for the Yorkshire Mountaineering Club at Irish Row.

The Coniston Coppermines are widely advertised as being one of the interesting sites to visit in and around the village, but they are not a formal visitor 'attraction' as such. However, the site is used by a large number of people from the local vicinity and further afield, and it seems to be this 'undeveloped' aspect of the site which one of its most cherished and important features.

In order to understand more about the use of the site by the community, a questionnaire covering various aspects of the site was sent out to individuals and groups identified as having an interest in the future development and management of the site. This group predominately comprised those listed in the 'stakeholder' section but forms were made more widely available to the general public at the Coniston TIC and the Ruskin Museum. A total of 19 questionnaires were completed, as well as 3 more general letters outlining issues and concerns. A small number of phone interviews were also conducted. The following analysis is based on a summary of information from the questionnaires.

The number of visits made, distance travelled and reason for visit.

The majority of those who responded to the questionnaire were regular users of the site, with 54% visiting the site frequently and 40% more than once a month. This might be expected given that the survey was targeted at key interest groups. It is also an indication of the degree of involvement that these groups have with the site and the dynamic nature of many of their members; particularly the mine exploration societies. However, the survey, therefore, only reflects the views of a small percentage of the community. Despite attempts being made to reach a broader range of people, by placing the forms at the TIC and Ruskin Museum, none of those who responded were not already familiar with the site. As such, the results could potentially introduce a bias into the survey which could skew the results. Further consultation and audience assessment

[4] Citing online reference 'The Coppermines and Lakes Cottages' http://www.coppermines.co.uk/index.htm, accessed 31/08/10

would be needed to provide a more rounded understanding of potential visitors to the mine. However, the current information does address the issues and concerns of those who currently enjoy the site.

Unsurprising, given the frequency of visits of those questioned, the majority lived quite close to the site, 54% coming from within 10 miles of Coniston and the rest coming from Cumbria, with only 1 person responding from outside the county. Most of those surveyed visited the site for a number of reasons, but the most popular response was to gain access up to the fells (74%), closely followed by visiting the copper mines (67%). The latter figure again may reflect the bias of those responding to the survey, with 54% stating that they visited the site to take part in mine exploration. In addition, 46% commented on the health benefits of visiting the site in terms of fresh air and exercise, and 33% visited to enjoy the natural environment. Surprisingly there were no responses from visitors to the YHA or holiday lets, although questionnaires were made available at both.

What makes the site important?

A series of possible options was provided to assess what made the site important and of these, all of those surveyed 'strongly agreed' that the archaeology and history of the Copper Mines was significant, with a further 74% commenting on the importance of the below ground 'mining' archaeology. All the other aspects suggested as contributing to significance received a fairly even coverage, with the majority of those questioned either agreeing or strongly agreeing. In terms of the importance of the wildness of the landscape, 47% 'strongly agreed' while 20% 'agreed' with the statement and the others did not comment. 'Access to great walks' received a similar response with an even distribution between those agreeing and strongly agreeing, as did the importance of the flora and fauna of the site and the mines potential significance as an educational resource. The only area where feelings did seem to be split were over the youth hostel with 13% of those questioned disagreeing that the YHA contributed to the importance of the site and 1 person even strongly disagreeing. However, this is probably a reflection of significance of the hostel to the individual in question rather than a condemnation of the YHA *per se*.

> *"So much to see on a walk in the area. The old remains draw me on to see what has changed since I last visited"*
>
> Response to questionnaire - Mr. P Timewell, Barrow in Furness

At the end of this section people were encourage to add any other aspects which made the site important to them. A number commented on the comprehensive nature of the site combining history, archaeology and geology with the enjoyment of the natural environment. There was a particularly interesting comment which placed stress on the importance of the site in understanding the 'working landscape' of the fells as opposed to the aesthetic quality of the

scenery, while for one person it was these very qualities which made the site important particularly for photography.

Issues facing the mines

The final two questions on the survey were aimed at establishing a general feel for how people would like to see the site managed and improved in the future. As might be expected, these two questions produced the greatest variety and depth of response, however, there appears to be a general consensus about the top three future priorities to enhance and protect the site these were:

i) improved interpretation and public presentation;
ii) while preserving the undisturbed nature of the site and preventing over development as a tourist attraction, and
iii) the consolidation and stablisation of the archaeological remains.

The identification of issues affecting the site had a more mixed response. These are summarised below and will be discussed further in the Risks and Issues section.

Access

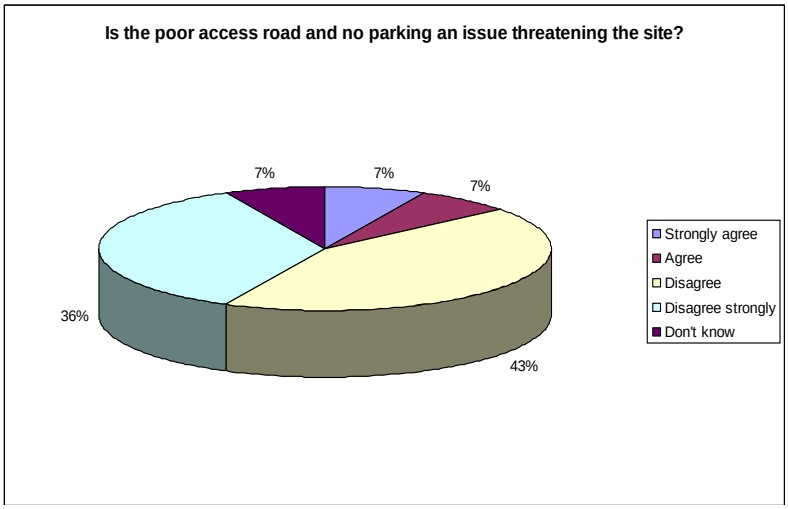


Figure 11: *pie chart showing responses to access issue*

There was a mixed response over the state of the access road into the site. Some people thought that the poor state of the road, and the restricted amount of on site parking, was a factor which limited their enjoyment of the mines and detracted from the broader public appeal of the site. However, the vast majority of those questioned saw the poor state of the road as a positive factor contributing to the preservation of the site by limiting the number visitors and safeguarding the wild and remote character of the area.

'' Better access and parking could destroy the attraction of the site. There is a good footpath up there". "Keep the access road just that – not a road for all to drive and park". "Improving road access to motor vehicles"

Mixed responses to the issue of access from the questionnaires

Similarly, opinion was split about the condition and extent of the footpath network. Half of those questioned did not see the condition of the footpaths as being an issue, but 25% did see them as a problem limiting their enjoyment of the site. The issue with the footpaths seemed to be rather in terms of management as opposed to the extent of the routes available. This problem is one of a number caused by the recent flooding which has washed away, or compromised, the path in places.

Access to some areas of the site was also felt to be a problem, although again largely split between those who saw it as a problem (61%) and those who did not (30%). Those who did see it as an issue were largely concerned with Bonsor Upper Mill which is held in private ownership.

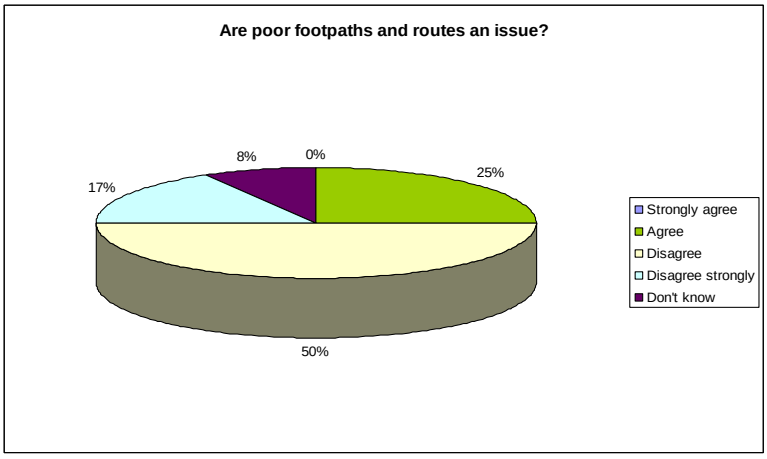


Figure 12: *pie chart showing responses to footpath issues*

Surprisingly, health and safety was another issue which seemed to divide people's responses with 58% seeing it as a concern while 48% were satisfied with the level of site safety offered.

Condition of the standing structures

All of those questioned saw the condition of the standing structures as being a threat to the future preservation of the site and wanted to see work undertaken to stabilise and consolidate these.

Interpretation and presentation

The majority of people wanted to see an improvement in the provision of information round the site, although there was concern that any signs erected were in keeping with the character of the site and were not too intrusive.

'' I think it is important not to 'Disneyfy' the Coppermines valley: too much has been lost now, and any reconstruction would be expensive, and rather pseudo"

"Information notices making people aware what is there and how important the site is and how it needs protecting"

"Provide vandal proof and weather proof information panels at strategic points'

Responses and suggestions regarding interpretation from the questionnaires

Threats to the setting, views and environment

A large number of those questioned (73%) were concerned that existing or potential developments may threaten the setting and views both to and from the site. Particular concerns included tree planting, new development, fences and signage. Other concerns included vandalism and litter although this was not seen as a large problem. Perhaps the most immediate risk was perceived to be from flood damage which had a considerable impact on the area during the winter of 2009/10; 60% of those questioned saw this as being a considerable risk to the future of the site.

Gaps in Our Understanding

The potential market – *more needs to be understood about those who do not currently use the site and what would attract them to visit. This of course should not be to the detriment of current users and would need to be carefully balanced, but as yet the broader demands of the area are not understood.*

The educational potential – *associated with the above would be a better understanding of the educational potential of the mines. The site would seem to offer a broad range of possibilities in accordance with Key Stage 2, 3 and 4 curriculum topics including local history, the natural environment, scientific discovery, geology, industrialisation and technological and economic change. Local schools in the area were asked to contribute to the plan but failed to do so, possibly because of the timing of the project during the summer holidays. This aspect might need revisiting, particularly with regards improvements to site interpretation and presentation.*

3.0 DEFINING SIGNIFICANCE

Background

The following section looks at just what it is that contributes to the unique site significance of the Coniston Copper Mines based on information gathered in the 'Understanding the site' stage. The national significance of the mines is already established by the site's Scheduled Monument status. However, this is a broad based assessment which looks across the whole country and, although helping to ensure the protection of the nation's historic monuments, does not really provide for the future management of any specific site. Each historic site has a unique cultural significance derived from a wide range of varying values and perspectives encompassing not just the physical fabric of the site but also its setting, use, history, ecology, traditions, local distinctiveness and community value (Kerr 1966, 4). Successful management of a site is based on protecting these various elements, foreseeing any potential conflicts of interest within them, and minimising any potential threats arising in the future.

> *'Anyone who manages such an asset will need to understand all its values because most management problems are the result of competition between different values'*
>
> HLF 2005, 11

This assessment of significance includes an overall evaluation of the whole mine complex according to guidance set out in Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008). This focuses on four high level themes:

- **Evidential Values** - the potential capacity of a site to yield primary evidence about past human activity (building design, extent of survival, etc).
- **Historical Values** - the potential of the site to offer a connection between the present and the past through association with people, events and aspects of life.
- **Aesthetic Values** - the potential for people to derive sensory and intellectual stimulation from a place, through design, art, character and setting.
- **Community Values** - The potential for a site to hold meaning for people to relate to it or whose collective experience or memory it holds (often closely related to Historical and Aesthetic values).
- **Natural Environment Values** - In addition, there will also be a consideration of the importance of the natural environment.

Within these five broad headings various site specific criteria and themes will be explored and evaluated, although there is considerable overlap between each of the groups. In order to help the formation of a positive conservation and management strategy each of the criteria have been

ranked (Clark 1999, 149; Kerr 1996, 19). However, the intention is not to de-value certain aspects of the site and it should not be assumed that an element designated as being of SOME or MARGINAL significance should be regarded as expendable, but only as less significant than other aspects of the site. It should also be stressed that significance may be modified as new changes are implemented and perceptions of the site alter. A review of significance should, therefore, not be seen as a single exercise but something to be regularly re-evaluated.

Ranking of Significance

Exceptional: aspects of the site considered as seminal to the evidential, historic, aesthetic or communal value of the site, the alteration or development of which would destroy or significantly compromise the integrity of the site. This category may be determined by the date, rarity, completeness, duration, setting or the representative quality of the element discussed.

Considerable: aspects that help to define the evidential, historic, aesthetic or communal value of the site, without which the character and understanding of place would be diminished but not destroyed.

Some: aspects which may contribute to, or complement, the evidential, historic, aesthetic or communal value of the site but are not intrinsic to it, and in some circumstances may be intrusive, and the removal or alteration of which may have a degree of impact on the understanding and interpretation of the place.

Marginal: those aspects which have only a minor connection with the evidential, historic, aesthetic or communal value of the site and could be considered intrusive, the removal or alteration of which could have a limited affect on the understanding of place.

In some cases, especially in the case of evidential and historic factors, the criteria affecting significance may vary spatially across the site. To clarify this, the individual significance of the key site components will also be assessed and ranked. However, again it should be stressed that this is intended to allow for informed management decisions and it does not mean that if, for example, Bonsor Low Mill is given a lower ranking than the Back Strings that they are necessarily intrinsically less valuable, but just possibly less sensitive to change.

3.1 OVERALL SITE SIGNIFICANCE

Although often overlooked in favour of the more extensive lead and coal mining industries, copper mining was nationally a highly significant industry, with far reaching social and economic consequences which shaped the landscape and communities for generations. It was also one on of the first industrialised extraction industries, introducing many of the technologies and processing methods which would subsequently contribute to the development of British mining. Alongside the mining of other non-ferrous minerals like lead and tin, the copper mines of Cumbria,

Cornwall and Devon were the precursors of the British industrial revolution and ultimately, through the expansion of trade, the growth of global capitalism.

The demand for copper rose considerably in the last quarter of the 18th century. By this period copper was being used for a wide range of purposes. It was used to sheath the hulls of merchant ships, essential to the growth of trade, and the Royal naval warships which jealously protected those sea routes. The strength of the navy also enabled the expansion of the empire, as Europe voraciously divided the world up amongst the emergent industrial nations. The movement of such wealth was also directly linked with the introduction of the first British copper currency in 1672. The metal has formed constituent part in many coins since this date including the beautiful Queen Victoria British pennies, issued between 1839 and 1859. In addition, copper was used in the sugar and dyeing industries to make hollow-ware boilers, vats and piping. It is also the principal constituent of brass used in a wide range of crucial fittings for steam engines, gun cartridges and brass trading goods.

At the zenith of production in the early part of the 19th Century, the British copper mining industry contributed more than half of the world's output. This mainly came from Cornwall, as the county's mines provided the bulk of the metal sent to the brass foundries of Bristol and Birmingham which were the leading exporters in the world. By the middle of the 18th Century the quantity of British copper sold was over 700,000 tons, and from just 1771 to 1838 about 5 million tons was produced in this country[5].

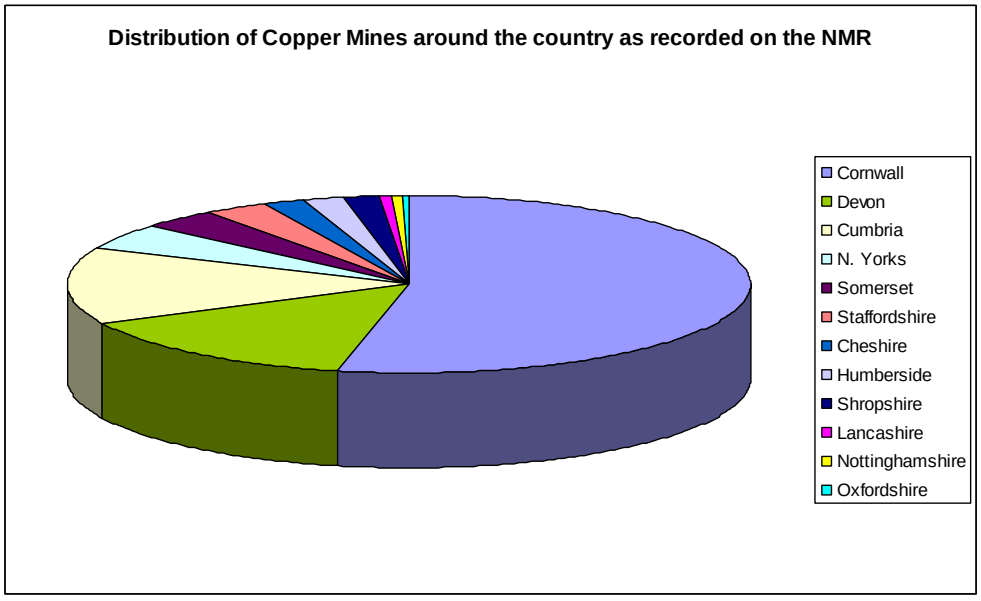


Figure 13: *distribution of copper mines across the country as recorded on the NMR*

[5] Citing online reference 'The Peak Yaers of British Copper Mining' > http://www.copper.org/education/history/60centuries/raw_material/thepeak.html, accessed 01/09/10

Economically viable copper mineral veins were comparatively rare in England. A total of 263 copper mines are listed on the National Monuments Record (NMR) although many of these are smaller mines, adits or shafts within a larger complex. Cornwall was the primary centre of production, with 140 sites being recorded in the county and a further 38 in West Devon. Outside the South West, Cumbria has the largest number of mines, with 37 recorded on the NMR. There were also important and profitable mines at Ecton in the Staffordshire Peak District and Alderley Edge in Cheshire. Copper has been worked at other sites in the country such as Middleton Tyas in North Yorkshire and North Molton, but these were insignificant and short lived ventures. No copper mines are currently at work in England.

Therefore, Cumbria had the greatest concentration of mines outside Devon and Cornwall and these are of **exceptional** significance in terms of an understanding of the broader development of the copper mining industry. Copper ores have been worked at a number of sites in the Lake District, although Coniston is one of the largest. Three other mines of comparable importance were Goldscope in the Newlands Valley, Tilberthwaite in the Coniston Fells, and Greenburn. Goldscope and Tilberthwaite mines date from at least the 16th century and continued working until the end of the 19th century, while Greenburn is a single-phase, late 19th century site. There were also smaller copper workings including Long Work and Dale Head in the Newlands Valley, the Hay Gill and Carrock End mines in the Caldbeck Fells and the Seathwaite Tarn mine in the Coniston Fells. Significant quantities of copper were also raised at Roughtongill in the Caldbeck Fells although this mine is better known as a lead producer. In addition, there were a number of insignificant or unproductive copper trials in Buttermere and Borrowdale, many of which are listed by Adams (Adams 1988).

Site preservation at Goldscope is generally poor and there are few remains of the 19th century processing plants. The significance of Goldscope lies more in the landscape impact of its dramatic two-phase spoil tips and the well-preserved 16th century open workings and rock-cut main level. Tilberthwaite also has extensive 16th century surface workings and is important in having a large and well preserved mid 19th century water-powered processing plant at Penny Rigg. Greenburn has remarkably well preserved remains which include the engine shaft, mine reservoir, mine office and a range of structures associated with water-powered ore dressing. This is probably the most complete copper mine in the Lake District but unlike the other mines it only operated during the second half of the 19th century and the remains relate to this single activity phase.

However, none of the other Lake District copper mines can compare with Coniston in terms of scale, overall range and quality of physical preservation or chronological and technological complexity. Coniston was the largest of the Cumbrian mines, producing over 100 tons of ore a month at its peak. This also makes it important within the group, the longevity of the mine's use and comprehensive nature of the surviving evidence further contributing to the **exceptional**

significance of the site.

