

An Archaeological Survey & Assessment of Big Ben, Quigleys and Barnetts Mines, North Zeehan, Tasmania



Prepared for Mineral Resources Tasmania

BY

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[with Greg Dickens]

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Cover Image: *View from Barnetts Mine across the mullock from the No.1 Adit and north down Barnett Creek valley to Quigleys Mine in the middle distance and towards the Montana SL Mine (just visible) in the far distance; the Big Ben Mine is to the left of image in far distance (Source – A. McConnell, Jan 2013)*

Acknowledgement & Disclaimer

The consultant has taken all reasonable measures to identify and review the available information on the historical heritage of the Big Ben, Quigleys and Barnetts Mines, North Zeehan, and other relevant background information within the scope of the project requirements, and to provide sound advice in relation to this place within the scope of the project requirements. However there will be sources of information which were not identified, management arrangements may change, and management issues may arise which were not known or foreshadowed during this study. The consultant therefore takes no liability in the event that additional heritage or relevant background information in relation to the project is identified, or where new management arrangements or issues arise. The consultant also takes no responsibility for any shortcomings of the project report that derive from subsequent stakeholder input or changes of view in relation to the valuing, use and management of the Montana Mine. Identified study limitations are outlined in Section 1.4 of this report.

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Anne McConnell & Greg Dickens, 30/4/2013

ABBREVIATIONS**TEXT**

DPIPWE	Department Primary Industry, Parks, Water & Environment
MRT	Mineral Resources Tasmania
RNE	Register of the National Estate
TAHO	Tasmanian Archives & Heritage Office
THC	Tasmanian Heritage Council
THR	Tasmanian Heritage Register
asl	above sea level
gci	galvanised corrugated iron

MAPS / PLANS

CSA	collapsed stoped area
T	trench
TA	tailings area (processed ore dumps)

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1 INTRODUCTION

1.1 Background to Report

This archaeological survey and assessment has been prepared for Mineral Resources Tasmania (MRT), to assist them in making sound management decisions in relation to the conservation and rehabilitation of three historic mines in the North Zeehan area – Big Ben Mine, Quigleys Mine and Barnetts Mine.

The assessment is part of a 2012-13 review of the Montana Silver Lead Mine (Montana SL Mine) and three other smaller nearby mines (Big Ben, Quigleys and Barnetts Mines) by Mineral Resources Tasmania in relation to their environmental and visitor safety risks. The aim of the review was to enable essential hazard remediation, primarily in relation to acid mine drainage and visitor safety, to be carried out in 2013. This rehabilitation project is funded by the Rehabilitation of Abandoned Mining Lands Trust Fund.

Where remediation work is planned on historic mine sites, MRT policy is to survey and document the mine site and assess the historic heritage significance of the site prior to remediation works if this work has not already been undertaken. This data is used to guide remediation work so that significant mines and mining heritage can be preserved where possible, and the significance retained.

The author (AM) was approached by MRT to undertake a survey, documentation and significance assessment of the Montana Mine and, if possible in the time available, the Big Ben, Quigleys and Barnetts Mines. In the event, all four mines were recorded. To expedite the assessment, Greg Dickens, a former MRT employee with considerable knowledge of Tasmanian mining history and of the MRT archival resources, was engaged by MRT to undertake the historic background research.

The project has been managed by Michael Reid, Environmental Assessment Officer, MRT, who is responsible for overseeing the remediation work at the mines. The historic heritage assessment has been undertaken as a consultancy, which was commissioned in early December 2012. The history research was undertaken in December 2012 (by G. Dickens), and the field survey was undertaken in January 2013 (by A. McConnell & G. Dickens, with input from M. Reid).

This report documents the assessment of the Big Ben Mine, Quigleys Mine and Barnetts Mine, and was prepared by A. McConnell. The Montana SL Mine assessment has been reported in a separate report (McConnell & Dickens, 2013).

1.2 Study Area

All four mines – the Big Ben Mine, Quigleys Mine, Barnetts Mine and the Montana SL Mine – are part of the Zeehan Mineral Field and occur near the north end of the Field. The four mines are located approximately 3-4 km north of Zeehan on the west side of the present day Zeehan-Corinna Road (refer Figure 1).

The four mine sites occur at the southeast end of a relatively flat area known as ‘Montana Flats’. This is essentially the upper catchment of Big Ben Creek, which flows north, then northwest into the Pieman River. This upper catchment is drained by Big Ben Creek from the west and Barnetts Creek from the south, with only minor tributaries entering from the east. The hills rise to the south to Oonah Hill (c.440m) to the NW of Zeehan and Mt Agnew (848m) to the south west, which is part of the NW-SE trending Heemskirk Range.