> *"Evidence of working from the earliest times right through to the 1950s are to be seen at Coniston, thus creating a unique memorial to the immense endeavour which has taken place both on and under these fells. Every fragment on the extensive spoil-heaps, has been held in someone's hand, glanced at with practised eye – and rejected'*
>
> *Eric Holland* (Holland 1986)

In so many ways Coniston epitomises the development of the Lakeland copper mining industry. It was one of the earliest mines to be established, and the surviving evidence of the Elizabethan workings remain well preserved, and though modified at various stages, they provide a clear picture of the nature of early industrial copper mining. However, the heyday of the mine was under the management of John Taylor and John Barratt and the material dating to this period makes the site one of the best preserved and finest examples of a 19th century water-powered mine and mill complex surviving in Britain today. All the principal features of an integrated mining operation – shafts, levels, spoil tips, leats, wheel pits, haulage and pumping inclines, track ways, mill buildings and dressing floors – have survived and there is physical evidence of the full extractive process from underground mining to the production of the final copper concentrate. Exceptional archaeological survival is combined with a full historical record which provides a rare opportunity to both read the industrial landscape and understand the chronological relationship between sites as the mine developed. Examples of the latter include the abandonment of the Paddy End Incline once underground shafts had connected High and Middle Levels to Grey Crag Level, and the later abandonment of the Paddy End Mill once Deep Level had become the main haulage adit for the whole mine complex. Very few mines elsewhere in Britain can be analysed and interpreted in such detail, again making the Copper Mines of **exceptional** significance.

In addition, Coniston has remained in almost continual use since the 16th century with only brief phases of abandonment until it finally closed in the mid 20th century. As such, the site traces the story and development of British copper mining. Despite the considerable re-use and modification of some areas, certain features remain strongly associated with key periods allowing the visitor to move from the 16th and 17th century Back Strings, to the 18th century workings of Roe at Bonsor East and down to the 19th century processing floors at Bonsor Upper and Low Mill. This 'walk through time' has enormous potential for site interpretation and the presentation of the mine to the public.

Other factors contributing to the overall significance of the site include the **exceptional** significance of the geology - as reflected in the SSSI - and some of the flora (especially the lichens) as well as the value of the surrounding landscape and setting. Coniston is important as one of the first truly industrial landscapes in the country and there is a very strong 'sense of place' which is felt across

the valley. This goes beyond the historic and archaeological material, evoking a very strong aesthetic and emotional response. So many people questioned during the preparation of this plan made reference to the wild and bleak atmosphere of the place which seems to encapsulate the harshness of industrial life and survival. Such subjective responses are very difficult to quantify and evaluate but what became immediately apparent from public consultation was the level of attachment, pride and interest there was in the Coniston mines, particularly amongst regular users of the site. However, the challenge will be to share this enthusiasm by attracting a wider body of people to visit the site whilst still retaining the isolation and unique 'sense of place' which makes it so special.

Summary of factors contributing to the overall EXCEPTIONAL significance of the site	
Overall importance of copper from mines like Coniston to the development of the modern world.	EXCEPTIONAL
Significance of Coniston as one of the group of Cumbrian Copper mines which were the greatest collection of mines outside of Devon and Cornwall.	EXCEPTIONAL
Within the Cumbrian group Coniston is the largest, most comprehensive and best preserved example.	EXCEPTIONAL
Coniston is multi-phased with preserved remains from each period. There are also a number of 'single phase' areas which allow a 'walk through time'.	EXCEPTIONAL
Coniston is one of the best, and most complete, examples of a 19th century copper mine in the country	EXCEPTIONAL
The preservation of much of the standing structures	EXCEPTIONAL
The whole process of copper making from gaining the ore to the final copper concentrate is evident at Coniston.	EXCEPTIONAL
The geological importance of the site as reflected in its SSSI designation	EXCEPTIONAL
The ecological importance of the site as reflected in the rare lichen communities and protected species	EXCEPTIONAL
The site is very important to the local community and the other users of the site although it currently does not have an extensive appeal outside the county	CONSIDERABLE
The isolated and enigmatic setting of the site creates a cherished and valued 'sense of place'.	CONSIDERABLE

3.2 EVIDENTIAL VALUES

Preservation on the site is very good in places, and there has already been considerable research undertaken on both the above and below ground remains. However, there is still considerable potential for the more information to be uncovered both in terms of the specific development of the

mines and more general data on mining technologies and the lives of the people who lived and worked on the site.

There are four different areas where material evidence at Coniston can be found:

1) **Above ground standing remains** – these have been the primary focus of the first section of the Plan and include buildings associated with the various mine operations as well as shafts, levels and dressing floors. These remains are considered to be of **exceptional** significance as discussed below.

2) **Sub-surface archaeological remains** – little is known about the preservation of the below ground archaeology associated with the site as very little excavation has taken place. However, based on the limited amount of work that has been undertaken, including that undertaken by CATMHS at Simon's Nick prior to scheduling, it would seem that preservation could potentially be good. Sub-surface remains are, therefore, considered to be of **exceptional** significance although levels of preservation may vary.

3) **Below ground mining activity** – this varies from the sub-surface, more 'traditional' archaeological remains and deals instead with the specialised field of mining archaeology. Currently only members of CATMHS have undertaken any below ground investigation and recording. These are considered to be of **exceptional** significance although a more detailed consideration of this area is beyond the remit of the Plan.

4) **Artefact Collections** – there are at least two Coniston collections, one at the Ruskin museum and one owned by Philip Johnston. The Ruskin collection in particular has the potential to be of **considerable** significance. Not least, because artefact collections are an invaluable resource for public interpretation and presentation.

All of the above are important in terms of expanding our knowledge of mining at Coniston but this Plan primarily deals with just the first, the above ground evidence, and to some extent the potential for the survival of sub-surface archaeological remains. What is immediately apparent from a consideration of the surviving material evidence is the comprehensive nature of the preserved remains. Each of the main phases of the mines development is represented with particularly good evidence of the 16th and 17th century mines.

Phase I – The Elizabethan Workings

The principal remains from this period are the openworks and dressing floors at Simon's Nick and the Back Strings, Low Work, White Work and the Cobblers Level (1048-50, 1005, 1024, 1000, 1010). In addition, there are possibly two buildings on the hill slope above Cobblers levels (1012-13) and a series of pack horse trails (e.g. 1054 & 1009) which may date to this period.

In general, the material evidence from this phase is considered to be of **exceptional** significance because of its importance in understanding early mining processes which were to have such a marked impact on the later development of the country's industries. Virtually all of the key early mining processes are represented at Coniston as well as some indication of living conditions, although this is very sparse. Combined with the historic data, this is arguably one of the most important elements contributing to the overall significance of the site.

Plates 41 & 42: *well preserved Elizabethan remains at the Back Strings. These make the material evidence of Coniston of exceptional significance*

White Work, Low Work and the Back Strings are rare survivals of early modern metal mining. The Back Strings are particularly important because they encapsulate the whole mining and ore preparation process - open stope workings preserved adjacent to contemporary hand dressing floors, stone huts and ore crushing mortars. The only local parallel for this type of primitive mining and processing is at the Long Work mine (NY 228162) in the Newlands Valley where a series of dressing floors with *in-situ* mortar stones are associated with 16th century openworks. Long Work was one of the mines worked by the Company of Mines Royal and, like the Back Strings at Coniston, has seen little later disturbance.

Well preserved dressing floors of this period are very rare elsewhere in Britain but comparisons can be made with the Comet Lode section of the Cwmystwyth mine, Ceredigion and the Tyndrum mine, Perth and Kinross which both combine small hand dressing floors, stone shelters and mortar stones. These examples are lead mines but the basic processes of primary mining and ore crushing apply equally to copper sites.

The open stopes at White Work (1024) are fenced and the interior surface is masked by vegetation. The north western end has been disturbed by 18th century, and later, mining activity but good preservation of early features may be expected to survive elsewhere at this site. Interestingly, no mortar stones have been recorded here. Further east, the surface area around the Low Work opencasts has been disturbed by later operations although the presence of

displaced mortar stones in the tips demonstrates a similar technology to that employed at Back Strings.

Cobblers Level (1000), despite later alterations, is a good example of a 17th century hand-picked mine level. It was driven to access and drain the Low Work open cast and so belongs to the final episode of Phase 1 mining. It is the only early level at Coniston which is accessible to the non-specialist and it can be compared with some of the hand-cut levels in the Derwent Fells, most notably the entrance workings at the Goldscope mine in the Newlands Valley. Datable mine levels of this period are comparatively rare in the rest of Britain and this increases the relative importance of Cobblers Level. The small dressing floor (1011) outside the level is also significant as it may have housed a set of water powered ore stamps. If this is correct – and the field evidence is currently inconclusive – then it would be one of the few surviving examples of a 17th century mechanised ore crushing site. The best local parallel is the stamp mill at the Greenhead Gill lead mine, Grasmere which was also operated by the Company of Mines Royal. Further afield there are good examples of 17th century stamp mills at the Cwmystwyth mine, Ceredigion and at some of the tin works on Dartmoor. Detailed survey and analysis of the Cobblers Level dressing floor would help in assessing its full significance.

In addition to the Elizabethan openworks there is also some suggestion that the two buildings on the hillside above Cobblers level (1012-13) might date to this period. This can probably only be proved by archaeological excavation. Similarly the sequence and function of those buildings adjacent to the Back Strings at Simon's Nick would merit further investigation and, in general, the possible survival of 16th century sub-surface archaeology across the site is considered to potentially be of **exceptional** significance.

Other surface remains of **considerable** significance include the various spoil tips around the site - distinguishable from the later tips by their orange-yellow colour - and the various pack horse trails which criss-cross the site.

The open stopes represent rare examples of early trench mining. They have not been examined in detail but can be expected to contain evidence of early mining techniques such as pick and gad marks, firesetting and gunpowder work. The detailed recording of underground mining features is still a new and little practiced area of research but John Barnatt's work on early lead mining sites in the Peak District (Barnatt and Worthington 2009) has shown the potential of this type of survey for identifying mining techniques and phases of mining. The current work by CATMHS to locate and enter Sebastian's Level at Back Strings may lead to the recording of a previously unexplored 16th and 17th century mine working which, if successful, will add greatly to our understanding of early mining at Coniston.

Phase II - The 18th century mine

During this phase the mines were worked by the Macclesfield Copper Company, one of the country's leading mining and copper smelting organisations. Evidence from this period is not as extensive as from the earlier phase, the main surviving features being the Bonsor East Shaft, Wheel and Leat (1055, 1015,1007) the Bonsor West shaft (1052) and potentially elements of the Red Dell Mill (1060-61), although all but Bonsor East were extensively re-developed in the 19th century. Similarly, any above ground features which may have existed at Paddy End during this period have been largely destroyed by later activity.

The surface features associated with the Bonsor East Shaft (1055) are in comparatively good condition and can be easily viewed from the track above. The wheel pit continued to be used until the 1850s but it appears to be of single phase construction and so is one of only a handful of examples in Britain of an unaltered 18th century water powered pumping mechanism. Hence, Bonsor East wheel (1007) is of **exceptional** significance both in terms of the development of mining technology as a whole, and as one of the few features on the site which dates to Roe's ownership of the mines which has not been subsequently modified and lost.

Advances during this period included the extensive use of gunpowder for excavation, and shot holes survive across site. However, it is impossible really to date these except to determine between the hand and machine driven holes. Together with pick marks, these do provide a valuable visual indication of how ore was gained and worked, bringing the site alive and useful for public interpretation.

Plates 43 & 44: *remains of the 18th century wheel and associated buildings at Bonsor East. These are of exceptional importance as one of the few examples of a single-phase 18th century mine water wheel in the country.*

Phase III – The 19th century mine

In 1824 John Taylor took over the Coniston lease and subsequent to this the mines worked continuously until 1895. The vast majority of the remains visible today belong to this phase of activity and include: the Paddy End Incline (1034) and associated levels (1041, 1045); the Paddy

End Mill (1028-32); the Thriddle Incline (1059); the Old and New Engine Shafts and Wheels (1017, 1052); Taylors, Flemings and Deep Levels (1001, 1062, 1071), the massive Bonsor Upper and Low Mills (1070, 1025) and a complex of water courses. The Red Dell Mill (1060-61) may also be a 19th century development but this has yet to be proven and its dating remains ambiguous.

All of the 19th century sites are significant as part of the integrated unit which makes Coniston one of the most important copper mining sites in Britain. Each element of the winning and production process is represented and the importance of one single feature is secondary to the significance of the group as a whole. What is particularly interesting is the spatial distribution of each of the processes moving down the site. This is apparent in some of the earlier phases, but is very clear during the 19th century, with ore moving from the mines, down the slope to the processing floors at the base of the valley, and from there down to Coniston village. Later, this process was largely conducted underground with each area connected via Deep level (1071) and all ore being shifted for processing at Bonsor Upper and Low Mill.

The Bonsor Upper and Low Mills (1025, 1070) are good examples of 19th century ore dressing plants. The Upper Mill has undergone later alterations but the Low Mill is still well preserved. The earthwork remains of the jigging and buddling areas and the tailings ponds appear to be in particularly good condition. Jigging and buddling and other parts of the final dressing process can leave fairly ephemeral traces which are often overlooked by field workers. But when these processes have been examined – as at Killhope, Durham and Esgair Hir, Ceredigion (Palmer and Neverson 1989) – they have been found to be archaeologically rewarding. The Low Mill floors thus have high archaeological potential.

The sequence of development at New Engine Shaft and Wheel (1052) is an area worthy of further investigation, extending out to encompass the Red Dell Mill. The various elements here are all superimposed onto one another making interpretation difficult without sub-surface archaeological investigation, but this seems to have been an area of considerable activity possibly since the Elizabethan period, and it has the potential to preserve considerable information regarding the development of the site, although subsequent works may have compromised any earlier remains.

The Old Engine Shaft and Wheel (1017, 1015) was part of a phase of 19th century expansion alongside the New Engine Shaft and works at Paddy End, but perhaps the greatest significance of this feature is its state of preservation. It is the largest and most complete standing structure onsite apart from the buildings associated with the Bonsor High Mill. As such, the building has an iconic as well as an archaeological value. The complex arrangement of leats and tailraces surrounding the structure is also important in understanding the sequence of development, particularly in relation to the Bonsor East Wheel.

On the west side of the valley, the sequence of mines at Paddy End, although less visually stimulating than the remains along the Red Dell Beck, are evidentially of **exceptional** significance in understanding the development of this area of the site. However, the shifting scree and spoil slopes on this side have masked much of the surface archaeology which means much of the material evidence comes from the below ground mine explorations. One notable exception is the Paddy End Incline (1034) running up to Middle Level, although this has sadly been partially washed away by the recent floods. The incline is important because of the link it established between ore moving from the Top and Middle levels, down the incline to the Paddy End Mill and dressing floors. Similarly, the Thriddle Incline (1059) on the opposite side of the valley is clear evidence of how material moved around the site prior to the expansion of Deep Level, and furthers our understanding of how the site functioned and operated.

Plates 45 & 46: *the Paddy End and Thriddle Inclines, two of the most important features associated with Phase III of the site's development. These two structures contribute to an understanding of how ore was transported around the site and are part of the comprehensive series of features associated with the 19th century mine.*

As well as the standing structure, water management features like the leats and tailraces are important in understanding of how power was provided across the site. At its peak, 13 water wheels were in operation at Coniston and these were supplied by a complex network of water systems - a feat which required a considerable knowledge of hydro engineering - and just how each of these worked as a unit is not fully understood. Various interpretations of the water management systems have been proposed but further research would help provide a more comprehensive understanding.

During the 19th century most of the ore from Coniston was sent to Merseyside for smelting, but in 1894 Warsop erected the experimental copper smelter at the Low Mill. This was the only time when copper ore was smelted on site and it is a rare, possibly unique, example of a small late 19th century copper smelting furnace. Copper smelting is a specialised process which has received little archaeological attention and the Coniston smelter is of particular value. However, there are no surface remains of the structure except for the smelt waste (1077).

Phase IV – The 20th Century

In 1895 the pumps were stopped and the mine was allowed to flood. In 1911 there was an attempt to re-process some of the mine dumps by the Coniston Electrolytic Copper Works, a French organisation which installed a state-of-the-art plant at Bonsor Upper Mill to produce copper sheet. Contemporary photographs and archives survive (Holland 1986, 263) and these have the potential to provide a detailed analysis and interpretation of the site remains.

These remains are not extensive but they do represent an important episode in the story of mining at Coniston. More significantly this is one of only two surviving examples in Britain of the electrolytic recovery process for copper, the other being at the Drwsycoed mine in Snowdonia where a German company erected an electrolytic plant in 1906 (Bick 1982,39). The introduction of chemical separation techniques in the early 20th century was an important development in British mining and one that has yet to be assessed by industrial historians and archaeologists. The remains of the Coniston plant are, therefore, of national significance and deserve further study. The construction of the plant using French capital and expertise is similar to the situation at Nenthead, Cumbria where the mines and dressing plant were operated during the First World War by a Belgian company, Vielle Montagne Zinc, using an Italian workforce. This demonstrates the collapse in the early 1900s of a local mining base and its replacement with a continental system

Summary of factors contributing to the EVIDENTIAL value of the site	
General	
The group value of the site – the comprehensive nature of the evidence, with all major elements of extraction and primary preparation are represented up to the point of smelting.	EXCEPTIONAL
The potential preservation of sub-surface archaeological material particularly that associated with the 16th century workings.	CONSIDERABLE
The potential preservation of below ground mining archaeology	CONSIDERABLE
The artefact collection salvaged from the site at the Ruskin museum	EXCEPTIONAL
The preservation of much of the standing structures	CONSIDERABLE
The artefact collection at the Coppermine Museum (not original to the site)	SOME
Phase I: The 16th and 17th century mines	
The comprehensive nature of the evidence – in particular the area around the Back Strings where openworks are located adjacent to evidence of processing floors.	EXCEPTIONAL
The importance of 17th century technological advances in terms of their greater impact on the more widespread development of the mining industry	EXCEPTIONAL
The surviving Elizabethan Works (Low, White and the Back Strings)	EXCEPTIONAL

Cobblers Level as the only easily assessable example of a coffin level, and the first tunnel on the site.	EXCEPTIONAL
Potential for more detailed study of the open stopes	CONSIDERABLE
The potential existence of 17th century stamp mills at Cobblers Level and Red Dell (needs further investigation)	CONSIDERABLE
Packhorse tracks and access routes	CONSIDERABLE
Other evidence of earlier processing, including the mortar stones (possibly earlier phases of mining)	SOME
Possible Elizabethan structures above Cobblers Level (needs dating)	SOME
Phase II: The 18th century mines	
The East Bonsor Wheel pit as one of the few surviving single-phase 18th water powered pumping mechanism in Britain.	EXCEPTIONAL
Sequence of shot holes across the site as a dating mechanism and in understanding the progression of extraction across the mines	MARGINAL
Phase III: The 19th century mines	
The comprehensive nature of the evidence including the levels, shafts, adits, processing areas and standing structures.	EXCEPTIONAL
Process flow around the site from extraction to buddling.	EXCEPTIONAL
Bonsor Upper and Low Mill, especially the jigging and buddling areas at Low Mill	EXCEPTIONAL
The remains of the Old Engine Shaft Wheel and associated water management systems	EXCEPTIONAL
The Thriddle and Paddy End Inclines in terms of their technological importance and visual indication of process flow around the site	EXCEPTIONAL
The water management system across the site including the remains of the various wheels, leats and tailraces	EXCEPTIONAL
The remains of the Paddy End Mines	CONSIDERABLE
Standing building remains of Bonsor Upper Mill	CONSIDERABLE
The 19th century smelt mill (has a higher historic than evidential value)	SOME
Standing building remains of the Paddy End Mill (preservation poor)	SOME
The existence of the aerial haulage system, potentially the longest in the country.	
Slate, gravel and sand processing during the last phase of the site's use in the late 19th century	MARGINAL
Phase IV: The 20th century mines	
The potential sub-surface survival of remains associated with the Coniston Electrolytic Copper Works	CONSIDERABLE
The potential survival of standing building evidence related to the Coniston Electrolytic Copper Works, although little of this probably survives given	SOME

the subsequent conversion of any associated buildings.	

3.3 HISTORICAL VALUES

One of the key elements which contribute to the **exceptional** significance of the site is the quality of the historic documentary evidence. For almost all periods of the mine's use there is detailed primary source material available, providing information not only on production but on technological advances, worker numbers, equipment, accidents, mining progress and litigation. This is an invaluable resource for a wide range of historical research including social, economic and industrial history, and a considerable body of research has already been undertaken by the likes of W.G. Collingwood (1910, 1912), E Holland (1981,1986) and most recently, Peter Fleming (2007), amongst others.