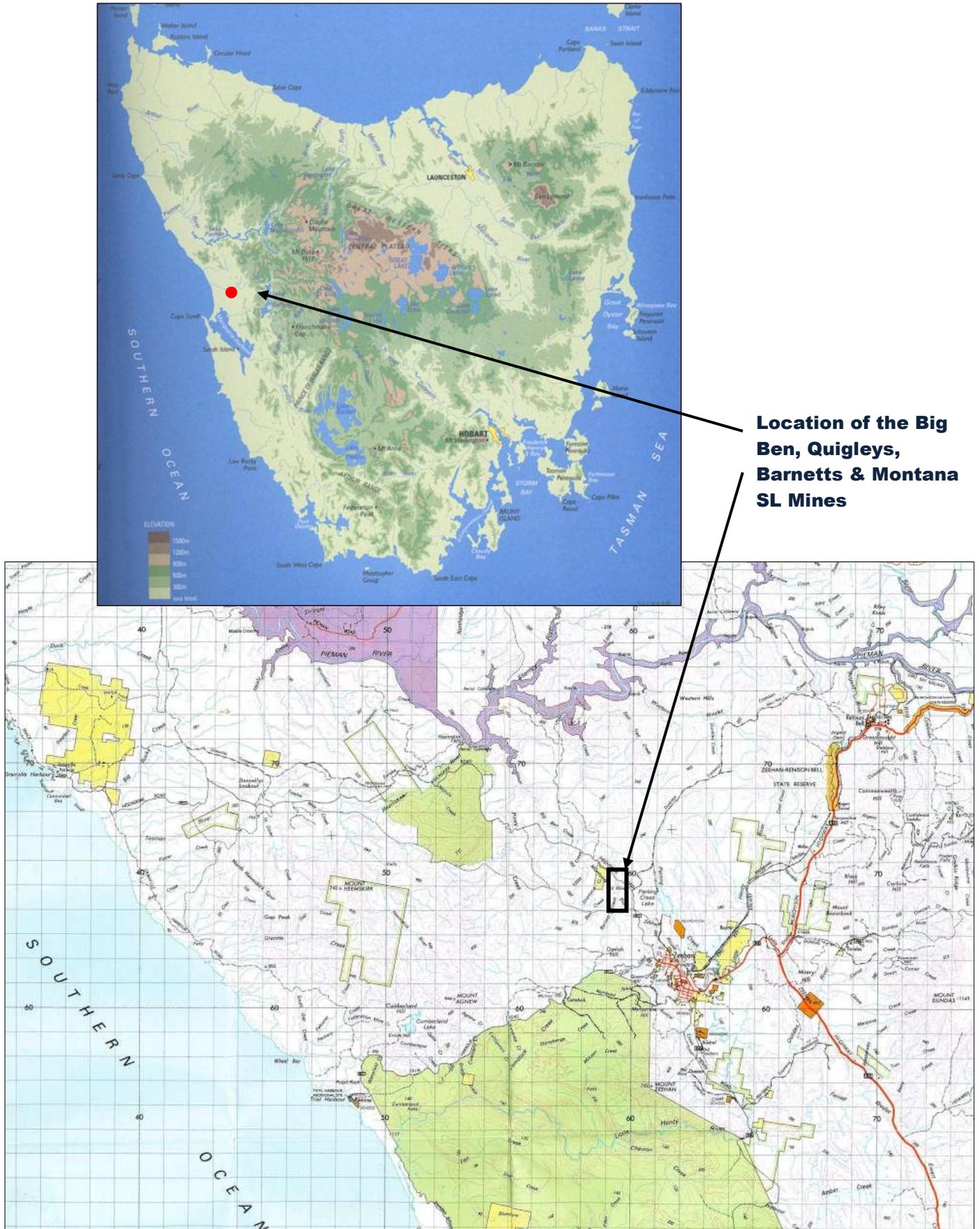


Figure 1 The general location of the four assessed mines – the Big Ben Mine, Quigleys Mine, Barnetts Mine and the Montana SL Mine.

[Map of Tasmania reproduced from Alexander, A. (ed) 2005, *Companion to Tasmanian History*; Map of Zeehan area taken from the Pieman 1:100,000 Tasmaph topographic map].

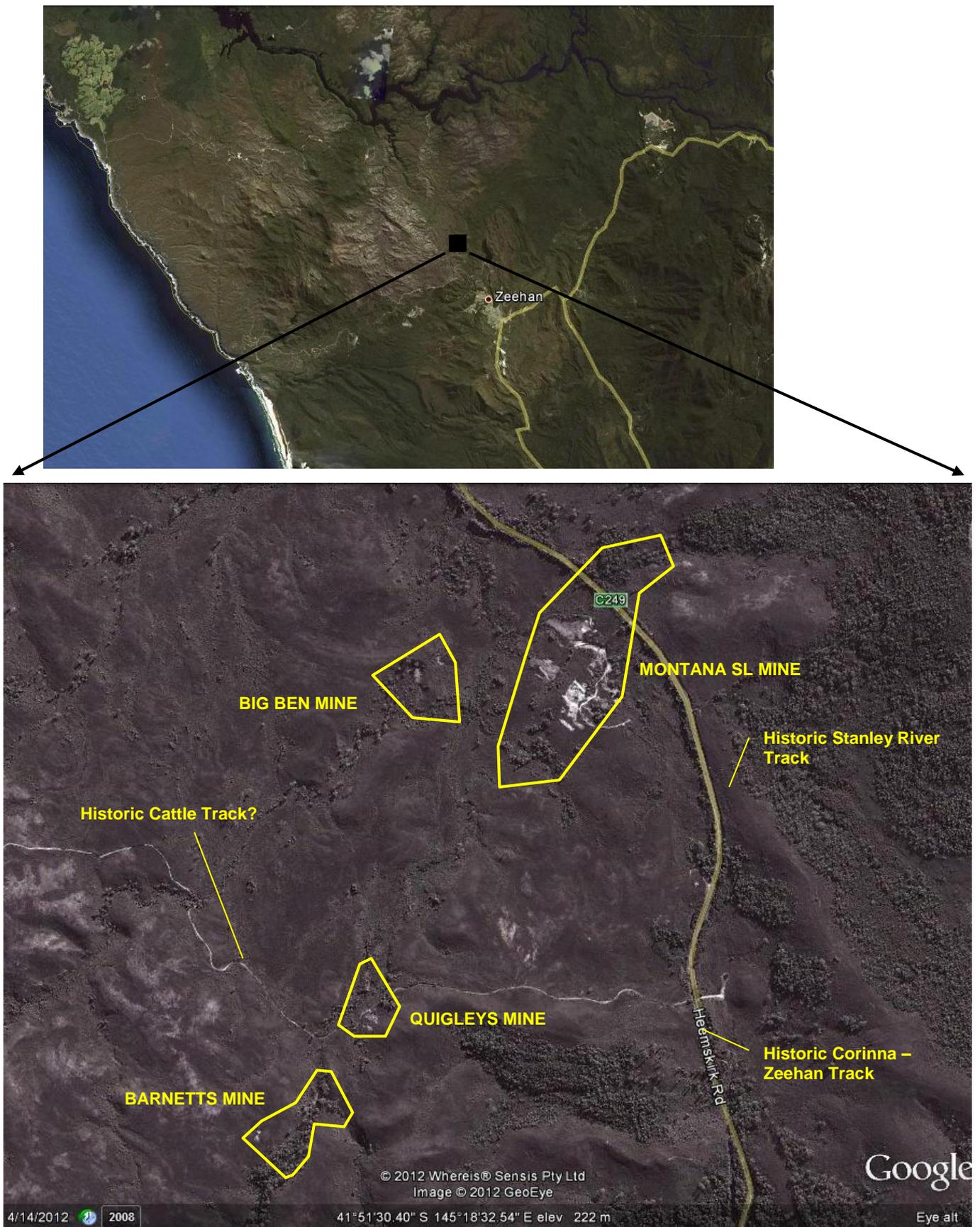


Figure 2 Location and setting of the Big Ben Mine, Montana SL Mine, Quigleys Mine and Barnetts Mine (area of each mine site indicated approximately by a yellow line). [Satellite image taken from Google Earth, April 2012].