Very few mining sites can match the level of archaeological preservation with such a comprehensive historic archive, and the opportunity for interpretation this offers is immense. The documentary material informs an understanding of the extant remains and visa versa, this has particularly proved to be the case with the below ground mine explorations where the mine records have helped to direct the path of investigations. Similarly, there is the potential for this material to help determine sub-surface archaeological remains associated with some of the key above ground features.

Contributing to the **exceptional** value of the historic resource is the time period covered by the documentary material. Such a level of detail might be expected for the 19th century site, although many mine's archives were subsequently lost or destroyed after closure. However, at Coniston there are detailed records dating back to the foundation of the modern mine in the Elizabethan period, providing an unparalleled glimpse into the nature of 16th century industrial development. These comprehensive accounts record the location of the works, how the ore was won, its quality, the number of German miners and local pickmen, as well as a wealth of other social and logistical information. There is evidence of workings dating to this period at a number of copper mines across the country but arguably none have this level of supporting documentary evidence. This information is important not only with regards an understanding of the development of the site, but also in national terms with Coniston being one of the first modern industrialised areas in the country. This, in turn, has direct implications to an understanding of the local history, remembering that the German miners where perhaps one of the earliest migrant industrial workforces in the country and their interaction and impact on the local community must have been substantial.

"I think it is very important that visitors should understand that 'the Lake District' has been an industrial region for many more years than it has been a picturesque/romantic paradise. Visitors should understand that people live and work here in a sustainable way that cities cannot emulate"

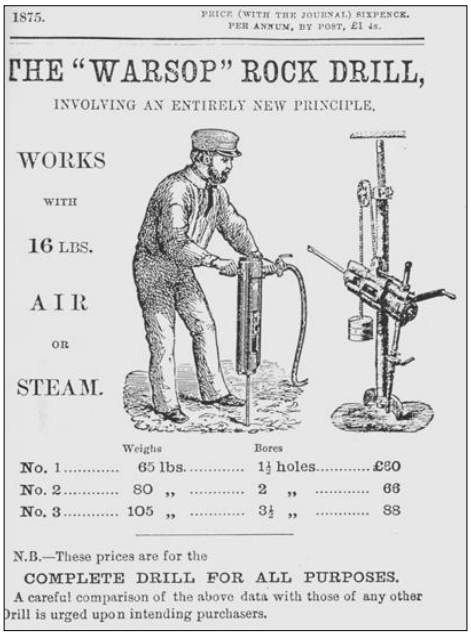
Victoria Slowe, Curator of the Ruskin Museum

In addition to the documentary material there are important historic figures associated with the site. There is the association with the Mines Royal and, as such, the royal patronage of Elizabeth and later Charles II. Daniel Hechstetter is also a very interesting character, a skilled mining engineer as well as a considerable entrepreneur, inventor and diplomat, although perhaps not recognised as such. The site also has long associations with the Le Fleming family who held the manor since the foundation of the modern mine in the 16th century and who still retain ownership of the land and royalties today.

More recently, John Taylor is a figure of considerable importance as one of the most successful mining engineers and entrepreneurs of his time. Taylor developed the idea of the high capital, fully integrated mine and Coniston with its complex of water courses and interlinked mines and mills is a good surviving example of his pioneering system of mine layout and organisation. Taylor was involved with mines in Cornwall, Wales, Ireland and even Mexico and his involvement at Coniston gives the site an international perspective. Taylor's mine manager, John Barratt is also an important character but without the far reaching influence on mining that Taylor had although his impact in terms of Coniston was greater, and it was he who instigated many of the later advances. Thomas Warsop, who took over the mine management in 1883, was another visionary and gifted inventor. His greatest influence was the introduction of compressed air for mechanised drilling into the mines and charging holes for blasting and other purposes with explosives, but his research saw him also experimenting with a huge range of other devices including: vacuum cleaning carpets by compressed air; a patented fly catcher; a railway rail lifter; a trouser stretcher; a self-acting weighing machine; an improved flash boiler; a reversible screw propeller and a simple automatic railway coupling. Thomas also erected many large air compressing and rock drilling plants both at home and abroad, including one in which air was conveyed over 8000 feet.[6]

Similarly, Charles Roe is a significant figure associated with the site, initially making his fortune in developing the Macclesfield silk industry he went on to have considerable success in copper mining and smelting. Although his involvement with Coniston was relatively short-lived, he did establish more profitable mines at Alderley Edge in Cheshire and Penrhyn-Du in North Wales and the Macclesfield Copper Company eventually became one of the three greatest brass companies of the late 18th century. The irony of Roe's involvement at Coniston is that he was so close to hitting the major sources of ore at Bonsor later worked by Taylor and Barratt but just stopped short of the mark.

[6] Citing online reference 'The History of Warsop and its Machines' > http://domain928502.sites.fasthosts.com/pdf_files/history/warsop_fairport_history.pdf, accessed 13/09/10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WORKS WITH 16 LBS. AIR OR STEAM.

	Weighs	Bores	
No. 1	65 lbs.	1½ holes	£30
No. 2	80 ,,	2 ,,	66
No. 3	105 ,,	3½ ,,	88

N.B.—These prices are for the COMPLETE DRILL FOR ALL PURPOSES. A careful comparison of the above data with those of any other Drill is urged upon intending purchasers.

Plates 47 & 48: *Warsop's compressed air 'Rock Drill' and John Taylor, civil and mining engineer.*

Outside those directly associated with the mine, there were a number of other historic characters and famous people associated with the site. John Ruskin, the writer, poet, art critic and social thinker, had strong links with Coniston, living close to the village at Brantwood. He had a great interest in the geology from an early age which drew him to the Coniston Fells. As early as 11 years old he noted in his diary, on a visit to Coniston Old Man with his parents in 1830, that the mountain had '*several rich copper mines'* (Victoria Slowe, *pers. com.*). His interest in geology no doubt continued to draw him to the Coppermine valley but it was his involvement in social justice and welfare which attracted him to the mines and quarries. He was concerned about the quality of life of the copper-miners and quarry workers - many of whom were women and children - who were employed in back breaking work in awful conditions. Ruskin strove to educate such people as a means to escape their poverty and improve their prospects. Coming fresh from lecturing at The Working Men's College in London in 1872, he became involved in teaching at Coniston Mechanics' Institute & Literary Society, established in 1852. Ruskin's treatises on social justice were later to have a significant influence on the development of the British Labour Party and Christian socialism.

A friend and colleague of Ruskin, and for many years his secretary, WG Collingwood - author, artist and antiquary - also had close associations with the site. He is known to have undertaken a number of watercolours in the valley (two of which form part of the Coniston Collection at the Ruskin Museum). The mines also form the backdrop for 'Dutch Agnes: A Journal of The Curate of Coniston 1616-1623', written by Collingwood in 1910 and described by the author as '*a historical picture in the style of Michelet, or a little more so; the outline is fact, the shading is inference, and*

the colouring imagination'.[7] As a historian, Collingwood conducted considerable research into the 16th century records of the site, publishing key articles on the topic. In 1901 he founded the Ruskin Museum, were the Coniston collection is currently stored.

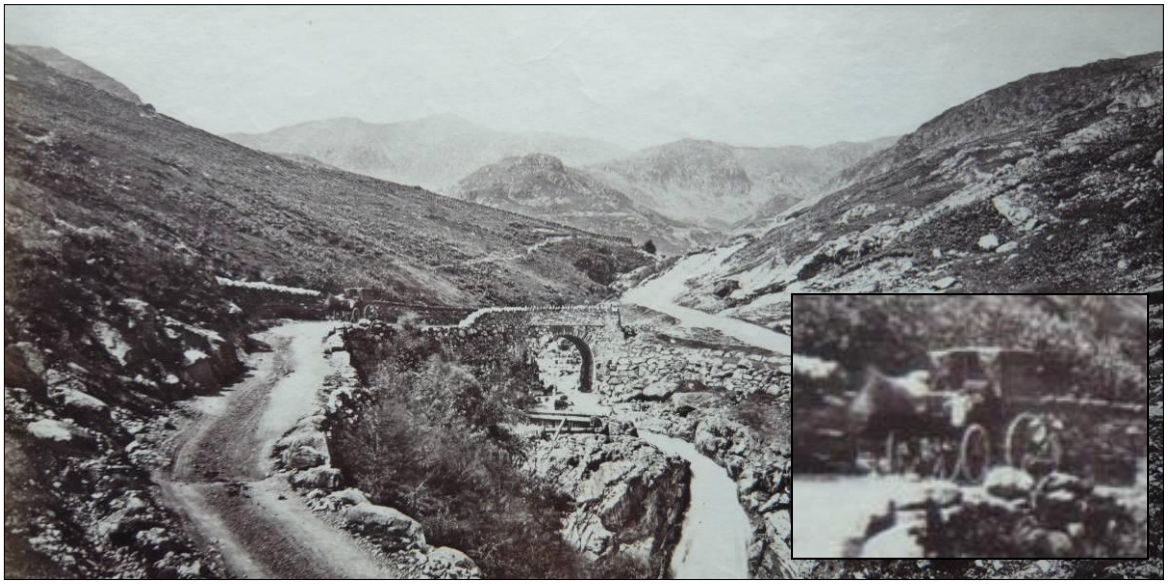

Plate 49: *an early photograph of the Miner's bridge at Coniston shows a bearded figure resting against a carriage wheel (see inset) – this figure is widely held to be Ruskin himself (P Fleming, pers. com.)*

A further literary connection is the character of Timothy 'Squashie Hat', in Arthur Ransome's 'Pigeon Post' and 'The Picts and the Martyrs'. Ransome is believed to have been modelled his character on Oscar Gnosspelius, Collingwood's son-in-law, who in the 1920s tried to re-open the Copper Mines (V Slowe *pers com.*). Ransome was a great friend of the Collingwood's and in 1828, the summer was spent teaching their grandchildren to sail which inspired the author to write Swallows and Amazons.

In more recent times, W.H. Auden wrote about the site in his poem 'The Chase' written in 1934, where he refers to 'Fleming's Chimney'. Auden found in the derelict mines of the Pennines and the Lake District, symbols of lost belief, the collapse of industry and the reassertion of nature.

'I look through the broken arms of waterwheels: I see lambs feeding.
Trucks lie overturned; an old rail patches a gap in the wall
Rain falls through the gaping roof of sheds; it falls on the obsolete inventions
and structures...
There is no smoke in Fleming's Chimney; the cupolas are cold in Washtub Wood
Daddry and Noonstones weep: at Broken Hill you were defeated"

W.H. Auden, the Chase, 1934

[7] Citing online reference 'Llanerch Publishers' > http://www.llanerchpress.com/book/category/northern-interest/11/dutch-agnes-a-journal-of-the-curate-of-coniston-1616-1623/w-g-collingwood/189785319X, accessed -7/09/10

The great Romantic artist, JMW Turner also visited the valley during his tour of the Lake District in 1797. Ruskin was a great advocate of Turner's work, having first become aware of the painter in 1833 when the writer was only 13 years old. The men later struck up a friendship, with Ruskin defending Turner's work in the face of severe criticism. Ruskin continued to collect Turner's work and was made executor of the artist will when he died in 1848.

Summary of factors contributing to the HISTORICAL value of the site	
The comprehensive nature of the historical evidence – there is good primary coverage, from a variety of sources, relating to all of the phases of mine's development	EXCEPTIONAL
The balance of good documentary evidence with well preserved archaeological material, both above and below ground. This provides a unique opportunity for site interpretation.	EXCEPTIONAL
The extent of the 16th century documentary archive.	EXCEPTIONAL
Documentary evidence of how the site developed as an integrated mining complex during the 19th century, including details of new technologies and methods.	EXCEPTIONAL
The extent of secondary evidence covering the site, particularly the work of Collingwood, Holland and Fleming.	CONSIDERABLE
Associations with important mining engineers and inventors of the time including John Taylor, John Barrett and Thomas Warsop.	CONSIDERABLE
Associations with the Mine Royal and the development of modern industrialised mining.	CONSIDERABLE
Significance of the site in terms of an understanding of local history	CONSIDERABLE
Associations with Ruskin	SOME
Association with Collingwood and Ransome	SOME
The royal patronage of the site and significance of the mines in terms of the economic and political history of the era	SOME
Associations with Daniel Hechstetter in particular, but also the other German miners - one of the first migrant workforces.	SOME
Associations with Charles Roe and the Macclesfield Mining Company	SOME
Associations with the Le Fleming family	SOME
Associations with JMW Turner	SOME
Associations with WH Auden	MARGINAL

3.4 AESTHETIC VALUES

The brooding natural beauty of the Coniston Fells attracts thousands of visitors to the area each year. The industrial remains, juxtaposed against this wild landscape, evoke a strong feeling of the passing of time and the transitory nature of human endeavour: a sense which resounds at some

of the country's greatest and most popular archaeological sites. When visiting the mines, one cannot fail to wonder what life was like working in such an isolated landscape, continually battered by the elements, and cut off by the weather for large parts of the year. As such, the site immediately engages with the visitor, and despite the vast and somewhat foreboding nature of the landscape there is a strong human connection. There is also a sense of discovery as the visitor encounters mine features tunnelled into the rock or poking out of bracken. The place is derelict and intriguing.

Plate 50: *a site full of intriguing buildings and features poking out of the bracken or hidden amongst the crags.*

The landscape of the upland is very different from the green pastures further down the valley and has a particular appeal. It is exposed and bleak, with very little tree cover and is of **exceptional** significance within the broader perspective of the National Parks, providing a contrast with the more pastoral landscapes of the valleys and contributing to the varied scenery which makes the region so popular.

"I see the seasonal changes, snow capped mountains, rushing waterfalls, wild flowers'
Response to questionnaire by Derek Cutmore, Lindal

The movement of water is a prominent feature of the landscape, from the still expanse of Levers Water, to the Levers Water and Red Dell Becks, cascading down the hillside in a series of small waterfalls, before converging in Church Beck. In addition there are also countless streams, leats and rivlets. The weather also makes for a continually changing landscape, as various fronts moving across the valley often in a very short space of time.

It was perhaps the changing moods of the landscape which attracted the great Romantic artist, JMW Turner to the site. He visited the valley during his tour of the Lake District in 1797 when he sketched the 'Church Beck Falls and Coppermines Valley' in his 'Tweed and Lakes' sketchbook. This pencil sketch was later worked up into the painting 'Morning amongst the Coniston Fells', exhibited at the Royal Academy in 1798. Although the artist was known to have drawn great inspiration from the industrial age in works such as 'Rain, Steam and Speed' (1840), this painting shows nothing of the copper works themselves, evoking instead the brooding power of the natural landscape and the changes wrought by time and weather. There is no subject or narrative in the picture, only the vivid effects of the morning light filtered through the swirling mists, creating a powerful image very characteristic of Turner's landscape work. However, this is quite an early painting, whereas most of Turner's 'industrially' inspired work dates to his later period. It should also be remembered that the artist was primarily enthralled by the nature of light and, given that the mines were water and not coal powered, the copper mines landscape would have been very different in nature from steam shrouded valleys of Yorkshire, Durham and Northumberland.

Figure 14: *Turner's "Morning amongst the Coniston Fells' exhibited in 1798.*

Summary of factors contributing to the AESTHETIC value of the site	
The wild and isolated and undeveloped nature of the site – an expanse of low shrubs, bracken and gorse, with few trees.	EXCEPTIONAL
The sense of dereliction and decay – the 'discovery' of archaeology amongst the wilderness.	EXCEPTIONAL
The Coppermine valley as a contrasting landscape in terms of the broader scenery of the Lake District National Park.	CONSIDERABLE
Various forms and movement of water around the site contributes to the overall character of the site.	CONSIDERABLE
Varying moods of the landscape according to changes in weather – constantly changing.	CONSIDERABLE
Views both to and from the site are a key part of the enjoyment of the mines and the surrounding landscape, and an important part of the historical setting.	CONSIDERABLE

Importance of the site for modern artists particularly photographers.	SOME
Turner's Morning amongst the Coniston Fells'	MARGINAL
Connections with W.H. Auden	MARGINAL

3.4 COMMUNALVALUES

The site is of **exceptional** communal value to those who already use it regularly and there is considerable potential to extend the educational and interpretative values of the site to attract a wider audience. Currently, the site is very popular with walker's who visit on their way up to the fells and the mine exploration groups, for whom Coniston is one of the most extensive and interesting sites in the area.

Plate 51: *a mine exploration visit lead by members of CATMHS. Every year a significant number of people visit the site to explore the underground workings.*

The contribution of the site to regional tourism is relatively low, although it does have considerable potential. Tourism is very important to the local economy of the Lakes, and remains the largest employer in the region. Mining sites have proved popular tourist attractions elsewhere in the country, such as the Sygun Copper mine in Snowdonia [8], Geevor tin mine Cornwall [9], Nenthead lead mine in Cumbria[10], and Killhope lead mines in County Durham[11] . Each of these sites draws a large number of visitors each year who enjoy both the above and below ground exhibits.

[8] Citing online reference ' Sygun mine' > http://www.syguncoppermine.co.uk/, accessed 03/09/10

[9] http://www.cornishlight.co.uk/cornish-tin-mine.htm

[10] http://www.npht.com/nentheadmines/

[11] http://www.killhope.org.uk/pages/KillhopeHomePage.aspx

Locally, Coniston already has a number of tourist attractions including boating on the lake, Ruskin's house at Brantwood, and further afield the Beatrix Potter's estate at Monk Coniston. However, there is little relating to the industrial history of the area with the exception of the Ruskin Museum. Nevertheless, the potential of the site as an attraction must be balanced with public opinion which is currently very much against any large increase in tourist numbers. There is a real and justifiable concern amongst all of the stakeholders that wider access to the mines could be to the detriment of the wild and secluded nature of the place which is so intrinsic to its character.

The majority of those who visit the site do so just for the day but the accommodation on site does provide for the experience of appreciating the isolation of the landscape at night. The Youth Hostel, holiday cottages and mountaineering club venues are all popular and regularly fully booked, testimony to the unique attraction of the valley as a place to stay.

The educational potential of the site is one of the areas considered to be of **exceptional** significance but currently under exploited. There is the potential here for further enhancement without necessarily disturbing the mines 'sense of place'. The Copper Mines are an important educational resource touching on a number of subjects within the curriculum ranging from history, geology, economics and geography to more esoteric subjects such as art and English. A poem submitted by a pupil at Ulverston Victoria High School as part of the recent 'A Sense of Place' children's writing competition (sponsored by Cumbria County Council)[12] keenly illustrates the power the site has to evoke strong images and feeling amongst the young. Similarly, the Copper Mines are also an important resource in terms of adult education with opportunities for local history, geology, archaeology and art.

"I scramble over the fell and enter the old mine
Bits of paper, old chain and bolts with no shine,
Cold, dark and wet with no sign of day
Rusty screws hold lanterns which once lit the way"

Extracts from a poem by Rebecca, aged 12.[13]

Associated with the educational significance of the mines is the interpretative value of the site. Currently this is underdeveloped and virtually non-existent. However, there are some elements of the former Coppermine Museum which remain on display at Bonsor Upper Mill. Although these are not directly related to the site and have been brought in from elsewhere they do stimulate the imagination of the visitor and contribute something to interpretation of the site.

[12] Citing online reference 'Consiton Copper Mine' > http://www.cleo.net.uk/consultants_resources//english/another_sense_of_place_t/index-2.html, accessed 03/09/10

[13] It should be noted that hopefully Rebecca was on a guided to when she entered the old mine and that she did not venture into such a dangerous environment without proper supervision.

Within the immediate vicinity of Coniston, the mines are of considerable significance to the local community. They are important in terms of an understanding of the social development of the village and the wider landscape. There is considerable local pride in the site as a 'hidden treasure', although the people spoken to were all too keen to promote a wider understanding and enjoyment of the site as long as a balance was maintained. The site is also of some significance in terms of promoting community health with many of those questioned in the survey visiting the fells for exercise.