The local area is one of low hills dissected by small creeks which flow west and north. The creeks flow in small narrow valleys or across wide flats (or small plains). The vegetation in the area of the four mines is essentially buttongrass heathland, but the narrow valleys contain stunted eucalypts with a heathy understorey or wet-forest - rainforest vegetation, and there are small patches of stunted eucalypt on some rocky slopes. Thick heathy vegetation is also found along creeks and drainage lines, usually where there has been mining disturbance. Eucalypts are also found in areas of mining disturbance. The soils are shallow and there are scattered bedrock outcrops. The local relief is c.200-280m asl. The local environment is shown in Figure 2.

All four mines are located on unallocated Crown land managed by the Parks and Wildlife Service.

1.3 Study Aim & Scope

Aim & Objectives

The aim of this archaeological assessment is to provide sufficient information on the heritage values of the Big Ben, Quigleys and Barnett's Mines to allow MRT to make responsible decisions in relation to the management of these historic mines and mine areas, in particular in relation to the maintenance of historic heritage values and mine remediation and safe access.

The objectives of the archaeological assessment were to provide 1. documentation of the historic mine sites; 2. a significance assessment of the historic mine sites; 3. advice in relation to likely remediation works and visitor safety; and 4. comment on the likely interpretative potential of the historic mines.

Scope

The study was asked to document and assess all four mines – the Big Ben Mine, Quigleys Mine Barnett's Mine and the Montana SL Mine. Essentially for timing reasons, the Montana SL Mine has been reported separately to the other three mines. This is also useful given the complexity of the Montana SL Mine compared to the other three mines, and the different history of the Montana SL Mine compared to the other three mines, which have a similar history.

The consultant was asked to focus on the Montana SL Mine as this is regarded as having the most serious environmental issues, and also the greatest interpretation potential. Quigleys was seen as the next most important mine to assess, and Barnett's Mine and Big Ben Mine were only to be surveyed and documented if time permitted (M. Reid, pers comm). Four to five days were allowed for on-ground survey work, however in the end all four mine sites were able to be surveyed and documented in some detail in the time available.

The consultant was asked to assess the significance of the sites to the extent possible with the available information. Additional historical archival research was undertaken by Greg Dickens because understanding the history of a site is essential to assessing its historical cultural heritage significance.

Advice in relation to environmental and safety remediation and interpretative potential was required to be of a general nature and to essentially focus on highlighting key potential heritage conservation issues. The intent is that MRT will use the report to enable heritage conservation to be considered in their assessment and design of the proposed remediation and in relation to possible presentation and interpretation (M. Reid, pers comm).

The two main constraints on the scope of the archaeological assessment were 1. the field time constraints which derive from funding constraints, and 2. the need to complete the archaeological assessment reporting of at least the Montana SL Mine by March 2013 to allow remediation work to be undertaken before winter 2013, which only allowed a relatively short period for the historical research and analysis to be undertaken prior to the fieldwork.

1.4 Study Methods

General Methodology

The general study approach reflects the standard approach to heritage assessment and conservation as set out in *The Burra Charter: The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (Australia ICOMOS 1999), generally referred to as the ‘Burra Charter Process’ (refer Figure 3).¹ As can be seen from Figure 3, this heritage assessment encompasses steps 2 to 5 of the Burra Charter Process.

The work has also been performed to at least the required standards for cultural heritage conservation in Tasmania and in accordance with *The Burra Charter* and other guidelines and policy as relevant. Constraints on, and limitations of, the survey and assessment are noted in Section 1.5.

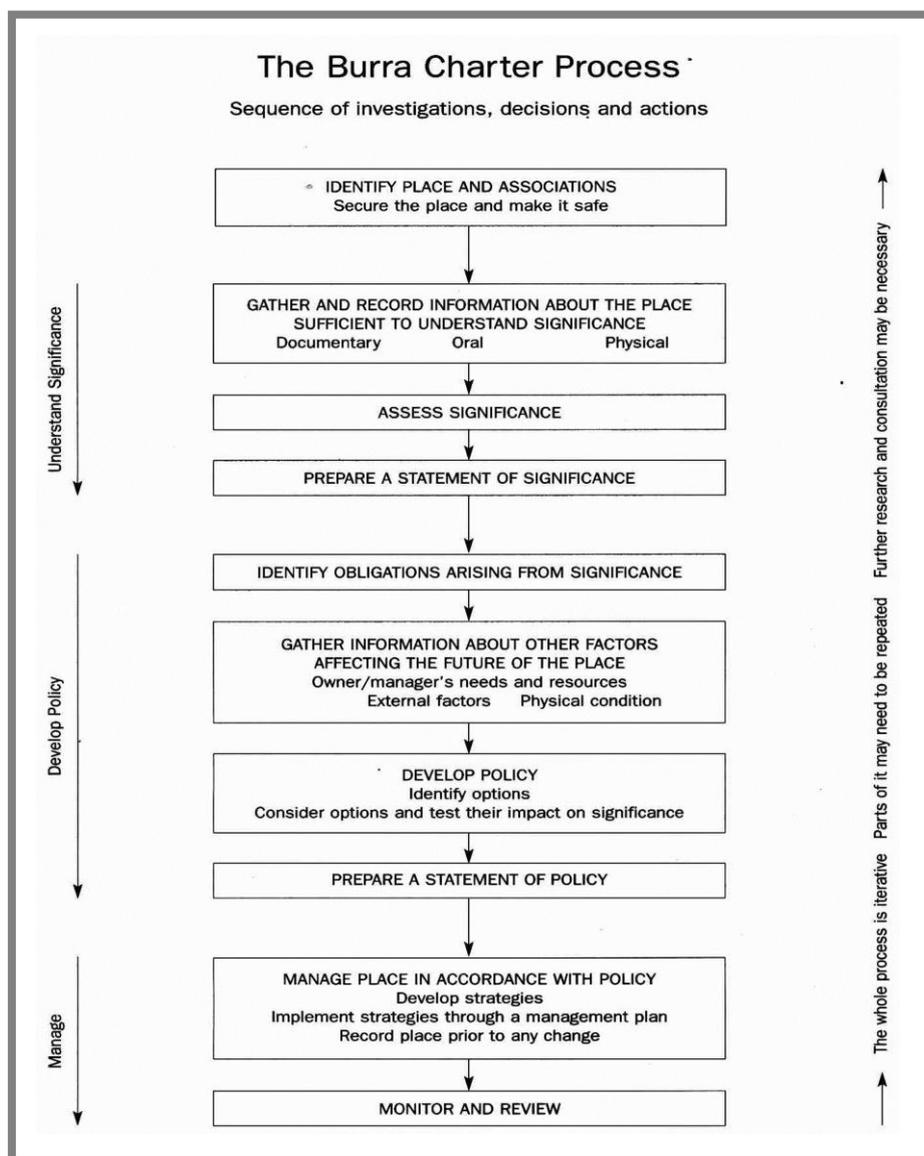


Figure 3 Australia ICOMOS (1999) *Burra Charter Process*.

¹ *The Burra Charter is currently the main guidelines for cultural heritage practice in Australia (refer also Section 2.2).*

Task Description

The following outlines the methods used for the different tasks undertaken in the preparation of the archaeological survey and assessment.

Historical Background Research

As small mines, little historical information is to be expected for the mines. The focus of the historic research was therefore on the MRT resources. The published and archival resources of MRT were reviewed for information (reports and maps/plans) for all four mines.

A small number of secondary sources, including published books, journals and unpublished reports, have also been used. Little information on the four mines is available through these sources, but they do provide some useful contextual information. A small number of images (of the Montana Mine only) were also sourced from newspapers and private collections known to, or held by, the authors.

The historic background research was undertaken by Greg Dickens, mainly in December 2012. The historical information was then passed to A. McConnell for analysis, which mainly occurred post-field survey.

Heritage Background Research

As no previous heritage investigations or assessments could be identified for the four mines, the background heritage research was limited to a review of the various government statutory heritage lists (undertaken on-line) and review of a small number of other reports on historic mines in the region² for contextual and comparative information.

This aspect of the background research was undertaken by A. McConnell in March 2013.

Field Survey & Site Documentation

Four full days were spent in the field surveying and documenting the four mine sites. Two and a half days were spent surveying and documenting the full Montana SL Mine site, half a day was spent surveying and documenting the Big Ben Mine, and one day was spent on surveying and documenting Quigleys and Barnetts Mines, which are only a short distance apart. No inspection was undertaken of underground workings.

The field survey and documentation was undertaken over the period 4-8th January 2013, with the fieldwork undertaken by A. McConnell and G. Dickens. Michael Reid, MRT, accompanied the author and Greg Dickens to all mine sites, and assisted by showing the party known features (at Quigleys Mine), helping with the survey, and discussing the remediation and safety issues noted prior to the survey.

The survey did not achieve 100% coverage (in terms of both site extent and density of survey) of any of the mine sites, but it did achieve coverage of the key workings and remnant features in all cases. The survey also used the historic documentation, in particular plans, to attempt to re-locate the known historic mining features.³

Field recording included developing a sketch plan of each of the mine sites based on GPS⁴ control points augmented by selected paced measurement of, and sightings to, major features, as well as tape measuring individual feature dimensions such as adit width and depth, and taking bearings to key features and of linear features. All identified features were photographed and some general site and landscape photographs were taken at each mine site. Notes were also taken on the nature and condition of key features at each mine site. It should also be noted that observations about drainage should be

² Other relevant studies are extremely limited.

³ Historic plans were only available for Barnetts Mine and the Montana SL Mine.

⁴ A hand held Etrex summit was used for this purpose – generally with a stated accuracy of 6-5m given the open terrain. The post-field mapping suggests that the GPS points are accurate to within c.1-2m, except in the area of the North Montana workings where the narrow gully and high vegetation decreased the accuracy.

regarded as 'dry weather' observations, given the prolonged dry period during and leading up to the survey.

The documentation prepared on the basis of the field inspection includes a scaled sketch plan of each mine site showing major identified historic mining features, as well as key other historical and modern features (provided as Figures 5, 7 & 9 in this report), a summary description of each mine site, a summary description of the individual features (provided as Tables 1-3 in this report), and a photographic record of each mine site (provided as Appendix 3).

Stakeholder Consultation

Given the nature of the project and the close involvement of MRT's project manager, Michael Reid, no formal stakeholder consultation was deemed necessary, and none was undertaken. Client consultation included a pre-fieldwork meeting of both consultants and the Project Manager, and the Project Manager also visited the Montana SL Mine during the field survey and to inspect and discuss the heritage findings, as well as the key hazards and remediation approaches.

Analysis – Assessment of Cultural Significance

The assessment of significance has used the standard criteria for cultural significance assessment (generally termed cultural heritage values) as per the Australia ICOMOS (1999) *Burra Charter*. The *Burra Charter* defines the cultural significance of a place as the 'aesthetic, historic, scientific, social or spiritual value for past present or future generations', with cultural significance seen as being 'embodied in the place itself, its fabric, setting, use, associations, meanings, related places and related objects' (Australia ICOMOS 1999, 2). Aspects such as the representativeness and rarity of a place, seminal nature of a place, and its authenticity and integrity are also taken into account in assessing cultural significance.

Assessment of significance is based on all these components, but is made without reference to other factors such as owner/manager needs and aspirations, or available resources (these other factors are however crucially important in developing policy and advice for managing a place). The information used in the assessment of significance is primarily the historical and fabric information generated by the project. The mines potentially have some local social significance, but this was not formally assessed as this would have expanded the project considerably.

The mines have also been assessed against the 'regional' level of significance (ie, whether of local, regional, state or higher level significance). It has been difficult however to provide a reliable comparative assessment as to date there has been little assessment of other historic mine sites of the same type and scale in the region.

Analysis – Management Advice

The *Burra Charter* (Australia ICOMOS 1999) advocates a 'values based' approach to heritage management (ie, decisions about managing a heritage place, if significant, are based on attempting to preserve the significance of that place). This is the approach taken in this report.

The advice for ongoing management is based on –

1. the Australia ICOMOS (1999) *Burra Charter* guidelines for the conservation of places of cultural heritage significance;
2. a review of the relevant legislative and other statutory instruments that apply to historic heritage and considered to apply, or to potentially apply; and
3. discussion with Michael Reid regarding the identified and potential environmental and safety issues for mine sites.

Given the aim of this survey and assessment, the advice provided focuses on identifying and mitigating the environmental and safety issues at each site, and also explores the interpretive potential.

Reporting

This report constitutes the full assessment report for the Big Ben, Quigleys and Barnettts Mines. The report, including the site sketch plans, has been prepared by Anne McConnell.

Michael Reid and Greg Dickens reviewed an initial draft of the report and their comment has been included in this final report.

Sources consulted in the compilation of this report are listed in the References (Section 6).

1.5 Study Limitations

Although the Heritage Report is not intended as a comprehensive report, there are some constraints and limitations that should be noted as they affect the ability of the study to provide comprehensive management related advice. These are discussed below.