However, the mines do form part of a working landscape. The Brandy Crag Quarry, although only worked when there is specific demand, is an important part of the Burlington group and the royalties provides a valuable source of income to the estate. Although the quarry is actually outside the scheduled area, access through the site for lorries is essential. Similarly, the waste water treatment works is an essential utility requiring access for site inspection and maintenance. Finally, there are common grazing rights across the fells and several farmers graze sheep across the upland area. Although these concerns might not directly contribute to the historic character of the place they are part of the cultural setting and do maintain a link with the valley as part of a working landscape.

Summary of factors contributing to the COMMUNITY value of the site	
Significance of the site in terms of recreational mine exploration.	EXCEPTIONAL
Significance as an educational resource for all ages	EXCEPTIONAL
Significance of the site to walkers and hikers.	CONSIDERABLE
Significance in terms of tourism potential	CONSIDERABLE
Community pride and importance	CONSIDERABLE
The Coppermine valley as a working landscape.	CONSIDERABLE
Accommodation on the site	SOME
Importance in promoting health and exercise.	SOME
Current significance of site interpretation	SOME

3.5 ECOLOGICAL AND GEOLOGICAL VALUES

The **exceptional** significance of the geology of the site has already been recognised in the designation of the Coniston Mines and Quarries SSSI. This recognised the national importance of the sub-surface and surface geological features designated, as a result of former volcanic influences and mineralisation. The geological influences have, in turn, had a paramount affect on the landscape, industrial archaeology and ecology of the site.

The rare lichen communities of the site are of **exceptional** significance and directly influenced by the underlying geology in the presence of a number of lichens which can survive on metaliferous

substrates. This has been recognised by scientists but it is also acknowledged that there has been a lack of survey of sites such as this one and further surveys could raise the importance of this site for lichens. A fuller comprehensive survey of the lichens on this site is therefore recommended.

The bat habitat created at the site by the buildings, open works and levels is of **exceptional** significance. Bats are highly protected and any destruction or disturbance of their habitat is illegal. These nocturnal and hibernating species will need to be carefully considered in any proposals to restore archaeological interests within the site.

The post industrial habitats associated with the mine workings and structures are of **considerable** significance, and on further investigation may well reveal exciting and rare species assemblages that could raise the profile to 'Exceptional significance'. The chasmophytic vegetation, partly due to mining operations are also of **considerable** significance at the site and exceptionally attractive in places. Although common in the Lake District, the interaction with the shafts, quarries, relict buildings and Metaliferous substrates extend the possibilities of rare and diverse habitats.

Natural moorland habitats and woodlands in the Lake District have often been degraded as a result of farming and leisure activities. In many areas attempts to restore these habitats are being carried out. In this case, however, there is a danger that trees and shrubs may damage the fragile deposits and building remains and undermine some of the more unique habitats. Therefore, the moorland habitats are assigned as of **some** significance.

Without further investigation the presence of protected species other than bats at the site cannot be confirmed. The status of **some** significance is therefore assigned. Any planning application however would need to have an ecological assessment undertaken and if any are found this would raise the significance value of the species concerned.

Summary of factors contributing to the ECOLOGICAL value of the site	
Significance of Coniston Mines and Quarries SSSI to the site	EXCEPTIONAL
Significance of the rare lichen communities	EXCEPTIONAL
Importance of protecting bats	EXCEPTIONAL
Interesting and potentially rare post industrial habitats at the site	CONSIDERABLE
Extensive opportunities for diverse Chasmophytic vegetation	CONSIDERABLE
Significance of exposed river sediments	CONSIDERABLE
Priority of enhancing moorland habitats	SOME
Priority of protecting other protected species	SOME

3.6 SIGNIFICANCE BY AREA

Those values contributing to the significance of the mines do vary spatially across the site, particularly with regard historic and evidential significance. The following section summarises significance by zone, as illustrated in figure 15. It based on the current values as well as potential i.e. the current communal value of some areas is poor but this would improve with better interpretation. This means that significance will of course vary in response to any changes and developments in the future.

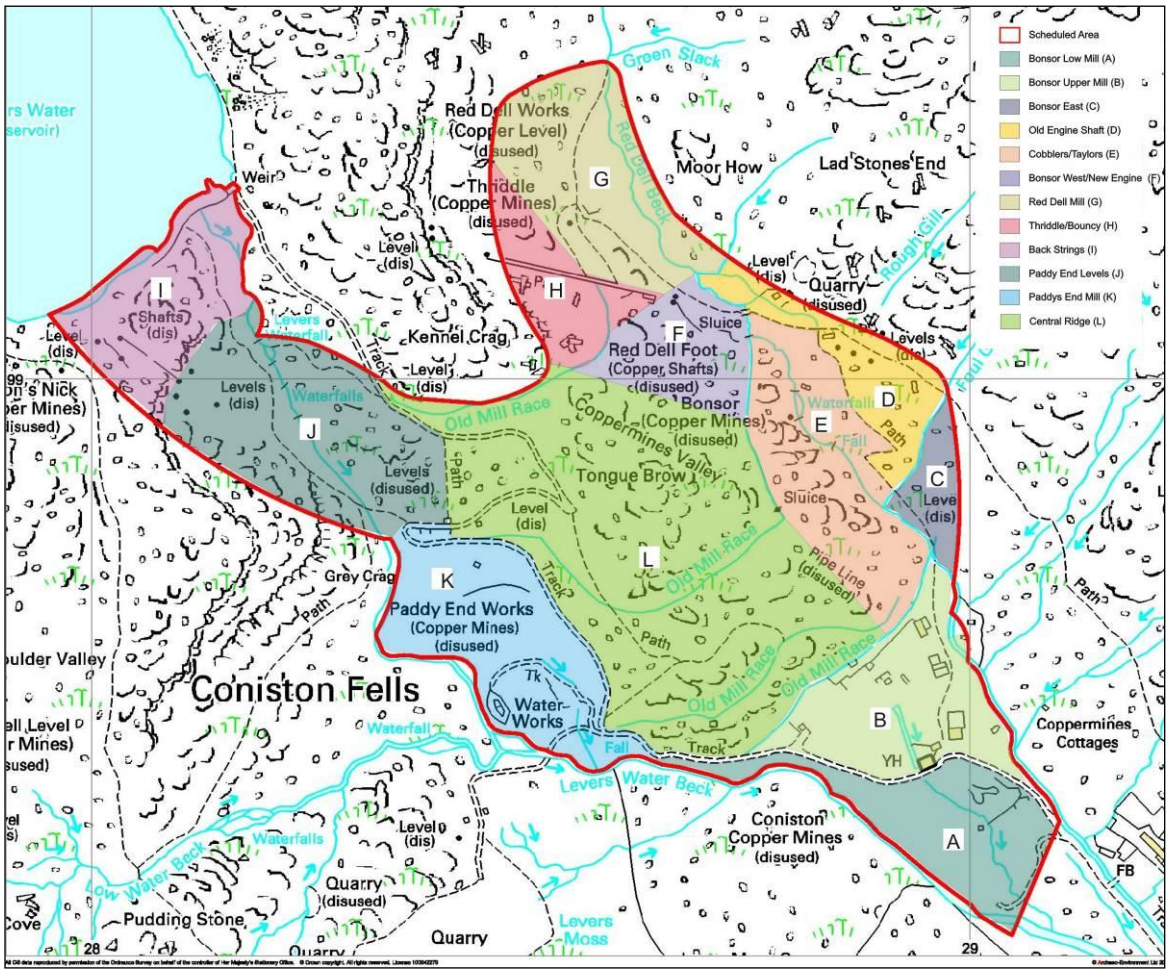

Figure 15: *Coniston zones of significance.*

Bonsor Low Mill (A)

Bonsor Low Mill is overall of **considerable** significance. In terms of evidential value it is of exceptional significance because it still contains well preserved examples of ore processing methods including settlement ponds and buddling, as well as the standing remains of the crushing mills. The waste slag relating to the smelt mill is also important as the only evidence of smelting on the site. Historically it is slightly less significant although, again, the smelt mill is a key factor. In terms of the aesthetic value of the area, it is the first part of the site encountered by visitors and is part of the long, sweeping view up towards the Upper Mill and the valley beyond. As a community resource it has considerable potential for interpretation and education, particularly as it is perhaps

one of the more accessible areas. Ecologically the extensive slag heaps, riverine shingles, structures and deposits may all harbour protected species and rare communities making it of exceptional significance.

Bonsor Upper Mill (B)

Bonsor Upper Mill is overall of **exceptional** significance. In terms of evidential value, it is important as one of the most extensive and long lived production areas. It has more complete extant structures than Low Mill, although some of these have been converted for an alternative use or are in poor condition. There is also the potential here for the survival of below ground archaeology relating to possibly all of the major phases of mine development. The Deep Level has also been included in this group, the opening of which was fundamental to the later development of the mine. Similarly, this zone is of exceptional significance historically as it housed the main offices of the mine - there are number of photographs showing the upper mill in use. Aesthetically, it sits at the base of the valley and is an important aspect of both the approaching view and the view down across the mines from the top of Simon's Nick and Kernal Crag. As a community resource the preservation of the archaeological material has enormous potential. Ecologically, the structures are important as potential bat roosts and hibernacula, and the structures and deposits may harbour other protected species or rare communities

Bonsor East (C)

Bonsor East is considered to be of overall **exceptional** significance. Evidentially it is exceptionally important as the best preserved example of 18th century mining on the site. Elsewhere much of the material dating to this period was superseded by development in the 19th century. Historically it is also important for its associations with the Macclesfield Copper Company. Aesthetically it is less significant although it does sit in a commanding position on the valley slope but the features remain largely hidden from view until you are close to them. However, the site is part of the overall setting of the place. Communally the site has considerable educational potential as the surviving example of Roe's venture. It is also an important site for the mine exploration enthusiast, providing good access underground. Ecologically, this area has at least one shaft where bats may be present. It also contains extensive spoil heaps which may harbour other protected species or rare communities.

Cobblers/Taylors (D)

The area around Cobblers/Taylors levels is considered to be of overall **exceptional** significance. Evidentially, Cobblers Level is very important as one of the only easily accessible coffin levels in the area. Associated with this is the is the possible 16th century dressing floor and mill, making this site of exceptional importance in understanding this phase of the mine's development. Taylors is also of value as an example of later 19th century expansion. Historically, the area is important as the first hand-picked tunnel dug on the site and it appears with some frequency in the documentary references. Aesthetically, it forms part of the important view up the Red Dell Beck

valley and as a community asset it has considerable potential for site interpretation. Ecologically there are a number of structures and extensive spoil heaps where bats and other protected species may be present.

Low Works and Old Engine Shaft (E)

Old Engine Shaft is considered to be overall of **exceptional** significance. Evidentially the remains of the wheel and the shaft are important as being well preserved remains associated with the 19th century expansion of the site, as well as remains of the 16th century open stopes. Historically there are many references to the development of the Old Engine shaft in the documentary accounts, as well as detailed descriptions of the Elizabethan workings. Aesthetically, the remains of the wheel housing forms one of the most iconic images of the site and dominates the view up the valley. Given the concentration of other factors, the site is also of exceptional community significance both in terms of its current use and its interpretative potential, particularly given that the area features remains from all three major periods of use. Ecologically the area is important as part of the geological SSSI.

Bonsor West (New Engine Shaft) and White Works (F)

The area around Bonsor West Shaft is considered to be of overall **considerable** significance. The evidential material is considered to be of exceptional significance because of the preservation of the surviving wheel structure and the story of the sequence of development (although this is not yet fully understood). The Elizabethan openworks are also important, although dangerous to access and currently fenced off. Like Old Engine Shaft, this area features evidence from all major phases of the mine's history. Historically it is important because of the depth of documentary material associated with the area. Aesthetically, the area lies on the slopes of the valley and is partially concealed, although it does form part of the view from Kernal Crags, it is also important visually as well as historically, in terms of the setting of the Thriddle Incline. All these factors contribute to the site being exceptional important in terms of the interpretation. Ecologically the area contains a number of spoil heaps and structures which may harbour bats and other protected species and rare species assemblages.

Red Dell Mill (G)

Red Dell Mill is considered to be overall of **exceptional** significance. In terms of the material evidence, it is one of the most puzzling areas of the site but may potentially preserve material relating to all major phases of use. It is particularly important in terms of understanding the transition between the 18th and early 19th century operations. Historically the site is important because of the dating of the Fleming Level and the Mill. Aesthetically, the longevity of ore processing in this area has made it very different visually from other areas along the beck. There are also a number of intermediate views from the small Red Dell plateau, both up the valley towards God's Gift, and down the beck towards the Old Engine Shaft Wheel and the Bonsor Mills. The site is also a key view from the Thriddle Incline and Kernal Crag. In terms of communal value,

the site has considerable potential, although it would benefit from further research and interpretation. The Fleming Level is also an important underground entrance point and was recently restored by CATMHS. Ecologically, there are a number of shafts and extensive spoil heaps which may harbour bats and other protected species and rare assemblages.

Thriddle and Bouncy (H)

The Thriddle incline and associated levels is considered to be of **exceptional** significance. Evidentially, the site is of exceptional significance, the incline being one of the most extensive above ground features on the site. It is also important in terms of the technological development of the site and how the mine operated. Historically, the incline is less significant although the extension of works beyond the Great Cross-Cut was important in terms of productivity and the expansion of the 19th century mine. Aesthetically the incline is of exceptional significance as, along side the Old Engine Wheel, it is one of the most dramatic man-made features on the landscape. As one of the major site landmarks it has an exceptional communal value and has the potential to be an important interpretative site. Currently it is also forms a key role as an access route up to the higher fells; this use is an issue in terms of the protection of the material remains. Ecologically, there are a number of structures and spoil heaps which may harbour bats and other protected species and rare species assemblages.

Back Strings and Simon's Nick (I)

High Nick and the area of the Back Strings is considered to be of overall **exceptional** significance. The evidential value of this area is exceptional as the best preserved example of 16th century mine working and processing on the site. Although there is extensive evidence of Mines Royal Works elsewhere, it is the adjacent processing (accommodation) evidence which makes this area possibly one of the most significant zones on the site. Levers Water was also an important feature in terms of powering the site. The evidential importance of the area is paralleled by the extent of the historical material which exists including the detailed 16th century surveys. Aesthetically, the location of the site on high ground above the valley makes it of exceptional importance. It commands views up to the fells and down to the valley base. The dramatic cleft of Simon's Nick dominates views up from Paddy End and is a major element in the landscape. The historical and evidential significance contribute to the exceptional communal value of the area, particularly in terms of interpretation. The site is also an important access point for mine exploration. Added to this is the significance of the Levers Water dam. Ecologically, the openworks may harbour bats.

Paddy End Levels (J)

The workings at Paddy End are considered to be overall of **exceptional** significance. Evidentially the surface material is less well preserved than that along Red Dell Beck but, nevertheless, what does survive is of exceptional importance; in particular the various levels along the Paddy End vein and the Incline. Historically the site is also important, particularly in the 19th century although there is also some 18th century documentary material. Aesthetically the site is exceptionally

significant as one of the primary views both up and down the valley. Of particular importance is the contrast of rocky and barren slopes of Paddy End with the more lush rough grassland of Red Dell Beck. As the second of the two veins worked in the area, the development of Paddy End is important to an understanding of the history of the mines and, as such, has exceptional community importance in terms of potential interpretation. The route is also significant for those accessing the high fells and by the mine exploration societies, and is crossed by United Utility service routes up to the dam. Ecologically, there are a number of deep workings and old spoil heaps which may harbour bats and other protected species and rare species assemblages.

Paddy End Mill (K)

The Paddy End Mill and Dressing Floors are considered to be of **considerable** overall significance. The evidential value of the material remains are thought to be of considerable importance, although an area of the floors was lost following the construction of the treatment works, and subsequent damage from the burst water pipe. However, there are still substantial standing remains and surfaces associated with the 19th century mill, although this was in operation for a far shorter period than the Bonsor Mills. This is also one of only a very few areas where there has been any extensive archaeological investigation. Historically the site is of exceptional importance in terms of the development of the site and there is a great deal of associated documentary material. Aesthetically the Paddy End Mill lies at the base of the valley and is a key position with regards views both up to Simon's Nick, and down the valley from the fells. However, the area is somewhat marred by the Water Treatment Works and the quarry, making it less significant than other areas. There is considerable potential for interpretation and presentation associated with the mill and processing floors and it is one of the areas with easy access, making it of considerable communal significance. The area is also important as an access route for both the quarry and the treatment works. Ecologically, it is an area of extensive deposits and riverine shingles which may harbour protected species or rare species assemblages.

Central Ridge (L)

Between Levers Water Beck and Red Dell Beck there is a central ridge of upland dividing the two sides of the site. This area is considered to be of **considerable** overall importance. The evidential material comprises a few key level entrances, as well as sections of water management features and roads which cross between the Paddy End and Bonsor mines. There are also a number of prospecting holes and soundings. Although the archaeology in this area is far more spread out and not as focused around key features as it is elsewhere on the site, it is still of considerable significance. It is particularly important in terms of understanding the movement of water power around the site. Historically the area is of some significance with the majority of material focused within the two valleys themselves. Aesthetically this area is very important as it provides intermediate high ground and is an important division between the two quite distinct sides of the site. There are panoramic views of the valley from this area and it is one of the most important in terms of visualising how the site worked as a unit. In terms of communal value, the views might

make it important in terms of providing interpretation panels etc. Ecologically it is predominantly degraded upland heath but there are a number of mill races and rocky outcrops which harbour chasmophytic vegetation.

Significance by zone	Evidential	Historical	Aesthetic	Community	Ecological
Bonsor Low Mill (A)	EXCEPTIONAL	CONSIDERABLE	CONSIDERABLE	CONSIDERABLE	EXCEPTIONAL
Bonsor Upper Mill (B)	EXCEPTIONAL	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL	EXCEPTIONAL
Bonsor East (C)	EXCEPTIONAL	CONSIDERABLE	SOME	EXCEPTIONAL	EXCEPTIONAL
Cobbles/Taylors (D)	EXCEPTIONAL	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL	EXCEPTIONAL
Old Engine Shaft (E)	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL
Bonsor West/New Engine (F)	EXCEPTIONAL	CONSIDERABLE	SOME	CONSIDERABLE	EXCEPTIONAL
Red Dell Mill (G)	EXCEPTIONAL	CONSIDERABLE	CONSIDERABLE	CONSIDERABLE	EXCEPTIONAL
Thriddle and Bouncy (H)	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL
Back Strings/ Simons Nick (I)	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL	EXCEPTIONAL
Paddy End Levels (J)	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL	CONSIDERABLE	EXCEPTIONAL
Paddy End Mill (K)	CONSIDERABLE	CONSIDERABLE	SOME	SOME	EXCEPTIONAL
Central ridge (L)	CONSIDERABLE	SOME	EXCEPTIONAL	SOME	EXCEPTIONAL

4.0 PROTECTING SIGNIFICANCE - RISK, ISSUES, OPPORTUNITIES AND POLICIES

Protecting the significance of the Mines

Those elements and values which contribute to the Coniston Copper Mine's unique cultural significance are under a number of real and potential threats. The following section looks at the various risks and issues which may threaten the future of the mines, as well as identifying and exploring opportunities for enhancement and improvement. At the end of the discussion on each set of related issues there are a series of policies aimed to mitigate or limit the potential threat. This aims to provide a clear and practical way forward and help form a long-term management plan which will protect and enhance the Copper Mines as a heritage asset for the future.

The section starts with a general section, highlighting 'a *vision'* for the future of the mines as well as a series of broad based conservation principles. It then goes on to look at those specific threats and issues identified through fieldwork and consultation with the various stakeholders. Given the nature of the risks and opportunities there may be some degree of reiteration across some sections.

4.1 GENERAL AIMS AND CONCERNS

The Vision

A vision for the Coniston Copper Mines

Coniston Copper Mines will continue to be a key exemplar of the important mining history of the Lake District. The site will provide a unique educational experience reflecting this aspect of the region's industrial history. It will compliment and contribute to the existing attractions of the area but will at all times maintain the wild and rugged quality which remains at the heart of its character. It will offer opportunities for understanding and appreciating local industrial history, exercise and health, enjoyment of the wider landscape, wildlife appreciation and mine exploration, but will at all times retain a good level of health and safety. As such the site will be an asset to the Lake District, the landowners, local community and all other users of the site and contribute to the cultural and economic growth of the wider area.

The vision will be achieved through active conservation, good management and sensitive tourism strategies, with the aim of preserving, balancing and enhancing all aspects of the site's cultural significance. The various stakeholders need to work together to ensure the future of the site as a valuable heritage and leisure asset while ensuring the protection of the historic fabric and strong 'sense of place'.

Adopting the Plan

The success of the Plan is, therefore, dependent on the agreement and understanding of all the major stakeholders, predominantly: the landowners, LDNPA, United Utilities, Burlington Quarries, English Heritage, Natural England, YHA, Commoners and the various mountaineering clubs and mine exploration societies which use the site. Adoption of the Plan must also include appropriate financial provision to implement policies, and a suitable timetable for assessment and review. Significance should only be changed after an appropriate 'research and review' period and not on the basis of future management expediency.

Statutory Requirements

As a site within the LDNPA, and a scheduled monument and SSSI, the site is protected and bound by a number both statutory and non-statutory guidance.

Scheduled Monument Status

The Copper Mines are a Scheduled Monument as defined in the Ancient Monuments and Archaeological Areas Act of 1979. As such, any activity which might be construed to impact on a Scheduled Monument including demolition or destruction; repair, drainage, extension or altering in any way, must have prior written consent from the Secretary of State. This would also include installation of fencing, gates and paths, tree planting or clearance and signage as well as other more radical changes. Failure to comply in this is a criminal offence.

In addition, the setting of a Scheduled Monument is also protected by Planning Policy Statement 5 (PPS5, 2010). This has direct implications for those sites outside the scheduling boundary and aims to ensure that any development within the area of a known scheduled site is carefully assessed. In terms of the guidance a monuments setting is defined as

'*The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral' (PPS5 2010,15).*

As such, setting does not necessarily have to relate spatially to the monument but might be any element which affects our understanding of the heritage asset. This has particular implications for the quarry as well as any potential development within the surrounding area including any hydro or wind farm schemes.

A small extension of the scheduled area to the north-west would help to protect those areas of shallow workings adjacent to the Back Strings, which are currently just beyond the boundary. In theory, there is an argument to extend the SM to cover Brim Fell and God's Gift mines but then

there is so much mining evidence spread across the fells that it is difficult to draw a boundary around any one specific spot. The current SM is a relatively cohesive unit and is unified by a number of factors including ownership. As such, an expansion of the scheduled area is not recommended, but God's Gift mine in particular might be worthy of scheduling in its own right, given the importance of the site.

Site of Special Scientific Interest

The geology of the site is also protected as a SSSI, this is intended to give legal protection to *'the best sites for wildlife and geology in England'*. Sites are administered by Natural England who are responsible for the identification, protection and conservation of SSSIs under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000).[14] Natural England will need to be contacted before any operations, within the boundary (or outside the boundary if affecting the integrity of the interest features of the site) are undertaken. Operations Liable to Damage (OLDS) the site would include any form of spraying, drainage works, planting or changes in grazing regimes. Such work will require consent, assent or advice from Natural England or the relevant competent authority under the CROW act. The Environment Agency may also need to be consulted depending on the nature of works.

Non-Statutory Guidance

As part of the Lake District National Park the Coppermine valley operates under the statutory objectives of the Parks Authority to:

- conserve and enhance the natural beauty, wildlife and cultural heritage of National Parks, and
- promote opportunities for the understanding and enjoyment of the special qualities of the National Parks by the public.

A new management plan (2010-2015) is currently being drafted - 'The Partnership Plan'[15] – central to which are the concepts of sustainable development, the promotion of world class visitor attractions, the conservation of the natural environment and involvement with local communities. Any management strategies and conservation policies at Coniston should aim to support and enhance these overarching aims.

POLICY G1: ADOPTING THE PLAN

All the main stakeholders should agree on, and adopt, the Plan as the basis for future management strategies and key guidance in assessing any proposed changes. An appropriate timetable for amendment should be established and no statement of significance changed except after appropriate research and review.

[14] Further information on SSSIs can be found on the natural England website http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/sssi/designation.aspx

[15] Citing online reference 'Lake District National Park –Management Plan and Actions' > http://www.lakedistrict.gov.uk/index/caringfor/partnership/ldnppmanagementplan.htm, accessed 05/09/10

POLICY G2: STATUTORY CONTROLS

All stakeholders should ensure that any maintenance or development work undertaken on, or in the vicinity of, the mines is in strict accordance with statutory controls and planning policy (and any revision or amendments to those controls). No work should be undertaken without consultation with the appropriate authorities and the provision of the necessary consents.

4.2 PHYSICAL CONDITION: PROTECTING THE MATERIAL EVIDENCE.

The condition of the standing remains

The majority of the structures on the site have been abandoned for over 100 years are in a semi-ruinous state. As with a number of upland industrial sites, this is part of their intrinsic character – the juxtaposition of decay and the wildness of the landscape – as such any maintenance plan needs to strike a balance between preservation and attrition. However, it is important to conserve the monument for future generations but the guiding factor should be stabilisation rather than any form of extensive re-construction. Where a feature is in danger of being lost completely and/or where such a loss would damage the understanding or physical condition of the wider site then re-construction might be considered, as in the case of the arch over the leat at Red Dell Mill which was recently restored by CATMHS. Of course, Scheduled Monument Consent would be required in advance of any such work and should be undertaken only under the auspices of the LDNPA and with permission of the landowner.

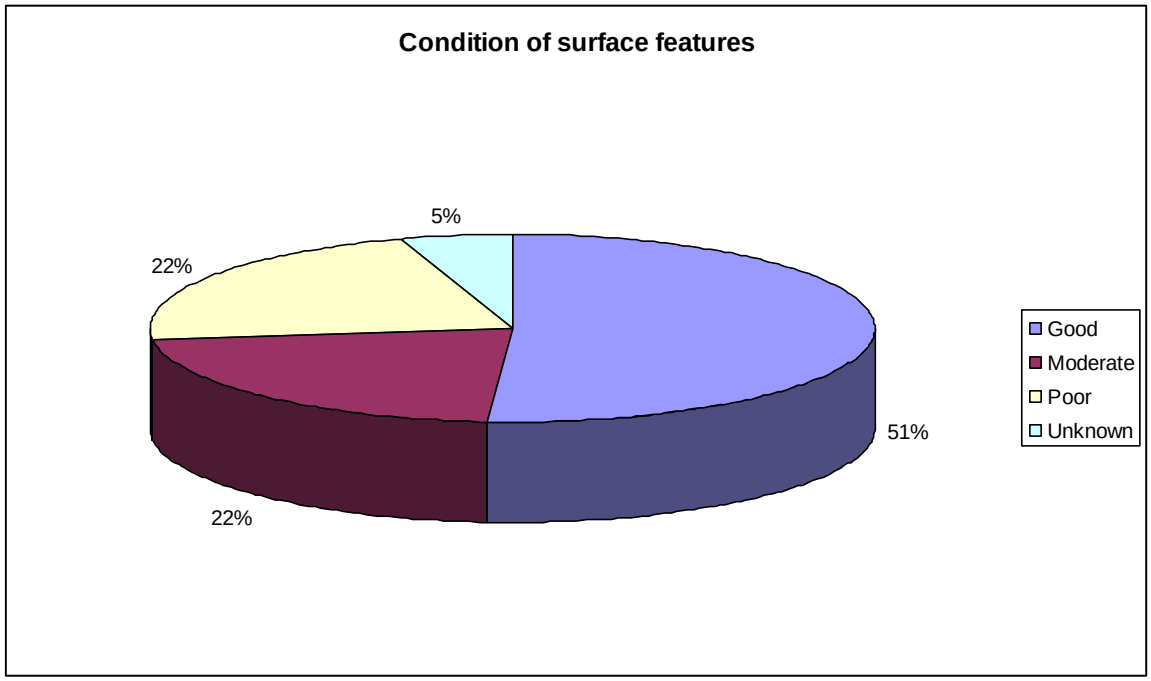

Figure 16: *overall condition of the key features identified across the site as detailed in the gazetteer.*

A full structural survey of the Copper Mines was not commissioned as part of this project but a preliminary, visual inspection of structures was made during visits to the site in May 2010. These

observations are included on a site-by-site basis in the gazetteer (Appendix 1) and summarise in Appendix 4. However, the elements at greatest risk are those highlighted in the table below. In the majority of cases the condition of most of the features is relatively stable and only affected only by the slow rate of natural attrition expected of any site exposed to the elements. However in some cases, man-made threats and environmental factors are contributing to an increased rate of deterioration. These will be discussed in the section below.

Table 2: *standing features considered to be at greatest risk*

Name	Condition Issues	Notes/Recommendations
Bonsor Low Mill (1070)	Many of the retaining walls and associated features have collapsed or suffered some degree of damage but most now appear to be in a stable condition. The earthwork remains of the jigging, buddling and settling areas are also stable. The main threat to the latter is from vehicle damage and to a lesser extent from flooding. Anecdotal evidence suggests that the large spoil tip south west of the mill is occasionally used as a source of aggregate/hard core.	Periodic assessment and review. The location of this site to the access road and the beck makes it a high risk area and, while condition is relatively stable, it will require long term monitoring.
Bonsor Upper Mill (1025)	Some of the structures in this area are in a very poor state of repair and appear to be at considerable risk of collapse (although a full assessment was not made).	Structural survey followed by periodic monitoring. Archaeological buildings survey of extant structures
Bonsor East (1007)	Retaining walls to the south and south east of wheel pit have collapsed in places and there is a significant structural bulge in the east wall of the wheel pit. There is also a danger of erosion regarding the holding pond - the wall above the tail race has partially collapsed filling sections of the channel with tumbled stone and blocking flow. Entrance to shaft is partly blocked and is threatened by erosion and possible collapse of retaining wall at east end of leat.	Structural survey and periodic monitoring recommended. Archaeological survey of extant structures
Old Engine Shaft Wheel (1015)	The revetment wall at the end of the tailrace is partially collapsed and there is a threat of erosion. The first launder pillar is stable, and the second has collapsed. The third launder pillar is the principal site	Given the comparatively good survival of this important feature and its dominant landscape position a full structural survey and assessment is suggested.

	feature and its top was concrete capped by voluntary wardens of the National Park Authority including CATMHS members in the 1970s but has lost a considerable amount of facing stone on its north eastern face and appears to be listing slightly. Overall stability is further compromised by a timber or machinery slot which passes through and weakens the fabric on the south western face. The wheel pit is in good condition but some of the coping stones are displaced allowing water to seep into the stonework.	An archaeological buildings survey is also advised. A certain amount of movement is expected in a building of this age but a survey will allow any escalating changes to be monitored warning of any more serious problems of subsidence and loss of structural integrity. It will also provide a baseline for any subsequent conservation work.
Thriddle Incline (1058)	Sections of the incline are well preserved but other areas are in a poor state, particularly near the base. The main problem is the integrity of the outer walls, once these fail then the rubble core will just disintegrated into scree. Decline aggravated by foot fall of hikers using the route to access the ridge	Given the comparatively good survival of the landscape and historic importance of this feature a full structural survey and assessment is suggested. The feature appears on the RCHME survey but a more detailed Level 2 (Photographic) survey would be advised to provide a baseline for future maintenance.
Paddy End Offices and Smithy (1026/27)	Both buildings partially destroyed when water pipe burst. Interiors filled with rubble and walls partially collapsed.	Two of the few ancillary buildings associated with Paddy's End operation and, therefore, of considerable significance. Recommend clearing the interior (under archaeological supervision) then structural assessment. Advice should be sought prior to clearance to determine whether such measures would further threaten stability.
Paddy End Mill (1028/ 1032)	Recent flood and erosion gullies have damaged some of the stone structures and exposed sections of wooden launders.	Further aassessment to determine extent of recent damage using OAU survey as a base line. Consolidation of track and related drainage might help to control further deterioration.
Paddy End Incline (1034)	The southern end of feature was washed away during floods of 2009/10. The result is that the inner core of the structure is washed out and the rest will certainly collapse in the very near future. Feature	Needs immediate assessment by structural engineer, although damage to lower section of the wall would seem too extensive to repair. Feature already recorded on RCHME survey

	is preserved further up its course.	but a more detailed Level 2 (photographic) survey should be undertaken to preserve by record.
Entrances to Paddy End mines (Middle Level (1041), Top (1045) Level, Grey Crag (1042) and Hospital Shaft (1038)	Many of the entrances to mines on this side of the valley are blocked by collapsed spoil and scree. Real danger of features being concealed completely in the near future, particularly at Hospital shaft. Hospital level is the only one still open and is therefore very important.	Following initial consultation with structural engineer, debris should be cleared from around site entrance and a full assessment of condition undertaken. There may possible be the need for some revetment further up the slope to prevent future build up, but this would need careful evaluation.


Plates 52 & 53: *the Old Engine Shaft Wheel housing (1015) under restoration and now. The lean on the launder tower appears to have increased, although this is partially a trick of the camera angle. However, it is recommended that a full assessment by a structural engineer is undertaken and any remedial action undertaken.*

It is recommended that a structural engineer or conservation architect undertake a full survey of those features identified in the table above. These are all of either exceptional or considerable significance to the cultural heritage of the site. The surveyors report will provide the necessary information to develop a full maintenance programme and act as a baseline statement for the implementation of future period conditions reviews (either quinquennial or less).

General Conservation Principles

The degree of preservation across the site varies but any consolidation or stabilisation work must take account of the unique significance as identified in section 2. Any work undertaken, either in terms of maintenance or to enhance the communal value of the mine (i.e. improvement to interpretation) should abide by established built heritage conversation guidelines (SPAB, Pickard 1996, 152- 171).

CONSERVATION PRINCIPLES

The following guidelines should be applied to any management decisions regarding changes to the historic fabric of the Copper mines:

i. ***Minimum intervention*** *– no repair work should encroach on the original fabric of the site in a manner which would diminish the authenticity of the structure.*

ii. ***Reversible change*** *– anything new that is introduced to the site should be reversible wherever possible, leaving little or no impact on the underlying structure. Repairs and alteration work should not prevent the future re-evaluation of the structure.*

iii. ***Repairs*** *– the purpose of repairs is to contain the process of decay but any work undertaken must maintain the integrity of the structure and respect its character and that of the broader setting.*

iv. ***Like-for-like*** *– repairs should be carried out using traditional techniques and re-used or salvaged material where possible. Priority should be given to repairing what is there rather than replacing with new fabric.*

vi. ***Detail*** *– particular emphasis should be placed on design detail with regards material, location, method of fixing, etc. All detail should enhance and complement the historic integrity of the mines.*

vii. ***Research*** *– no repair work should be undertaken without adequate research and recording of the existing structure. Any removal of fabric, structure or spaces should be adequately recorded according to appropriate guidelines.*

viii. ***Removal of material*** *–should only be undertaken where it is shown that it plays no significant role in the cumulative historic interest of the site.*

ix. ***Reconstruction*** *– priority should always be given to restoration over reconstruction. Reconstruction should only be undertaken where indisputable historic and pictorial evidence is available.*

Erosion

Given the exposed nature of the site there is a general problem with erosion across the area. However, the problem does seem to vary between Red Dell and Paddy End. At Paddy End, the rock is more exposed with very little ground coverage. The majority of the larger dumps and slopes are stable at their core but there is a considerable about of shift of the looser material. This has been accelerated by flooding along the beck and by snow melt. The result is that all the mine entrances on this side of the valley are partially blocked by fallen scree and spoil, with some, such as Hospital Shaft (1038) and Top Level (1045), at risk of being buried completely in the near future. Foot fall of walkers using the path up the slope to Simon's Nick and the upper fell adds to the problem, but this is marginal compared to the natural forces.

Over the other side of the site, along the Red Dell Beck, the situation is much better. In this area there is considerable ground cover which helps to stabilise the site. However, recent flooding has caused a number of areas of severe erosion along the banks of the beck. This has placed a

number of features at some risk, primarily through an increase in the amount of debris moving down the water course which has the potential to block up entrance to Cobblers and Deep Level. There is also a risk that features may be directly undermined by such erosion should the matter worsen. In areas where slope erosion is particularly bad then retaining cloth might prove necessary to stabilise the area and encourage new growth. Erosion along the beck also threatens the 16th century packhorse routes which will need to be monitored and assessed for any increased deterioration.


Plates 54 & 55: *problems with erosion. The first is Middle Level, blocked by fallen scree and spoil, the second is bank erosion along Red Dell Beck, just above the entrance to Deep Level.*

Footfall Erosion

In general, much of the erosion is caused by the weather or by flooding and there does not appear to be a significant problem from footfall, although this may change should visitor numbers increase in the future. The only area where this is perceived to a problem is on the Thriddle Incline which is used by walkers to provide access to the higher fells. However, there does not appear to be a way to avoid this without causing more damage. A secondary path could be introduced but it is unlikely that this would be used, and would also have an impact on the integrity of the site. It is recommended that the route be accepted and the necessary footpath improvements made. A more detailed survey of the Incline should be produced prior to any improvements (EH Level 2/3) building on the work already produced by the RCHME survey. The Incline should then be regularly monitored and appropriate action taken to rectify and subsequent decline. As detailed above, a structural survey should be undertaken to assess how best to stabilise the structure and address the immediate maintenance issues.

Bracken

Bracken potentially obscures archaeological sites, making them harder to interpret and more vulnerable to accidental damage. The root systems can also cause extensive damage to buried

archaeological remains and low-lying extant features. Bracken is a particular problem on the northern slope of Red Dell Beck and across the central ridge dividing the two sides of the site. The threat to the larger features in these areas, such as East and West Bonsor and the Old and New Engine Shaft Wheels is not considered to be a major threat. Bracken is an issue with regards the network of leats across these areas as it damages the retaining walls and obscuring the path of these features. Fieldwork was also undertaken when the bracken was low and further evaluation would be necessary to assess the full extent of any threat.

However, the ferns in this area are identified as being of considerable ecological significance and any bracken control could potentially damage these. In addition, any chemical control might damage other flora and habitat in the area and could potentially contaminate the water source. It is, therefore, recommended that no bracken control is undertaken. Cutting or trampling could be safely undertaken (although damage to the ferns would still occur) but this method has little long term efficacy.

There is some gorse and shrub on the site, but nothing which is believed to significantly threaten the archaeology of the site. However given the veracity of gorse, this should be monitored and the gorse treated if it starts to invade wider areas. Again, Natural England will need to be consulted before any clearance work is undertaken.

Grazing

Current grazing regimes do not cause any measurable impact on the archaeology of the site, although sheltering sheep are exacerbating erosion problems in some areas. However, sheep are also helping to keep the growth of vegetation down in key areas. As long as no feeders, water troughs or pens are introduced to the site without prior consultation with the LDNPA then there are no major issues perceived in this area.

Possibly the greatest threat to the cultural heritage of the site from grazing is the use of quad bikes for stock herding. During fieldwork these were observed crossing directly over the Paddy End dressing floors. Currently, the type of damage from quad bike use seen at other archaeological sites is not seen at Coniston but it is a potential risk. Those grazing stock on the land must be made aware of the importance and location of the archaeological material, so that any future problems are averted. Where possible, quad bike use should be restricted to existing roads and pathways.

Flooding

Increased rainfall and spring melts increase the risk of flooding at certain times of the year. This has some impact on those sites along the water courses and needs to be monitored and the necessary remedial action taken. This might simply be the recording of any exposed or damaged features or in some cases the restoration of any revetment walling. However, there could

potentially be a conflict here with the SSSI Conservation Objectives which recommend no flood control measures. Advice would need to be sought before any such reconstruction work was undertaken. All features along Red Dell and Levers Water Beck should be monitored annually for any signs of increased erosion and damage. Such work might be conducted by volunteers.