1. **Historical information:** Although the project has been able to undertake research of primary sources, in particular the detailed records held by MRT, the mines are relatively small mines and there is consequently only very limited historical information available for the mines (although there is a moderate amount of information for the Montana SL Mine). There may be some additional information available through oral sources, which were not researched, but this information, if available, will only relate to the later period of use of the mines. The limited historical information makes it difficult to understand the full history of each of the mine, and restricts the ability to reliably assess the cultural significance of the Big Ben, Quigleys and Barnettts Mine sites.
2. **Field survey:** The field survey is believed to have located most surviving known features at Big Ben, Quigleys and Barnettts Mines. However, since the survey was not a 100% systematic survey, additional surviving features may still occur which have not been identified through the assessment.⁵ This is not considered to affect the significance assessment, but should be taken into account in the future management of the sites.
3. **Significance Assessment:** Because of the limited amount of archaeological survey, documentation and assessment of historic sites on the West Coast, and in Tasmania more broadly, it is difficult to make a comparative assessment for the Big Ben, Quigleys and Barnettts Mines. This makes it difficult to reliably assess the significance of the Big Ben, Quigleys and Barnettts Mine sites in the regional and Tasmanian context. The ability to document and assess four mines of a similar type in this one project has however allowed some limited comparative comment to be made.
In relation to social values assessment, no formal social values assessment has been undertaken. This will affect the assessment of social significance, especially given that it is probable that all four mine sites have at least some local social significance. The lack of data in this area however is unlikely to have a major impact on the advice provided in relation to rehabilitation work.
4. **Stakeholder consultation:** Other than for discussion with MRT, no stakeholder consultation has been undertaken as part of the project. This may have implications for management.⁶

⁵ An indication of this is the absence of features relating to the on-site accommodation of the miners which is considered likely for the earlier mines.

⁶ It is understood that MRT will undertake all required stakeholder consultation in relation to the rehabilitation of these mines.

2 HISTORICAL OVERVIEW

2.1 Historical Overview

Mining in the Zeehan Area

The first mineral discovery in western Tasmania was the discovery of tin at Mt Bischoff in 1871. In 1872 gold was discovered on the Hellyer River, leading the *Mercury* to anticipate “a rush unprecedented in Tasmania” (Scripps 1990, 54-55). The Hellyer River find did not develop a major rush, and further mineral discoveries were relatively slow until the discovery of tin in the Heemskirk area in 1876 (Scripps 1990).

There was little interest in the central West coast area and little visitation by the European colonists prior to the mineral finds (Scripps 1990), but by 1881 (following the Mt Bischoff tin discovery in 1871) prospectors “had probed every part of the west, established major tracks from Lake St Clair and Circular Head and opened the mining fields of Bischoff, the Pieman River, Mt Heemskirk and the King River” (Binks 1988, 198).

The first mineral find in the Zeehan area was the discovery of alluvial tin in 1876 at South Heemskirk, which rapidly established the small Heemskirk Tin Field. Ongoing prospecting led to the discovery of silver-lead deposits in the Zeehan town area in 1882 which developed rapidly into the Zeehan Mineral Field, a major West Coast mineral field producing mainly silver, lead and zinc, and for some time the main focus of mining on the West Coast. The main period of mining on the Zeehan Field was 1882 to 1914, with only major mines in general continuing into the mid-1900s and beyond (MRT 89-3014, 593010).

The Zeehan Field was slow to develop as, according to Scripps (1990, 56) “many investors had got their fingers burnt over Heemskirk and were reluctant to take another risk”. By 1891 however, following a boom in the silver market, there were 159 mining leases on the Zeehan Field. Mines rapidly increased in number and production, and in 1894 the Zeehan Field had its most productive year (Scripps 1990). Mining and mineral prospecting has been the main focus of activity in the Zeehan area (McConnell 2009).

The following 1957 account provides a succinct summary of the history of the Zeehan Mineral Field –

“Zeehan (the town), in the 1890’s had an even greater boom period than Queenstown. Silver was discovered there in the 1880’s, and according to the then mining expert of the Hobart “Mercury”, the discovery of the field “bids fair to become a rival to the celebrated silver fields of the United States, Mexico, and Peru”. Rich surface ore was mined and sent by packhorse and dray to Trial Harbour, 12 miles west of Zeehan, for export to Australian and German smelters. Most of the profit from Zeehan’s early exports was lost in transport costs. The population of Zeehan rose to a peak of 8,000 in August 1897, but it was discovered that the silver lodes were shallow, and no payable ore was found below a depth of about 600 feet. By 1901, Queenstown had displaced Zeehan as the third largest town in Tasmania, and thereafter the population of Zeehan steadily declined.” (MRT UR1957/9-12)

In spite of government assistance for prospecting in the mid-1910s and again in the 1930s (and possibly continuously throughout this period), no new major discoveries were made (MRT 89-3014, 593010). By the c.1930s mining activity had largely ceased in the region except for a few large mines (McConnell 2009). Figure 4 shows the location of the historic mines of the Zeehan field.

According to MRT 89-3014, there was a resurgence of silver-lead mining on the Zeehan Field from 1947 to 1960 during which time the Montana SL and Oceana Mines were worked.⁷

By the 1950s the Montana SL Mine and Oceana Mine were two of very few mines operating on the Zeehan field other than the very large mines that have continued until recently or which still operate (G. Dickens, pers comm). The MRT UR1957/9-12 report notes that in fact in the late 1950s there were only six mining companies in total producing ore on the West Coast (Mount Lyell, Electrolytic Zinc (Rosebery & Williamsford), the Renison Associated Tin companies (Renison Bell), Mount Farrell (Tullah) and the Montana and Zeehan Mine companies (Zeehan)).

There was another upturn in mining in the region in the 1960s, but this led to no major developments in the Zeehan area (McConnell 2009). 1960 was effectively the end of the historical mining period on the Zeehan Field. At about this time both the Montana SL Mine and the Oceana Mine closed down.

Although the Zeehan Field can be considered to have had a short life, by West Coast standards it had a relatively long life, with many of the other, smaller fields having closed down by the mid-1880s (McConnell 2009). Silver lead ore production figures for the mines of the Zeehan Field for approximately the main period of mining (1890-1918) indicate that production ranged between 5 tons to over 66,000 tons (Montana No 1). The total production of the Zeehan Field to the end of the historical mining period was 5.3 tons of tin, 194,816 tons of lead and 26,586.00 oz of silver (MRT 89-3014, 593010).

Related Activities

The mining was supported by other activities: Given the level of mining and prospecting in the area, there was clearly a need for major access routes. These were initially foot tracks, but better tracks were established from the early 1890s. The Waratah-Corinna cart road (the Corinna Track), first used in the late 1870s, was the longest track on the west coast and was completed from Waratah to Corinna in 1891 with Waratah prospectors and miners entering and exiting by boat on the Pieman River (Binks 1988) or crossing over and continuing to Trial Harbour or Zeehan along the southern continuation. The southern part of the Corinna Track appears to have been the main access from Zeehan to the Montana Flats mines. There was also a major track from the Stanley River Tin Field south to Zeehan, known as the Middle Track, crossing the Pieman River just east of the Heemskirk River (in the vicinity of big Ben Creek) [Waterhouse 1914], which appears to have taken off from the Corinna Track in the area of the four Montana Flats mines (refer Figure 2).

Food was important on the mining fields and in the late 1800s the Van Diemen's Land Company used the northwest coast as a stock route from their holdings in Northwest Tasmania to supply meat to the mining fields around Zeehan (Binks 1988). The route, at least south of the Pieman Heads, was known as the 'Cattle Track' and ran southeast from the Heads to Zeehan. This appears to be the 'pack track' that ran E-W through Quigleys Mine (refer Figure 2).

Timber was also needed for the mines and the associated settlements. A number of companies, JS Lee & Sons, Dunkleys, Grey, Britton, Fenton, Kaeger, Cummings and the Mackays established timber cutting and sawmilling operations in the region, which resulted in a network of tracks and tramways (Scripps 1990, 59) as well as a number of mills which were mainly located near the towns and/or mines. These businesses survived well into the 1900s.

⁷ MRT 89-3014 (p593010) comments that the Montana SL Mine was 'newly discovered' in this period. This however is incorrect, as the 1950s mining operation continued to use a major shaft established in the 1890s.

2.2 Management Context

General Management

The Big Ben, Quigleys and Barnetts Mines are located on unallocated Crown land that is managed by the Parks and Wildlife Service. The mines are abandoned.

Previous Heritage Studies

No previous heritage studies of the Big Ben, Quigleys and Barnetts Mines, or parts of these mines, are known.

There have been no broad based regional mining heritage studies or broader heritage studies undertaken that include the Zeehan area. As a consequence the Big Ben, Quigleys and Barnetts Mines appear not to have been identified in any previous heritage studies.

Heritage Status

The Big Ben, Quigleys and Barnetts Mines are not listed on any local, State or national statutory heritage registers (eg, the West Coast Planning Scheme Heritage Schedule (ie, Table 19.1, Items and Places of Heritage Significance)), Tasmanian Heritage Register, National Heritage List and Commonwealth Heritage List).⁸

The status of the Big Ben, Quigleys and Barnetts Mines in relation to Aboriginal and natural heritage values is not discussed here as this is not within the scope of the assessment.

Heritage Legislative & Policy Context

The following outlines the main legislative, policy and other statutory and non-statutory (but commonly accepted) frameworks for historic heritage assessment and management likely to apply, or potentially apply, to the Big Ben, Quigleys and Barnetts mine sites.

Legislation

The *Historic Cultural Heritage Act 1995* is the primary Act relating to historic cultural heritage in Tasmania and is administered by Heritage Tasmania and the Tasmanian Heritage Council. Under the Act heritage protection is required only for places assessed as being of State level significance (according to set criteria) and listed on the Tasmanian Heritage Register (THR). The Act operates to ensure that the cultural heritage significance of listed places is not diminished through use or works. As the Big Ben, Quigleys and Barnetts Mines are not currently listed on the THR, the standard protective provisions of the *Historic Cultural Heritage Act 1995* do not apply.

It should be noted that under the provisions of Part 6 of the Act, a listed, unassessed site can be granted temporary protection by declaring it a 'heritage area'; or under Part 8 of the Act the Tasmanian Heritage Council can issue a stop work order if it is believed that a development or works (including for example potentially damaging remediation works) would affect an unregistered historic place considered to have State level significance as defined under the *Historic Cultural Heritage Act 1995*.

Protection for historic heritage may also occur at the Federal level through the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999 (& 2003 (Heritage) Amendments)*. In relation to cultural heritage, this Act mainly applies in cases where an historic heritage place is listed on the National Heritage List or Commonwealth Heritage List, or is considered to be of national level significance and at risk. This Act does not apply, and is not likely to apply, in relation to the Big Ben,

⁸ *These mine sites are also not listed on the Register of the National Estate, but this Register no longer has statutory powers.*

Quigleys and Barnett's Mines as these mines site are not considered to have national level heritage significance and are not Commonwealth owned or controlled.

Statutory Planning

The main statutory regulations that apply to cultural heritage in the study area are those contained in the *West Coast Planning Scheme* (West Coast Council). The *West Coast Planning Scheme* provides planning direction and control for the West Coast Municipality under the *Land Use Planning and Approval Act 1993* and has as its primary objective 'to achieve sustainable use and development of resources in the planning scheme area'. It provides for environmental protection through zoning and schedules (termed 'Codes').

Historic heritage protection is provided for in Schedule 19.1 - 'Items and Places of Heritage Significance'. If a place is listed in the schedule then it must be managed in accordance with the planning scheme's 'Heritage Code'. This applies regardless of the broader Scheme zoning. It should be noted however that places or areas of heritage value not listed in Schedule 19.1 are also subject to the Heritage Code.

The Big Ben, Quigleys and Barnett's Mines fall within the 'Natural Resources Zone' of the West Coast Planning Scheme. The intent of the Natural Resources Zone is to protect and allow for the sustainable use and development of existing key resource uses, as well as for new uses 'that do not adversely affect the values of the zone'. The planning objectives for this zone reflect the intent, but also include a conservation objective (objective e) which is to "maintain the scenic, historic and cultural values of the zone" (WCPS, item 9.4.1 (e)).

The *West Coast Planning Scheme* takes its direction in relation to the treatment of cultural heritage from Schedule 1, Part 2 of the *Land Use and Planning Approvals Act 1993* which sets out the objectives of the Act, and specifically from objective (g) which in relation to historic heritage is "to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value".

Policy

No state or other major policy that relates to historic cultural heritage management is known to apply to the Big Ben, Quigleys and Barnett's Mines or their environs.

Guidelines

In Australia, including in Tasmania, the main guideline for cultural heritage that is used is the *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 1999). The *Burra Charter* has been in place since the late 1980s and has been adopted broadly by government in Australia as a standard for cultural heritage management.