However, the winter of 2009/10 and 2010/11 brought exceptional levels of flooding which have caused considerable damage, most notably to the Paddy End Incline. The levels of damage caused by flooding appear to be increasing and the flooding more frequent. Flooding has always been an issue with some areas of the site and is an integral natural occurrence in upland landscapes. There are references in the documentary evidence to measures put in place to prevent water pouring into Low Works in the 16th century. In the past revetment walls have been put in place to deflect the water from key sites and it may prove viable to repair and re-instate these where they do occur. Although there is probably little that can be done to protect against such occurrences as floods, there should be measures put in place to meet any unforeseen threats to the site from man-made or natural sources. This type of damage is not covered by the general maintenance programme and would potentially require the availability of emergency resources, both physical (in terms of man-power and equipment) and financial in order to limit impact and prevent further deterioration.

Plates 56 & 57: *threats and issues. Recent flooding has destroyed the lower end of the Paddy End Incline and quad bikes crossing the dressing floors at Paddy End.*

It is also of paramount importance that those key sites identified as being of exceptional significance to the cultural heritage of the site are adequately recorded, in both plan and elevation, to ensure that, at the very least, they are preserved in record. Such a record will also facilitate long term conservation management.

Vandalism and litter

The relatively isolated nature of the site means that vandalism is not really an issue for concern, although this might be altered by an increase in public awareness of the mines and higher visitor numbers. The sites which are at greatest risk would be those within easy access of the road,

namely Bonsor Low Mill and possibly the Upper Mill too. The only real occurrence of wanton vandalism was in the 1950s when a local reprobate blew up part of the New Engine Shaft Wheel housing using a home made bomb! (P. Fleming *pers.com*). However, in the past there has been a problem with people being intrigued by the depth of the open stopes and throwing rocks down into the works. This is a threefold issues as often the rocks they throw down form part of an adjacent archaeological feature (a particular problem at the Back Strings), the stones also fill up the below ground works and are a potential threat to anyone investigating the mines below. Fencing the majority of the open stopes has prevented this problem to a large extent.

Litter is currently not seen as a major issue but this is one of the key areas which may change should visitor numbers increase. However, given the isolated location of the site it has been a target for the dumping of builders waste, although this is minimal. More of a risk has been the 'procurement' of some of the spoil heaps to be used as aggregate for construction work. This is not necessarily detrimental to the heritage of the site as some clearance of the later heaps might expose buried features but the whole process would need to be discussed and managed through the LDNPA. It may also be in conflict with the preservation of the site's ecology.

Inappropriate development work

There has been some development and conversion work across the site. The Waste Water Treatment works was constructed prior to the scheduling of the site, but this would have caused considerable damaged to the buried and built archaeological remains in that areas. Similarly, some evidence may have been lost during the conversion of buildings associated with the Upper Bonsor Mill, but an archaeological record was made at the time. Good conservation does not necessarily restrict sustainable development, and indeed finding a new use for historic buildings is one way to ensure their preservation, but such work does need to follow clear working practices and guidelines. Given the scheduled status of the whole area, any development or conversion work, in any form, needs scheduled monument consent, and should be discussed, in advance, with the LDNPA archaeologist.

Listing those standing buildings associated with the site might provide another layer of protection and should be considered, although a scheduling does supersede any other historic environment designations.

Damage caused by site maintenance work

Given that the site is a working landscape there is the potential for general maintenance work to be undertaken which could potentially damage the monument, this might include drainage clearance, erection of gates, fencing, ditch cutting etc. In particular, fencing has been an issue in the past. The fences erected at Simon's Nick have potentially compromised sensitive sub-surface archaeology in this area and do contravene scheduled monument legislation. However, it is accepted that some form of barrier in this dangerous area was necessary as a health and safety

measure but guidance should have been sought in advance from the LDNPA archaeologist, and the appropriate consents secured. The Park's archaeologist could have advised on the best type of fencing to use and most appropriate location of any posts to minimise any damage to the above and below ground archaeology of the site. It is recommended that the fencing which can be seen on the skyline at Simon's nick be removed as this has a detrimental impact on views of the site. However, the rest of the fencing is probably best to leave unchanged, as re-locating it may cause further damage, but the area should be monitored to make sure that there is no adverse impact on the surrounding archaeology by changes in footfall.

Maintenance work could also potentially have an impact on the ecology or geology of the site, and again guidance should be sort from Natural England in advance of any work.

Threats to below ground archaeology

Most of those issues detailed above also have the potential to damage sub-surface archaeology and geology. The main problem with sub-surface remains is the very fact that they cannot be seen and, therefore, it might not seem immediately apparent that something is a threat. In general, advice should be sought from the LDNPA archaeologist and Natural England in advance of any maintenance work.

Tree planting

One potential threat to sub-surface archaeology is from root action. This has already been mentioned in relation to bracken but it also applies to the planting of trees. Tree coverage is very limited on the site and is almost solely restricted to those trees planted around the Bonsor Upper Mill site. The majority of these pre-date the scheduling notice but recently fast growing conifers have been planted around the converted old powder store to provide some privacy and a wind break for residents of the house. This is a highly sensitive archaeological area and the root action from these trees has the potential to cause considerable damage to buried remains, although the extent of this damage is subject to differences of opinion. The trees are also considered by some to have a detrimental impact on the geological and landscape setting of the site. However, removal of the trees at this stage is contentious and might cause further damage to the archaeology, geology and ecology if not done properly. It should be agreed with the owner that the trees be managed to limit their height and impact on the surrounding environment and that no further trees are planted in the area without the necessary consents. This also applies to the Youth Hostel and Barrow Mountaineering and Ski Club grounds.


Plates 58 & 59: *threats and issues. A burst water pipe associated with the Water Treatment Works virtually destroyed the offices at Paddy End and tree planting around the converted Old Powder Store is the subject of differences of opinion regarding their level of threat to the buried archaeology.*

Climate change

The recent increase in rainfall, and subsequent frequency of flooding, has been linked by some authorities with climate change. It is difficult to know if the increased flooding at Coniston is due to climate change and so the site needs to be monitored further in order to establish a pattern.

Policies to protect the physical condition of the site

In response to those risks and issues outlined above the following policies are proposed to guide the future management of the mine complex.

POLICY PC1: PRODUCTION OF A MAINTENANCE PROGRAMME

With further advice from a structural engineer, a maintenance and repair programme should be prepared, agreed and adopted by all relevant stakeholders. This should include a list of prioritised short, medium and long term repairs and maintenance issues, and identify those responsible for undertaking this work. Appropriate funding and culpability will need to be established to ensure the successful implementation such a plan.

POLICY PC2: CONDITIONS REVIEW

A periodic (quinquennial) programme of conditions monitoring should be agreed upon. This will include the monitoring of erosion, bracken and footfall damage as well as those issues outlined in the maintenance plan. A more frequent annual review might be considered for some features (this could potentially be undertaken by volunteers).

POLICY PC3: PROVISION FOR EMERGENCY REPAIRS

A response programme for emergency situations will be put in place. It is acknowledged that in the current financial climate additional funding is not likely to be forthcoming, but there should still be a longer term attempt to secure funds and appropriate resources to deal with unforeseen man-made or natural situations like the winter flooding and the burst water pipe. This should not be left to the general maintenance budget as unanticipated expenditure may put at risk the

provision for more minor on-going repairs. Natural England should be part of the emergency planning discussions.

POLICY PC4: STOCK MANAGEMENT

There should be no major changes to stock management regimes without consultation with the LDNPA (Ecology and Archaeology) and Natural England. No feeders, watering troughs of fences will be erected without permission. Quad bike use should be kept to establish paths and access routes. LDNPA Archaeologist to make farmers aware of particularly sensitive archaeological areas.

POLICY PC5: VANDALISM AND LITTER

Levels of vandalism and litter dropping will be monitored and suitable measures put in place should the issue become a problems.

POLICY PC6: INAPPROPRIATE DEVELOPMENT/ MAINTENANCE WORK

In accordance with planning policy and scheduled monument legislation (detailed above) no development or maintenance work (including fencing) should be undertaken without consultation and approval by the LDNPA archaeologist who will help secure the appropriate consents if necessary. The LDNPA archaeologist is to ensure that all stakeholders have necessary contact details.

POLICY PC7: TREE PLANTING/FELLING

No new tree planting will take place without the permission of the LDNPA archaeologist and appropriate Scheduled Monument Consent. This applies to both the scheduled area and wider landscape should this be determined to have a direct impact on the setting of the monument. Existing trees should remain but their growth height should be restricted to minimise visual impact. In addition, none of the existing trees on the site should be felled without prior consent.

POLICY PC8: CLIMATE CHANGE

The site will be monitored for any indication of impacts from climate change and any necessary measured discussed and put in place to secure the preservation of the monument.

4.3 HERITAGE IDENTITY: PRESERVING THE HISTORIC EVIDENCE

The ever changing nature of Coniston Copper Mines

The mines have undergone a huge number of changes and modifications during their 400 year history. Some of these occurred as part of major phases of expansion affecting the whole site, while others have been more localised. Each of these events has contributed to the unique history the site and need to be understood and protected. Coniston's exceptional significance is partly

derived from the comprehensive nature of the historic evidence, covering all aspects of mining over four centuries and this diversity must be preserved and enhanced.
All of the alterations and modifications undertaken across the site in the past have been in response to changes in the use, function or focus, and this evolution is an important part of understanding the history of the mine. Each of these various phases contributes to the overall significance of the site and it is necessary to identify how each of these elements can be represented and retained in order to tell the whole story of the Coniston Copper Mines, and there should be no attempt to restore the works back to a specific phase or period.

Threats to the artefactual evidence

Many of the artefacts from the site have come from underground exploration but some fixtures and fittings do survive above ground - largely iron fittings as well as some timber fixtures. These elements add to an understanding of how the site worked and are part of the on site experience of the mine and, therefore, should remain *in-situ* although this does place them at some risk from attrition and theft. However, to place such fittings in the museum collection would detract from their significance by divorcing them from their context – in effect making them lumps of iron. This is not, of course, the case for all surface finds but simply the majority of smaller bolts, nails, braces and pump rods. Anything larger needs to be reported to the LDNPA archaeologist. The Ruskin Museum curator should also be contacted as they currently house the largest collection of material. However, any finds do legally belong to the landowner (unless Treasure Trove, which seems unlikely).

The preservation of the more complex pieces of mining equipment *in-situ* is a matter which needs immediate attention. At Old Engine and Bouncy shaft, elements of the pumping and winching gear still remain in their original location, including sheave wheels and fragments of the balance bob. These are hugely important in terms of understanding how the mine functioned. Currently they are stable, thanks largely to preservation work undertaken by members of CATMHS, but this may change in the near future and careful consideration needs to be given to a long term management strategy. Arguably, these are the type of artefacts which would be more accessible in a museum but contribute towards the significance of the site while they are *in situ*. They are also at risk from collapse and theft.

Similarly, a decision needs to be made about the preservation of the mortar stones. Again, they are part of the significance of the site and are interesting features which capture the imagination of visitors but they are at risk from being removed or their location lost. The latter is now recorded on the site gazetteer, so hopefully that will not be an issue, but they are portable and can easily be moved off site. It may prove prudent to remove at least one to safe storage for both preservation and interpretation purposes.

Potential loss of documentary material

Identified as being of exceptional significance has been the amount and calibre of primary documentary material associated with the site. Much of this is preserved in publicly accessible archives but some remains in private hands. In particular, a great amount of primary source material is believed to remain with widow of Eric Holland, who wrote the important and comprehensive history of the site (P Fleming & V. Slowe *pers. com*). A valuable resource was also recently lost when many of the original mine ledgers and cost books passed into the hands of a private collector following the auction of material from the Hext estate earlier this year[16], although some were purchase by CATMHS. Luckily, in this case many of the documents had already been scanned (with the owner's permission) but in future such important material could be lost. Very recently the grand-daughter of WG Collingwood, Janet Gnosspelius, died and she was known to have been the family historian, curator and archivist. It would seem highly likely that her estate will contain important material related to the Copper Mines, particularly given that her father, Oscar Gnosspelius, was the mining engineer who tried to re-open the Copper Mines in the 1920s (V Slowe *pers. com*.).

Improvement in access to documentation

Measures which might improve documentary access would include an online catalogue of all available resources, listing the archive in which they are stored. There may also be the capacity to scan and store some items for direct online access, and CATMHS members are already undertaking some of this work.

Attempts should also be made to try and secure access to the mine records stored with Mrs Holland and others. In addition, a procedure for an emergency purchase fund to respond to cases like the Hext sale might also be considered. This might simply take the form of 'Friends of Coniston' who could be contacted in such an event, as well as a mailing list of potential contributors. Application for existing national funding would also form part of this including the Heritage Lottery Fund and the Heritage Memorial fund.

Future management of the Ruskin Collection

Presently much of the artefactual evidence originating from the mine is stored at the Ruskin Museum. The museum, working with CATMHS, does an enormous amount to publicise the significance of the mine, and promote the history of the site. However, there is the opportunity to strengthen this relationship in the future. There may also be the opportunity to work on combining together other collections relating to the site.

[16] Citing online reference 'Tennants Auctioneers – the Hext Sale' > http://www.tennants.co.uk/About-Us/News/News-Articles/The-Hext-Sale.aspx, accessed 07/09/10

The Ruskin Museum remains committed to supporting the Coppermines and Penny Rigg projects as they develop, as we view both sites as integral to a full understanding of Coniston, and the development of the local community. (Vicky Slowe, Curator, Ruskin Museum)

Provision of a Collections and Artefact Plan

The museum and CATMHS have already achieved a great deal in collating archives and collections associated with the site but it is recommended that an Artefact and Collections Plan be formulated to understand more about what does exist and how the stakeholders can work together to protect and promote this aspect of the mine's heritage. In particular, the plan would look at procedures for reporting finds, building a gazetteer of in-situ finds (based on the gazetteer submitted with this report) and raising emergency funds for finds conservation work etc. Information from the Artefact and Collections Plan would feed into the Site Interpretation Plan.

Policies to Protect the Heritage Identity of the Site

POLICY HI1: RESPECTING THE COMPLEX HISTORICAL DEVELOPMENT OF THE MINES

All elements of the mine's rich and varied past need to be appreciated and there should be no attempt to return the site back to a specific historic period. All care should be taken to preserve and retain the historic fabric of the mine including any later adaptations to changes in form or function.

POLICY HI2: PROTECTING THE COMPREHENSIVE NATURE OF THE EVIDENCE

All areas should be considered as part of the overall mine complex although certain areas may be less significant than others. The setting, function, and historic relationship between each of areas across the site will be protected and enhanced with no imbalance introduced.

POLICY HI3: PRODUCTION OF AN ARTEFACT & COLLECTIONS PLAN

Following a survey of all surviving *in-situ* artefacts (building on the existing gazetteer), a Collections & Artefact plan will be drawn up for the future management of all the surviving fixtures and fittings, including any surviving headgear. The plan should include procedures for reporting and conserving any new finds (including those found during mine exploration) and explore avenues for conservation and collections funding. It will also look at management of current collections and accessibility to documentary material. Information from this review will feed into the Interpretation Plan (Policy I1).

4.4 SETTING: PRESERVING THE INDUSTRIAL LANDSCAPE

Existing setting issues

The setting of the Coppermines valley is of exceptional significance to the cultural heritage of the site and is one of the most cherished aspects of the site for its users. A number of those issues affecting the physical condition of the site also apply to setting including:

- **Inappropriate development work** – the construction of the Waste Water Treatment work has clearly had an impact on the setting of the site
- **Damaged caused by site maintenance work** – primarily fencing but potentially other elements as well. The fencing at Simon's Nick is particularly an issue as this can be seen on the skyline for miles around and considerably detracts from the drama of the crag.
- **Grazing** – changes in grazing regimes could potentially impact upon setting, and
- **Tree planting** – this has had a marked impact on views of the Bonsor Upper Mill area and the setting of the valley base.

The Quarry

The Brandy Crag quarry has perhaps the greatest single impact on the setting of the site. Arguably, quarries have been part of the worked in the area for hundreds of years, and are as much a part of the industrial landscape as the Copper Mines. As such, the quarry does provide some continuity with the past, but the potential expansion and impact of a modern quarry is different from that of its predecessors. Currently the quarry is only intermittently worked and, therefore, expansion is controlled but any future expansion might be an issue.

Potential setting issues

Any new development either in, or within the vicinity, of the Coppermine valley could potentially have an impact on the setting of the monument. In such cases a monument's setting is not bound spatially by the views and features within or in the vicinity of the site but would include any element which might affect our understanding of the heritage asset. This might include:

- Other industrial sites (mines, quarries, mills, smelters, foundries etc)
- Transport routes (the railway, copper sheds, quays on the lake, packhorse routes)
- Pattern of settlements (Coniston village and the outlying hamlets and villages with links to the mines, including upland settlement)
- Hydrology (becks, leats, damns etc providing power not just to Coniston but as a network operating across the landscape)
- Built Heritage (form, design, materials of the buildings within the wider regional context)
- Social/Economic implications (Development of community including worker's housing, schools, churches, workers education, etc)

Plans for any development should be discussed well in advance with the LDNPA archaeologist.

Increased use

An increase in the number of people using the site may pose a considerable threat to the setting of the site. At the moment, the deserted and 'secret' nature of the site is one of the most important elements of the mine's character but attracting more visitors could detract from this. This would apply not only to the physical number of those present but also to car parking, improvement of access routes, visitor facilities and signage. Balancing any improvement in the tourist and educational significance of the site with the preservation of the current cultural setting will be one of the greatest challenges in the future management of the site.

Plate 60: *setting: view up along the Red Dell Beck towards the Fells, one of the important views of the valley.*

Policies to Protect the Setting of the Site

POLICY S1: ADDRESSING SETTING ISSUES

No factor shall adversely impact the setting of the site, and any issue currently affecting the setting of the site should be redressed including fences and tree planting (see PC Policies above). The introduction of any new element which might adversely affect setting must be discussed in advance with the LDNPA (archaeology and ecology) - this includes tree planting, erection of new structures, paths and footbridges.

POLICY S2: LIMITING THE IMPACT OF QUARRYING ON SETTING

The quarry is recognised as part of the historic industrial landscape but any plans for expansion could potentially have an adverse impact on the historic setting of the monument and should be discussed in advance with the LDNPA archaeologist and English Heritage.

POLICY S2: LIMITING THE IMPACT OF VISITOR NUMBERS ON THE SITE

The significance of the cultural setting of the site must always be considered in balance with any plans to increase visitor numbers and enhance interpretation.

4.5 USER REQUIREMENTS: MANAGING THE EXPECTATION OF EXISTING AND POTENTIAL USERS

"Leave the damn place alone!"

Response to Coniston questionnaire

Many people use the Coniston site for a variety of reasons, and each of these have different requirements and expectations, some of which bring them into conflict with other groups. The table below summarises the main groups and there key interests and potential conflicts

Table 3: Current User Requirements and Potential Conflicts

User	Requirements	Potential Conflicts
Rydal estates (Landowners)	Revenue from the quarry should be safeguarded. Public liability (Health and Safety threats minimised) Relations with common grazing tenants maintained Site Maintenance Potential hydro-schemes	H & S has created conflict in the past with setting and conservation (minimum) More people on site increases H&S concern. Quarry could be a potential settings issue in the future. Maintenance work has come into conflict with scheduled status in the past Further development could bring estate into conflict with EH, EN and the LDNPA
Philip Johnston (landowner)	Revenue from holiday cottages Potential revenue from museum Privacy and a nice place to live Road Access (personal and for users of cottages). Revenue for hosting events weddings etc Site security	Conversion work has come into conflict with scheduled status in the past. Trees around house are a setting/conservation issue. Public access Marquees to impact upon setting.
United Utilities (Waste Water Treatment Works)	Vehicle access to WWT site Vehicle access to Levers Water	Burst water main severely damaged site. Minimal risk that vehicles are a risk to public safety.
Burlington Stone (Quarry)	Access to quarry for lorries	Minimal risk to public from lorries

	Waiting area for lorries Possible expansion?	Lorries parked at Low Mill are a potential threat to the buried archaeology. Expansion would be a threat to setting.
Commoners	Stock grazing Vehicle access to manage stock	Changes to grazing regimes could cause conflicts with ecology/archaeology Quad bike use threatens archaeology.
Mountaineering societies (Barrow and North Yorkshire)	Road access and car parking Some privacy for residents Site Security	Large numbers of cars could be an issue with other users.
Youth Hostel	Road access and car parking Some privacy for residents Site Security	Large numbers of cars could be an issue with other users.
Lake District National Park, English Heritage & Natural England	To protect and curate the archaeology, geology and ecology of the site and ensure legislative requirements are met To conserve and enhance the natural beauty, wildlife and cultural heritage of Coniston To promote opportunities for the understanding and enjoyment of the site To ensure successful future management of the site.	Potential conflict with landowners
Mine Exploration societies	Road access and car parking Good public access on site Advice and support with regards excavation and conservation.	Potential conflict with landowners regarding access (though not been a problem in the past) Large numbers of cars could be an issue with other users.
Walkers	Road access and car parking Good public access across the site Further information on the site Toilet facilities	Potential conflict with landowners regarding access (though not been a problem in the past). Large numbers of cars could be an issue with other users.

Steering Group

Resolving any potential and existing conflicts is a complex issue and not easy to resolve. However, the failure to meet the requirements of key users, and subsequent issues arising from

this, is possibly one of the greatest risks to the future conservation and management of the mines. It lies at the heart of many of the primary risks identified including site maintenance, public liability, access and presentation. Recommendations to mitigate against some of these issues are suggested in the accompanying management plan, but key to the successful management of the mines has to be establishing communication between all of the main stakeholders. Ideally, this would take the form of a steering group or forum which would regularly meet to discuss issues and proposals relating to the mine, or at the very least an online forum for matters to be raised and discussed. In many cases users are simply unsure of the correct procedure to undertake and where the archaeology is focused. This Plan should go a considerable way to alleviating this and might be used as a springboard for further discussions.

Encouraging new users

One of the primary aims of the LDNPA is to promote opportunities for the understanding and enjoyment of the site, enhancing its potential as an educational and community resource. The site is currently used by a fair number of people, predominantly walkers and those involved with mine exploration, but the numbers are not considerable. Although the results of the questionnaire was somewhat skewed by the distribution area, most of those currently using the site lived in Coniston or Cumbria. There is the potential to attract a wider audience but this needs to be balanced with the current cultural significance of the site which has at its core the isolation and peaceful nature of the landscape. As such, any form of major tourist 'attraction' similar to the likes of Killhope and Nenthead, is seen as unsuitable for an environment like Coniston. Such a development would not only be a threat to the significance of the 'sense of place' but also an issue in terms of access and public liability. This does not mean that there are not a considerable number of things which could be done to enhance and improve the site and encourage some increase in site users.

To achieve a full understanding of potential users and their needs, an Access Audit (AA) and Audience Development Plan (ADP) would need to be undertaken, but this is considered to be unnecessary and a smaller scale assessment is all that would be required. In the table below are some potential new users which could be targeted and a consideration of the potential threat they may pose to the existing significance of the site.

Table 4: Potential users

User	Requirements	Potential Conflicts
Schools and colleges	Road access and car parking Mini bus/coach access? Good public access across the site Further information on the site - (Heritage and Education Centre)) More information on the geology and ecology of the site.	Potential conflict with landowners regarding access (though not been a problem in the past). Large numbers of cars could be an issue with other users. Increased facilities might have an impact on setting

	Toilets.	Increase in numbers could threaten isolated character of site. Increase in Health & Safety concerns
Outdoor activity centres	Road access and car parking Mini bus access? Good public access across the site Further information on the site Toilets and some type of catering.	Potential conflict with landowners regarding access (though not been a problem in the past). Large numbers of cars could be an issue with other users. Increased facilities might have an impact on setting Increase in numbers could threaten isolated character of site. Potential to damage sensitive ecological communities
Day trippers (picnickers) visiting or staying in Coniston and the area.	Road access and car parking Good public access across the site Further information on the site Toilet facilities/ some type of catering	Large numbers of cars could be an issue with other users. Increase in facilities on site could detract from historic character

Both existing and potential users would benefit from minor improvements in the way of on site presentation and interpretation.

Policies to Help Meet User Expectations

POLICY U1: ENSURING THE NEEDS OF EXISTING USERS

A collaborative approach is needed to ensure that all key users (stakeholders) are involved in steering a long-term management strategy for the site. As such, a steering group of the key stakeholders will be established to guide all decision-making and resolve any existing or potential conflicts.

POLICY U2: ENSURING THE NEEDS OF THE BROADER COMMUNITY

An online public forum will be made available to encourage comments from the more general community. There should be close contact between the discussion forum and the steering group.

POLICY U3: ATTRACTING NEW USERS

Measures will be explored to attract new users to the site without compromising the cultural significance of the mines and their unique 'sense of place'. A more comprehensive user survey will be considered to evaluate potential new users.

POLICY U4: IMPROVING CONTACTS WITH SCHOOLS AND COLLEGES

Links with local schools and colleges will be extended in order to promote the educational value of the site. There will be consultation with teachers regarding input into future interpretation plans.

4.6 ACCESS: GETTING THERE AND MOVING AROUND

Access - both physical and intellectual – is one of the biggest issues facing the mine and its collections. There are a number of issues related to this, not least health and safety concerns.

Road Access

The road leading from Coniston to the mine is in quite poor repair. This has been a conscious decision by the landowner in order to limit vehicle access. This policy seems to have worked as the number of cars driven onto the site is quite limited. However, this limits the communal value of the mines and their educational and tourism potential in particular. Coupled with this is a lack of car parking, although given the low number of vehicles currently on site this is not much of an issue, but inexperienced drivers do exacerbate the problem. Signs directing visitors to the site are also poor, but again this has been intentional to keep visitor numbers low.

In addition, the access road to the site has to be maintained to some degree to provide for the needs of those who live on the site, as well as to the Water Treatment Works and the Youth Hostel traffic. Emergency vehicle access is also essential. So far arrangements for maintenance are informally shared between United Utilities, the Wilson family of Coniston Hall and the graziers, but the bulk of it appears to be carried out by Mr Philip Johnson with occasional support from the Youth Hostel Association resulting in significant costs (P. Johnson pers comm.). The issue of maintenance should be discussed by the steering group in the hope of leading to a road management agreement.

Quarry Traffic

The access road has to be substantial enough to withstand quarry traffic, although this is not continuous but varies according to demand. Quarry traffic is also a safety issue in terms of both pedestrian and motor vehicle access around the site. Again, this is not seen as being a large problem at the moment but would increase with larger visitor numbers. One solution might be to limit lorries using the site to particular times of day - before or after most visitors have left. There is also a direct risk to the archaeology of the site from the quarry lorries using the Bonsor Low Mill as a waiting area. Although the section used by the lorries is clear of standing remains there is still the potential to damage sub-surface material, particularly in bad weather.

United Utilities Traffic

Vehicles servicing the water treatment works are much smaller than the quarry lorries and are not seen as being a problem. The only potential problem might be the public safety issue related to the use of vehicles using the road up to Levers Water, but this is not perceived to be a great threat.

Access around the site

The tracks and footpaths around the site are generally good, although there is some problem with erosion (as detailed above). One area of concern is the formation of new tracks across archaeologically sensitive areas such as Simon's Nick. This is not perceived to be a considerable problem at the moment but could be in the future if changes are brought about to existing routes by either man-made (fencing) or natural (flood damage) factors.

The access track down from Simon's Nick to Paddy End is quite treacherous. A factor which will need to be monitored and which might have implications on any future interpretations plans, such as guided routes around the site.

Public Access

The area is defined as open access and so the public are free to wander across the site, however there is no recommended walking route across the site which might encourage people to the most interesting areas which are also least sensitive to visitor erosion.

Plate 61: *fencing at Simon's Nick, a necessary health and safety measure but its present location detracts from the setting of the site as it is clearly visible on the skyline on this, one of the most significant views of the mines.*

Health and Safety

Given the nature of the site, health and safety and public liability is a continual problem. Old mines

can obviously be dangerous places but a great deal has been done by Rydal Estates to limit this risk. Access to publically accessible shafts and levels has been gated and the most treacherous of the open stopes are fenced, although the latter has caused some setting and conservation issues. CATMHS, the Ruskin Museum and other parties have also all been very good in terms of stressing the message that 'no below ground exploration should be undertaken' in all the literature surrounding the site. There is still some open access to more discrete levels and deep workings but one of the difficulties is establishing the extent to which a post-industrial moorland landscape can every really be safe.

Currently, the measures undertaken by Rydal Estates are considered to be comprehensive and responsible given the level of public use of the site. Some of the fencing around Simon's Nick does need to be re-thought – either re-routing it away from the skyline or lowering it to minimise impact - but in general the health and safety measures in place do not conflict with the cultural significance of the site. However, this judgement is just based on observation and should not be seen as a health and safety audit which would need to be undertaken by an H& S consultant. Requirements and provisions might also change if there was an increase in the number of visitors to the site.

Disabled Access

Under Compliance with the Disability Discrimination Act 1995 (DDA) reasonable provision should be made to provide disabled access to heritage assets; however given the nature of the terrain, physical access to the site is very limited. Access is possible around Bonsor Low and Upper Mill and any improvements in interpretation should take this into account. Other innovative approaches should also be considered including interactive website via discrete webcams and online tours and information.

Intellectual Access

CATMHS has done a great deal to promote public interest in the social and industrial history of the site, producing articles, guided walks, online contributions, websites and a dedicated CD-Rom. This provides a great platform from which to explore further opportunities to enhance and attract people to the 'story of Coniston Copper' both from within the immediate community and from further afield.

Policies to Protect and Promote Access to the Site

POLICY A1: THE MAIN ACCESS ROAD

A review of vehicle access to the site should be undertaken by the steering group and a way forward agreed. Funding for any improvements and maintenance needs to form part of this discussion.

POLICY A2: QUARRY AND SERVICE TRAFFIC

Quarry traffic and United Utilities service vehicles must have access to the site. Discussions will be undertaken to look at lessening any risk to the public using the site.

POLICY A3: FOOTPATHS

The conditions of the current footpaths around the site should be maintained but no new paths should be established. Any impromptu paths will be monitored and assessed for archaeological impact and appropriate mitigation undertaken. This is likely to be a suitable level of archaeological recording followed by footpath improvement to minimise any potential damage.

POLICY A4: ACCESS AROUND THE SITE

The level of public access around the site will be maintained and improved where possible.

POLICY A5: HEALTH AND SAFETY

Current levels of Health & Safety provisions will be maintained by Rydal estates (although the fencing around Simon's Nick should be reviewed). Health & Safety provision will be regularly reviewed (annually) by the steering group. Every effort will be made to find an appropriate way to combine safety requirements without compromising either the historic fabric of the mines or the character of the site.

POLICY A6: DISABLED ACCESS

All relevant stakeholders will work together to ensure that disabled people have all reasonable access to the site, including the consideration of more innovative measures to extend the user experience.

POLICY A5: INTELLECTUAL ACCESS

Every effort will be made to promote the intellectual access to the Copper Mines as an online educational resource including establishing links with schools and colleges and existing community web sites. On site information should also be a priority, although considerations must also be given to the type of displays suitable given the constraints of the environment.

4.7 IMPROVING THE INTERPRETATION AND PRESENTATION OF THE MINES

Increasing the educational and tourism value of the mines

Coniston has an enormous potential as an education resource in a number of different areas for both children and adults. This would include both on site and online access. Ways to enhance the educational potential of the site without impacting its significance would include:

Guided tours

One way to increase user access but limit numbers and public liability would be to arrange regular guided tours. Tours are already conducted by members of CATMHS but these are reliant on the good will of the society's members. One of the landowners, Mr Philip Johnston has also conducted guided walks around the valley illustrating its industrial significance (P. Johnston pers comm.). During the summer months more regular tours could be operated from within the village, and publicised more widely. There might be a number of different tours adjusted according to interest (geology, ecology, social history, technological development etc). During term time tours could be run aimed specifically for schools and designed to tie in with key curriculum studies. To achieve this successfully, teachers would need to be consulted in order to produce relevant source material to facilitate a continuation of course work back in the classroom.

Transport might be an issue with an increase in tours although vehicles could be parked in Coniston and participants walk to the site. However, this might have a detrimental impact on car parking in the village and would need to be planned. How the tours would operate would also need discussion and agreement. The continuation of the volunteer programme is an option but this does rely on the good will of those involved and hence could be unsustainable. Alternatively a commercial enterprise might be set up.

Improving onsite interpretation

Improving interpretation on site would benefit both existing and new users. This could take two forms: physical and virtual. In terms of physical displays, panels might be considered at key points around the site. The design of these must take into account the cultural significance of the site and blend in with the natural environment. A muted material like slate might be an option. Vandalism is not a huge problem on site but any signage would undoubtedly be prone to abuse and this has to be kept in mind when designing any panels, as well as the extremes of the weather in this area. Where the signs are erected would also need careful consideration, and to maximise potential they would need to follow an arranged course around the mines, telling 'The story of Coniston'. Luckily, the site is aptly suited for this with many areas relating to a specific phase in the mines development like Bonsor East (18th century) and the Back Strings (17th century).

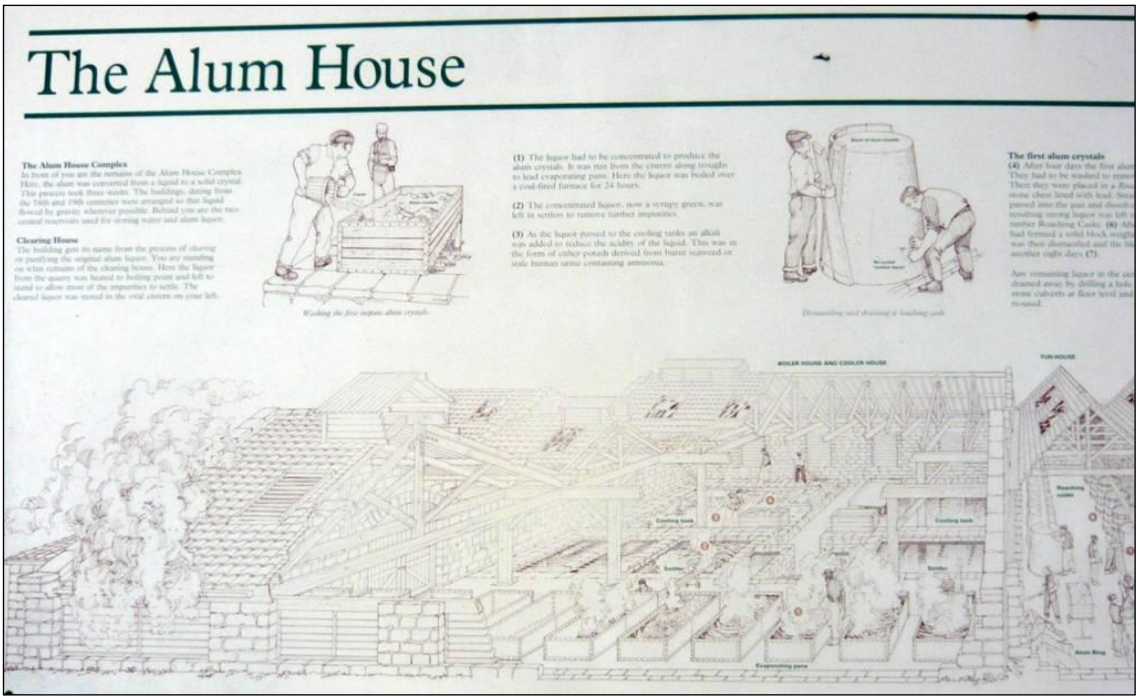

Plate 62: *example of signage from a comparable early industrial site – the Alum works at Ravenscar. This panel, produced by the National Trust includes graphics and text to illustrate how the various processes of production took place around the site.*

A second (or accompanying) option might be to provide no signage but a downloadable tour of the site which gives a commentary of the mine's history. This would be accompanied by a map and route - all available online. This has considerable potential to engage the visitor through weaving facts with a fictional narrative illustrating the social and industrial history of the site. The 'tour' could also be easily updated and would have no physical impact on the site, although there would still need to be discrete numbers and information points. However, it might exclude those visitors who do not have access to the appropriate equipment, and a combination of signs and virtual tours might be considered. Equipment could also be made available for hire at the Ruskin Institute or another suitable venue.

In addition to promoting the social and industrial history of the mines it is also important to remember the ecological and geological significance of the site. There are clearly opportunities for promotion of the geology, flora and fauna of the site to a wider audience. This should be undertaken in co-operation with Natural England due to the sensitivity of the site.

Heritage Centre

As part of an integrated interpretation plan some form of heritage centre might be considered. This does not need to be a large concern but simply somewhere where the history of the site can be displayed, and ideally there is web access and a computer so that visitors can download the virtual tour. No building existing on site at the moment fits this bill, although there could be some discussion with regards building on the Bosnor Upper Mill site. Alternatively, a structure might be

considered somewhere on the approach into the site, where it would not have any impact on setting or archaeology. This might be a small temporary structure and possibly even something which could be removed at the end of each season. Otherwise it might be worth exploring the possibility of extending the displays at the Ruskin Institute, or even providing computer access at the YHA.

Plate 63: The sawmill in 1870 (photo: Mr P. Johnston)

Toilets and Café

These are elements which numerous visitor surveys elsewhere have shown are a requirement for the majority of short term visitors to a site. Currently there are no provisions for either at the mines, although it is a longer term goal of the Coppermines, Lakes and Cottages business to reinstate a heritage centre in the Copper Store and/or possibly the Barn and perhaps also to provide toilets in the Barn, if funding was forthcoming (P. Johnston pers comm.). This is another area which could bring improvements into conflict with the existing significance of the site and which would need careful consideration. Discussions with owners on the site could provide a solution, particularly the Youth Hostel who might consider opening their facilities and providing a small café, although that would have staffing implications etc.

Interpretation Plan

Clearly all of these options will need considerable discussion, planning and funding. With this in mind it is recommended that members of the Steering Group undertake an interpretation plan to look at the various options and assess demand and opinion and the relationship of any interpretation proposals to existing facilities at the Ruskin Museum. This need not be an extensive exercise (i.e. not an Audience Development Plan) but rather would look at establishing a list of improvements to put in place. Improvements do not necessarily have to be complex and costly and the plan should look at providing short, mid and long-term options to enhance the presentation of the site to the wider public.

Policies to Improve Interpretation and Presentation

POLICY I1: IMPROVING SITE INTERPRETATION

An interpretation plan will be undertaken to consider various proposals to improve interpretation at the site. This will aim to provide short, mid and long term improvement measures and identify potential funding. It should include considerations of the Archaeological, Geological and Ecological aspects of the site.

4.8 ECOLOGY AND GEOLOGY: PROTECTING THE NATURAL ENVIRONMENT OF THE SITE

Geology

It is essential that the Coniston Mines and Quarries SSSI remains in a favourable condition. The management criteria which will ensure this are contained within the Conservation Objectives (Appendix 5). The site is protected under the Wildlife and Countryside Act 1981(as amended). Natural England will need to be contacted before any operations, within the boundary (or outside the boundary if affecting the integrity of the interest features of the site) are undertaken. If the work involves any of the Operations Likely to Damage (OLDs) (Appendix 6) it will require consent, assent or advice from Natural England or the relevant competent authority under the CROW Act.

The types of actions which are likely to significantly affect the site include changes and disturbance to the veins, mines and underground passages, as well as tree planting, engineering works (including inappropriate restoration works) and measures to stabilise the in situ deposits.