Most importantly the *Burra Charter* provides a process for considering cultural heritage (refer Figure 3) and a number of important principles. Key *Burra Charter* principles include -

- 'significant cultural heritage should be conserved' (article 2.1),
- 'the aim of conservation is to retain cultural significance' (article 2.2)
- 'places of cultural significance should be safeguarded and not put at risk or left in a vulnerable state' (article 2.4),
- 'significant associations and meanings of a place (including spiritual values) should be respected (articles 24.1 & 24.2),
- 'the policy for managing a place must be based on an understanding of its cultural significance' (article 6.2), and
- 'conservation should make use of all the knowledge, skills and disciplines which can contribute to the care of the place' (article 4.1),

2.3 General Management Approach for Significant Mining Heritage

The following provides general advice for the retention of cultural significance of the Big Ben, Quigleys and Barnettts mine sites (also applicable to mine sites generally). Mine specific advice in relation to environmental remediation, safety risk minimisation and interpretation is provided for Big Ben, Quigleys and Barnettts Mines in Sections 3.3, 4.3 and 5.3, respectively.

Obligations for Management

There is no previous heritage management to be taken into account in relation to the Big Ben, Quigleys and Barnettts Mines, and as none of these three mines are listed on any statutory heritage register or in any list there are no direct statutory obligations in relation to their heritage values.

However, given that the Big Ben, Quigleys and Barnettts Mines are well preserved historic mines, then they are likely to have some historic cultural heritage significance, there is a general obligation under generally accepted cultural heritage guidelines such as the *Burra Charter* (Australia ICOMOS 1999) and given the intent and objectives of legislation such as the *Land Use Planning and Approval Act 1993* (Schedule 2) and the *Historic Cultural Heritage Act 1995* to retain the significance (significant aspects) of these three mines where possible. This obligation is based on historic heritage being a non-renewable resource. The extent to which the Big Ben, Quigleys and Barnettts mine sites can be conserved is dependent on a range of factors such as other important uses, other environmental considerations, and safety and resourcing.

General Conservation Advice

The following advice is strongly based on the Burra Charter principles, but is designed to apply specifically to the Montana SL Mine.

Definition of Site

- For heritage conservation purposes the full area of a site should be considered in relation to the conservation of the heritage values. This should include the mine workings, processing and dump areas, access tracks, and habitation areas, offices, etc.
- The setting of the site should be considered as well as individual features. This means that where possible the undisturbed areas of a site should be left undisturbed (or disturbance minimised and/or rehabilitated), and an undisturbed buffer zone should also be left where possible around the site so that the historical context is preserved.

Intervention at the Site

- Intervention at the site for any reason, but including cultural heritage conservation, should do as much as is required, but change the site as little as possible.
- Where intervention occurs, where possible this should be reversible without additional disturbance of the site or its features.

General Treatment of the Site

- Movement of site features and artefacts, removal of site features (or parts of such) and artefacts, flattening or otherwise modifying historic earth features, burying features, excavating features (or parts of features) and the introduction of new (in particular unrelated features and structures) all constitute impacts and should avoided where possible. Where this is not possible, such disturbance should be kept to the minimum possible.
- Associated works (eg, such track building to access parts of the site, equipment storage, using heavy equipment, construction of interpretation infrastructure) can potentially impact on sites and site

features, and should also therefore be avoided or minimised. This can be achieved to a large degree by keeping these works off historic features, especially significant and well preserved features, and where possible keeping the works outside the main site area.

- Intervention should where possible avoid intact or otherwise well preserved features.
- All intervention and change should be documented to enable the history of the site to be fully understood.
- In all cases where heritage will be impacted, the heritage features should be fully recorded before they are damaged or destroyed.

Major Change

- Where it is proposed to re-use the site for mineral exploration, mining or some other purpose, then where significant aspects of the site can be conserved, or where unmanaged actions can put the site at risk, then conservation of the historical cultural heritage values of the site should be managed through a heritage conservation management policy for the site (which should be prepared by a heritage expert).

3 BIG BEN MINE – DESCRIPTION, HERITAGE ASSESSMENT & MANAGEMENT ADVICE

The Big Ben Mine is located approximately 3 km north of Zeehan and approximately 300m from (to the southwest of) the present day Zeehan-Corinna Road, and approximately 300m west of the Montana SL Mine. This historic mine is understood to have operated from 1922 to c.1936.

The mine site is located on the Montana Flats, and is situated between a tight bend of Big Ben Creek just above its confluence with Barnetts Creek and a distinctive horseshoe shaped hill with steep slopes. The general terrain is buttongrass moorland, but the creek valley and lower slopes of the hill have a dense shrubland cover of mixed forest species with scattered eucalypts.

The Big Ben Mine has essentially the same geology as the Montana SL Mine. The local geology is undifferentiated Precambrian rocks comprising mainly quartzites, siltstones and shales, and there are nearby overlying Permian tillites and associated glaciogene rocks (Geological Survey of Tasmania 1994).

3.1 History

According to MRT Report UR 1926/217-221, the origin of the Big Ben Mine is the discovery of an ore body in the mine area by prospectors by G. Clarke and L.C. Blacklow in 1922.

Clark and Blacklow are understood to have 'carried out the first portion of the developmental work' at the Big Ben Mine (lease 8912M, 20ac) (MRT UR 1929/32-34), presumably from 1923 to 1926 (see below). MRT UR 1929/32-34 notes that 'further developmental and mining work' was undertaken by the West Coast Silver Lead Co., but following this work the company ceased operations and the Big Ben Mine was transferred back to Clarke and Blacklow, presumably prior to 1929. The cessation of mining by the West Coast Silver Lead Co. was in 1926, apparently due to low metal prices at this time (Blissett 1962, 213).

The 1926 government report (MRT UR 1926/217-221, 220) comments that the ore body in the area of the Big Ben Mine is "the most important ore body thus far developed in the area. It is not only the longest and widest, but the richest". The report goes on to comment that all of the metallic minerals are 'richly argentiferous' and in addition "it is remarkable that the metallic minerals are not intimately associated, but are dissociated in blebs and bunches allowing of easy separation by mechanical means". In 1962 the lode is described more technically as follows – "The lode dips at 60° to the east and two shoots of ore were uncovered, each about 60 feet long and separated by about 60 feet to 70 feet of faulted lode material of variable grade. South of the shaft, the ore body is said to be 3 feet wide in the face." (Blissett 1962, 213).