Lichens

Any operations, including the restoration of structures within this site may affect protected lichens or rare lichen communities. Rare lichen communities have been highlighted for protection by Natural England in the favourable condition table for the SSSI. Such work, therefore, will need to be preceded by a survey carried out by a specialist lichenologist. Important lichens can be present on derelict buildings, in situ deposits and on geological features, where copper and other heavy metals may be present (especially in relation to the Bonsar and Paddy End veins and derivative spoil heaps) as well as structures which may have used materials from these veins. *Lecidea inops* (and potentially other species of lichens found at the site) is protected under Schedule 8 of the Wildlife and Countryside Act 1981

Bats

Bats are highly protected under European law under regulation 41 of the Conservation of Habitats and Species Regulations 2010. Works undertaken to restore or modify structures, mines (especially entrances) and buildings (derelict or otherwise) should be surveyed by a licensed bat ecologist to assess risk with respect to bats. This is a requirement under planning permission

regulations, but even where planning permissions are not required it is illegal to disturb or harm bats and they should be considered in detail with mitigation.

Any measures to block shafts for health and safety reasons should always take the welfare of bats into consideration and be structured to allow free entry and exit to bats. Any existing shaft plugs should be assessed for accessibility to bats and remedial measures taken if necessary.

Post industrial habitats

These are very important for their interest and possible rare communities. The conservation objectives stated in the Coniston Mines and Quarries SSSI notes that the spoil tips should remain free of vegetation and can be practically exposed if required and that vegetation is acceptable over no more than 20% of the *in-situ* deposits for favourable conservation status to be maintained. This is consistent with the requirements of open sward calaminarian grasslands. There may however be conflicts with archaeological needs to stabilise the deposits (especially those liable to flooding and subsidence). Any requirements to stabilise deposits through engineering or vegetative means would need to have consent under SSSI regulations. On top of this, the needs of the vegetative communities described above should be discussed with Natural England and lichenologists prior to any work being undertaken.

Inland rock habitat

Any inland rock habitat which includes Chasmophytic vegetation, Calaminarian grassland and early pioneer communities on skeletal substrates, is a priority BAP habitat. The main threats to their condition being ascribed to unsuitable grazing management (overgrazing and undergrazing), lack of suitable management leading to the development of scrub and woodland in place of open habitats, recreational pressure of walkers and climbers causing damage to fragile vegetation communities, redevelopment on brownfield sites and atmospheric pollution. Clearly future changes of management of the site should consider the effects to this habitat.

Water courses/sediment movement

The conservation objectives of the Coniston mines and Quarries SSSI cites the need to refrain from restricting fluvial processes at this site. However flooding is of concern at this site and has resulting in damage to the Paddy End levels and caused problems downstream from the site.

Any fluvial restraining plans should take account of the possibility of the riverine shingle sites supporting rare invertebrates and preferably should be preceded by a thorough invertebrate survey, although at present this is not a legal requirement.

Bracken

Control of bracken may be desirable or necessary in the future management of the site. Due to the occurrence of other fern species on the site, appropriate consideration should be given to the

method used and location for bracken control.

All developments or restoration projects carried out on the site will need to include an environmental statement which takes into account all habitats and species which are protected and provide full mitigation plans. A full explanation of regulations and licensing and the implication for planners, owners and other competent authorities can be found at www.naturalengland.org.uk

Emergency situations

A response programme for emergency situations should be put into place. This is particularly important for flood events where damage to spoil heaps and deposits may occur. There are potential conflicts here between the archaeological needs of the site and geological and ecological interests and the early agreement of emergency plans for future scenarios will speed up the response time and prevent damage at a later date. Natural England should be part of the emergency planning discussions.

Policies to Protect the Natural Environment

POLICY E1 PROTECTING THE GEOLOGY ON THE SITE

Plans for the protection of geological features will be integrated into any maintenance, interpretation and access plans for the site and close communication maintained between the LDNPA ecologist/geologist and Natural England's geological team. Surveys will be required prior to obtaining planning permission so this should be allowed for in future timescales.

Any Operations Liable to damage the SSSI must be assessed in advance by Natural England and the maintenance, and enhancement of the Geological interest features will be part of both the strategic and day to day management of the site.

POLICY E2 PROTECTING THE ECOLOGY OF THE SITE

Plans for the protection of protected species and important plant and animal communities will be integrated into any maintenance, interpretation and access plans for the site and close communication maintained between the LDNPA ecologist and Natural England.

Any proposed restoration schemes or developments will take full account of statutory obligations and planning policy guidance.

POLICY E3 PROVISION FOR EMERGENCY SITUATIONS

A response programme for emergency situations should be put into place and Natural England should be part of the emergency planning discussions.

4.9 FURTHER RESEARCH: IMPROVING OUR UNDERSTANDING

In a number of areas there remain gaps in our knowledge which have been highlighted at the end of each appropriate section in the 'Understanding' chapter. These cover a broad range of issues some of which will require further research and survey.

Gaps in our Understanding of the Archaeology and History

Targeted Excavation

In terms of understanding the archaeology, it is recommended that further work be undertaken to look at the nature of the 16th and 17th century evidence on the site. This is one of the elements contributing to the exceptional significance of the mines but, as yet, there has been little archaeological investigation to support the considerable body of historical study already undertaken. A programme of targeted excavation is suggested at the Back Strings and White Works to look at some of the key unanswered questions including: what was the nature of processing adjacent to the works? What was the function of the standing structures? Is there any dating evidence? This might be coupled with a detailed survey and record of the openworks looking for evidence of fire setting, hand-picking, stope and feathering etc., and below ground exploration - possibly further attempts to locate the 'Sebastian Adit'. In addition, work might be undertaken at the proposed dressing floors (1011) adjacent to Cobblers Level to determine whether there was ever a crushing mill in this area.

Other work, relating to all periods, would be a detailed study of the Red Dell Beck Mill area. This would follow on from the survey work undertaken by RCHME. It is suggested that a detailed standing structure survey (including elevations) and a programme of targeted excavation might provide a better understanding, and some dating evidence, to illuminate the complexities of this area. In particular this might address whether there was an Elizabethan mill on the site (as proposed by Holland), as well as identify any 18th century remains, and provide a better understanding of the 19th century works.

Other work at Bonsor Low Mill and Upper Mill might also be considered.

Further Survey

In addition to excavation, it is recommended that further survey should be undertaken to build on the work undertaken by the RCHME. This would predominantly be the provision of a standing buildings record of the key structures to support the topographic plans already produced. Such a record would also act as a baseline for conditions monitoring. It is recommended that such survey work be undertaken in the first instance at the Old Engine Shaft Wheel (1015), the Bonsor East Wheel (1007), the New Engine House/Red Mill area (1052, 1060-61) and Bonsor Low Mill (1070). And that the existing records for Paddy End and Bonsor Upper Mill (the latter in Mr Johnston's

possession) are collated and assessed, and any necessary work undertaken to complete the record.

Expansion of the Historic Environment Record (HER)

Currently the Copper Mines are recorded as just one site on the HER. It is recommended that this be expanded to include those sites listed in the gazetteer (or at least the key sites). This would provide for a more comprehensive record of the resource for future research and management.

The North West England Research Framework (NWERF)

In terms of expanding a broader understanding of the archaeology of the region, work at Coniston should aim to explore those research aims discussed in the NWERF (Brennand 2007). Coniston has the potential to inform a number of areas discussed in the Post-Medieval and Industrial and Modern sections of the agenda including: settlement and Land-use; technology and production, trade and exchange.

Gaps in our Understanding of the Ecology

Bat Survey

Natural England have also suggested that they would be keen to explore opportunities for surveying bats within the unusual environment offered by the mines. Bat surveys would also be a prerequisite for any planning permission for development or restoration at high risk sites in this area. An initial data search via Tullie House Record Centre may reveal existing records of bat species found at this site. A bat survey was apparently undertaken in 1995 but this has not been made widely available.

Other surveys

Further studies into the lichens on site is recommended, this could reveal much about the ecological requirements of lichens in this sort of habitat as well as the most sensitive areas which should be undisturbed. Surveys by a lichenologist and bryophytologist would allow for a better interpretation to fully appreciate the significance of these habitats at this site. This is also the case with Chasmophytic vegetation. A fuller survey, especially of cave entrance, seepage, fissures and ledges however may reveal specialised and rare species. Furthermore a survey of shingle areas and adjacent in-situ deposits may identify rare assemblages of invertebrates

4.9 OWNERSHIP AND FUNDING: WHO IS RESPONSIBLE FOR WHAT

Issues relating to ownership and responsibility are a considerable risk to the future management of the site. The majority of these arise from miscommunication or a lack of clarity in terms of responsibility. The proposed steering group should alleviate this by offering a forum for discussion before conflict occurs. As a minimum the LDNPA should ensure that land owners (and key stakeholders) are made aware of the appropriate procedures and how to seek advice. This might

take the form of an information pack sent to the key stakeholders containing details of various procedures and contact numbers. This will need to be reviewed and updated regularly, possibly online.

In addition, while the preservation of the historic and cultural significance of the mines should remain at the heart of any management strategy, so easily outside pressures and demands can begin to influence and affect decisions. Every attempt should be made to minimise this and raise awareness of the unique values of the Copper Mines.

Funding maintenance and improvements is a perennial problem but failure to secure appropriate funding could place the future of the site at risk. In particular, funding needs to be generated to undertake any essential maintenance work necessary to stabilise those structures identified as being of high risk. Agri-environmental funding, under a High Level Stewardship scheme, has already been identified as one source of possible long term funding. The Coppermine valley is one of those areas already identified by Natural England as a target area and this Plan has shown that the Copper Mines would qualify in terms of the majority of those key themes set out under the Natural England ' North West: Higher Level Stewardship Theme Statement', not least:

***Theme 5**: Reducing risk to nationally designated assets identified by the Heritage At Risk Survey Natural England will consider applications that maintain low risk assets in their present circumstances or provide the most appropriate options for addressing the source of high or medium risk to Scheduled Monuments, such as addressing imminent collapse or further deterioration.*

And,

***Theme 6:** Securing positive management of prioritised historic buildings Natural England will consider applications offering to maintain or restore historic buildings that are assessed as a priority in the region.* [17]

HLS funding may contribute to some of the recommended capital works including the stabilisation and conservation of those buildings identified as being at risk (Historical and Archaeological Feature Protection HAP – up to 100% of costs, or Restoration of Historic Buildings HTB – up to 80% of costs) and possibly funding for access and wetland management.

Other forms of national funding, including Heritage Lottery Funding[18] (Heritage Grants, Your

[17] Citing online reference 'North West: Higher Level Stewardship Theme Statement' > http://www.naturalengland.org.uk/images/hlstargeting/North_West.pdf, accessed on 22/09/10

[18] Citing online reference 'Heritage Lottery Funding' > http://www.hlf.org.uk/HowToApply/programmes/Pages/programmes.asp, accessed on 22/09/10

Heritage Grants and Young Roots Funds) and the National Heritage Memorial Fund[19] might be pursued to provide for improvements to interpretation, the collections, and public access (either physical or intellectual). As well as other NGOs like the Charles Hayward Foundation Heritage & Conservation Programme[20]

POLICY OF1: DEFINING RESPONSIBILITY

The key roles and responsibilities of those associated directly with the day-to-day management of the site should be established; namely Rydal estates, Mr. Johnson, United Utilities, LDNPA, Natural England and English Heritage.

POLICY OF2: IMPROVING COMMUNICATION

Communication between these key stakeholders should be improved by the formation of the steering group but it is of paramount significance that representatives from each of these groups are kept informed and methods should be explored to ensure this, including an online forum.

POLICY OF3: SIMPLIFYING PROCEDURE

The LDNPA will attempt to ensure that the various applications and procedures necessary in the management of the site are simple and straightforward, and will ensure that there is advice on hand where necessary.

POLICY OF4: INFORMED MANAGEMENT

All decision-makers, at all levels, need to be made aware of the significance, risks and issues discussed in this Plan and any subsequent updates.

POLICY OF5: FUNDING STRATERGY

A short and long term funding strategy needs to be explored to safeguard against any risk to the maintenance of the site and provide for improvement to site interpretation and outreach.

3.10 REVIEW OF POLICIES

In considering potential risks and issues to the future significance of the site it is important to remember that these will not remain static but will reflect changes in use and condition over time. As such, any policies should not be seen as 'set in stone' but will need to be flexible and adaptable to meet the changing needs of the site. These should be reassessed at regular intervals and suitable policies added or amended as appropriate.

[19] Citing online reference 'The National Heritage Memorial Fund > http://search.hlf.org.uk/nhmfweb/aboutthenhmf, accessed 22/09/10

[20] Citing online reference 'Charles Hayward Foundation' > http://www.charleshaywardfoundation.org.uk/, accessed 22/09/10

5.0. MANAGING THE FUTURE: MANAGEMENT AND MAINTENANCE PLAN

Priority is based on: 1 = urgent due to health and safety or the structural stability of the site; 2 = within 5 years; 3 within 10 years

Plan no.	Task	How	Priority	Notes
Maintaining the asset				
1	Commission a specialist structural survey of the mines (above ground).	This will focus on those structures identified as being of greatest risk but might include other areas of the site dependant on available funding.	1	Survey should result in an itemised and costed list of short and long term repairs, prioritised according to urgency.
2	Action repairs list	Based on the results of the structural survey all actions should be taken to stabilise the site. This should primarily focus on any major structural requirements, but also any minor repair work which might prevent further decline	1	Minor repair work should not be undertaken until a structural survey is complete in order to avoid having to repeat work should more extensive repairs prove necessary. The appropriate ecological surveys (bats, lichen, newts etc) will need to be undertaken in advance of any remedial work.
3	Commission and undertake buildings survey of key structures.	More comprehensive records of the key standing structures will provide some preservation by record. The resulting surveys will also act as a baseline to measure any further decline and provide for later conservation.	2	Surveys for those sites identified as exceptions (including the New Engine Wheel House and East Bonsor Wheel) should be EH Level 3, others would be acceptable at Level 2.
4	Establish emergency action fund and procedures	Establish a strategy to deal with emergency repair requirements as a	2	Funding for this work should be separate from that allocated for maintenance work so that emergency

		result of flooding or other unforeseen damage. This should identify suitable resource to make the structure stable, and undertake repair work; and allocate funds immediately available to cover this.		repairs are not a drain on the more long-term maintenance needs of the site. However in the present financial climate such funding is unlikely to be forthcoming in the near future.
5	Establish an on-going timetable of monitoring to assess the condition of the site	Set up a quinquennial inspection programme to review the condition of the site and assess the success and suitability of repairs.	2	Timetable should be set up at the same time as the maintenance plan but first review not scheduled until later. An intermediate review may be necessary in the short term to gauge the success of initial repairs and assess the 'settling down' of the site.
6	Site security	A site security strategy needs to be formulated to address any short of potential long-term requirements.	3	Vandalism and theft is not considered to be an issue at present but could increase if more people know about the site.

Plan no.	Task	How	Priority	Notes
Responsibility for managing the future of the site				
7	Establish the role and membership of the Coniston Copper Mines Steering Group (CCSG)	The membership and division of responsibilities of the CCSG needs to be established in or to manage the long-term future of the site and provide a necessary forum to resolve conflict This should included representatives	1	This may be a seamless transition from the current Task Group. It is unlikely that representatives from all stakeholder groups will be able to attend at any given time but a process for feedback should be established, possibly online.

		from the LDNPA, Rydal estates, Philip Johnston, United Utilities, Burlington Slate, Grazer, CATMHS, YHA, Natural England, English Heritage and the mountaineering clubs who use the site.		
8	Funding Strategy	The steering group need to oversee the formulation of a funding strategy to secure money to manage the long-term future of the site, including the commissioning of surveys and improvements to interpretation.	1	This is particularly challenging in the present economic climate. A wide range of NGOs might be approached for funding. Private investors in the interpretation and tourist potential of the site should also be investigated, although at all times the protection of the cultural significance of the site must remain paramount. Charges for tours and downloads might also be considered, and ploughed back into the maintenance of the site, although the cost of administering this might be greater than the resulting income.
9	Community Consultation	The presence of CATMHS on the steering group will ensure that the needs of the broader community are represented in any decision-making; however, further open public consultation forums should be timetabled and a website discussion group set up.	2	
10	Define procedures	Those procedures associated with the	1	For example, a fluvial survey would help to clarify

		management of a scheduled and SSSI site should be clarified and all stakeholders made aware of ramifications and potential conflicts. An online 'information pack' should be set up providing details of procedures, forms and contact numbers and made available to all stakeholders.		what conservation requirements should take priority as there is a potential for conflict between the ecological requirements and the historic environment. This may also help to clarify whether conservation work should be carried out on archaeological features where flooding is becoming more frequent.

Plan no.	Task	How	Priority	Notes
Protecting collections and archives				
11	Prepare Artefacts and Collections Plan	Run by a sub-section of the steering group (Ruskin Museum, CATMHS, LDNPA, Philip Johnston,). This should include an audit of all relevant documentary archives and collections and result in the production of an (online) catalogue. It will also formulate a strategy to respond to future finds and procedures for reporting.	2	Discussions might include plans for a permanent location for the Coniston collection – possibly an extension of the current arrangement with the Ruskin Museum. HLF funding might be available to pursue this.

12	Emergency purchase procedures	Collections steering group should look at plans to put in place an emergency response plan to canvas for fund to buy related documents and artefacts offered at auction	1	CATMHS have already mobilised to raise funds for the Hext bids and knowledge from this would form the basis of any procedures but a broader discussion might contribute other ideas/options.

Plan no.	Task	How	Priority	Notes
Improving the site for existing users				
13	Car Parking and the circulation of vehicles around site	A clear strategy for car parking (if any) needs to be established. Movement of quarry and United Utilities vehicles around site also needs to be discussed in order to limit any risk to the public.	1	
14	The condition of the access road	This issue needs to be discussed by the steering group and a way forward agreed. If the intention is to increase visit numbers then improvements will need to be made. There may also be an issue regarding the condition of the access road for emergency vehicles	2	Appropriate funding would need to be agreed if improvements were to be made.
15	Improving intellectual access	As part of the preparation of the IP the group should focus on providing	2	Possibly eligible for HLF grant aid

		intellectual access via a web presence to increase awareness of the site and provide a facility for disabled people		
16	Toilet and Café facilities	The IP steering group will need to access the demand for improved facilities and the options for offering these.	3	

Plan no.	Task	How	Priority	Notes
Reaching new users and Improving Interpretation				
17	Prepare Interpretation Plan	Run by a sub-section of the steering group (Ruskin Museum, CATMHS, LDNPA, Philip Johnston). This will include provision for a possible Heritage Centre, onsite displays and an outreach programme.	1	Interpretation plan should look at implementing those suggestions already put forward in the CMP and any new suggestions. It should include long and short term strategies, and Action Plan for implementation and guideline cost figures. Possibly eligible for HLF grant aid.
18	Undertake further audience surveys	As part of the preparation of the IP further surveys should be run covering a broader user group, including local and regional schools.	2	Providing for a broader user base should be one of the longer terms management plans but and increase in visitor numbers should not be to the detriment of current significance or sense of place. Possibly eligible for HLF grant aid.

Plan	Task	How	Priority	Notes

no.				
Protecting the Natural Environment				
19	Promoting the natural environment	The importance of the site as SSSI should be embraced and fed into the Interpretation Plan and onsite displays.	2	

Plan no.	Task	How	Priority	Notes
Further research and recording				
20	Expand HER	All of the key sites in the gazetteer should be added to the LDNPA HER.	2	
21	Excavation	A programme of integrated excavation and survey should be undertaken to explore those areas where understanding is still poor.	2	Must be conducted under the auspices of the LDNPA and English Heritage. And should respond to those research aims proposed in the NWERA.
22	Further standing buildings survey	In addition to those surveys of the buildings at risk, undertaken as part of the maintenance programme, then further surveys might also be undertaken.	3	
23	Understanding the natural environment	Further Bat and Lichen surveys undertaken under the guidance of Natural England.	1	The nature of the bat survey will be dependent on what was carried out in 1995

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Cartographic material

1851 Six inch First Edition Ordnance Survey Map - Lancashire CS Sheet 1

1890 Six inch Second Edition Ordnance Survey Map - Lancashire CS Sheet 1 (NW/SW)

1919 Six inch Third Edition Ordnance Survey Map - Lancashire County Series Sheet 1 (NW/SW)