Considerable work appears to have been undertaken at the Mine by 1926. According to MRT Report UR 1926/217-221, by 1926 the Mine has a 50' underlay shaft (on dip of 50°) with a drive cut for 66' from the 50' level (with associated stoping), and another 18' drive. The underlay shaft and initial drives are understood to have been constructed by the West Coast Silver Lead Co. (Blissett 1962, 213). By 1926 there is also at least one adit, Hanlon Adit (where the ore body was also located), and two trenches (60' and 70' long) north of Hanlon Adit which also exposed the ore body (MRT UR 1926/217-221). These workings are all understood to be to be on mining lease 8912M.

Mining lease 8909M, which is the southern part of the mine and includes Big Ben Creek, has had considerable trenching, but no ore extraction, by 1926. Trenches are noted as occurring on this lease 'on the south bank of Big Ben Creek near its point of confluence with Barnetts Creek' and 'on the hill ridge at the northern boundary of the lease) (MRT UR 1926/217-221). The 1926 report also suggests there is a significant amount of ore stockpiled on site in 1926, noting that "The dumps at the mine are estimated to

hold over 300 tons of second grade ore ... [of a class] marketable at the Electrolytic Zinc Company's works at Zeehan" (MRT UR 1926/217-221, 220).

Mining by Clarke and Blacklow appears to continue up until at least 1929, possibly to 1930 (Blissett 1962, 213). In 1929 Hanlon Adit (lease 8912M) is described as being driven WNW for c.100' with short N and S drives on the lode (MRT UR 1929/32-34). By 1929 there is a vertical shaft (termed the 'main shaft') sunk to 38' [or 37'] and a 200' long drive in the Underlay Shaft (UR 1929/32-34). In 1929 the vertical shaft is not connected with the other workings (MRT UR 1929/32-34). Up to 1929, the Big Ben Mine does not appear to have an ore treatment plant, and only the first class ore is being sold (MRT UR 1929/32-34, 33). Also in 1929 access to the mine is described as being by a short connecting track from the Granville Tramway (2' gauge) (MRT UR 1929/32-34).

Clarke and Blacklow relinquished their lease over the full mine area in 1931 (Blissett 1962, 213). At this time the core of the workings is taken up as lease 10884M (5ac) by J.A. Duff (mine lease maps and plans, G. Dickens research). It is unclear what mining is undertaken in this period, but the production figures for the Big Ben Mine indicate that it operated to at least 1935 (from 1923), but with no production occurring in 1930-34. The following comment made by a government geologist in 1935, suggests the mine is still operational in 1935 – "At the Big Ben Mine there are excellent prospects and if this mine were properly equipped and placed under efficient management it should give good results" (MRT UR 1891-1969/57). Since this lease is taken up by M.K. Robertson in early 1934, this suggests that the short lived recommencement of mining (c.1935-36) was undertaken by Robertson. Also in 1935-36 there was extensive trenching undertaken out west of the Montana SL Mine by a small prospecting party, and it is possible that some of this trenching was undertaken in the Big Ben Mine area (Blissett 1962).

The total production of the Big Ben Mine was 348 tons (184.35 tons lead, 29,137.46 oz silver) (Blissett 1962, 214). Production may have been influenced by the fact that the mine, at least up to 1929, did not have a treatment plant, with the aim of the operations being to "obtain as much first class ore, ie, galena suitable for sale, as possible. The second class ore which would ordinarily be treated in a milling plant is not mined but is left in the mine" (MRT UR 1929/32-34, 33).

Although there appears to be no mining after 1936/37, there is an ongoing transfer of leases. In late 1937, lease 10884M (5ac) appears to be transferred from M.K. Robertson back to Duff, while another lease (11822M, 35 + 40 ac) which surrounds lease 10884M is taken out by A.A. Summerhayes. By 1946/47 (possibly as early as 1939-40), Duff appears to have taken over these leases (at this time lease 28M/46, 75ac) (and may have had the northern 40ac lease by late 1937). In 1947 Robertson, who holds the 5 ac lease, also takes over Duff's lease 28M/46. It appears there is some further transfer of leases between Robertson and Duff at this time as by 1948 Duff re-acquires lease 28M/46 (later 10884M) (the 5 ac core mine area) from Robertson. In 1954 this 5 ac lease is transferred back from Duff to Robertson; who then holds it, together with the 75 ac lease 11822M, until 1957 when they both appear to lapse (mine lease maps and plans, G. Dickens research).

After 1957 there appears to have been only sporadic exploration work carried out at the Big Ben Mine or in the broader mine area. Known exploration comprises diamond drilling (3 unsuccessful holes to 200') by the Electrolytic Zinc Co., and geophysical surveying was conducted over the larger Montana Flats area by the Bureau of Mineral Resources in 1954 (Blissett 1962, 213; MRT 89-3014, 593012).

3.2 Physical Description

Overview

The full extent of the historic Big Ben Mine workings appears to have covered an area of approximately 200m by 200m. The area in which historical workings have been identified however is approximately

140m (N-S) by 150m (E-W), although there is understood to be some trenching to the south of the main workings which have not been re-located.

The main mine area is nestled inside and in the northeast part of the concave area of a crescentic hill on a small area of flats on the north bank of Big Ben Creek, that in this area follows the curve of the hills. There are exploration trenches on the inside slopes of the crescent to the west, with the trenching extending from the base of the slope to near the crest in places. There are additional workings, primarily an adit, on the outer side of the crescent hill on the east side (opposite the main workings) at the base of the slope. A connecting track has been cut up the outer hillslope from north of the adit, southwest to the crest of the hill, presumably to connect to the main workings (although there is no evidence of the track on the west side of the crest). Possible evidence of the access track from the Granville Harbour Track was located to the northeast on the south bank of Barnett's Creek (at GR approximately 0359468.5365137).

The workings survive essentially as archaeological remains, with no buildings left intact and no in situ equipment left on site. Some known historical features (eg, the main shaft) appear not have not survived. This appears to be a consequence of the historical mining operations as there is no evidence of post-historical mine operation modification.

Mine Working Areas & Features

The main part of the mine includes a NNW-SSE trending overhanging (east dipping) linear cut in the northeast corner of the concave part of the hill. This linear feature has a deep, narrow angled (east dipping hole of c. 4m x 5m diameter, that is assumed from its nature and location to be the Underlay Shaft that was sunk to 47' by 1926.⁹ About 5-8m north along the cut is another irregular opening into the underground workings (F1) which is interpreted as part of the collapsed stoping to the surface that was undertaken prior to 1926 in one of the drives of the underlay shaft. There is no evidence of the Main Shaft, the collar of which is known to have been 10' below that of the Underlay Shaft (see Table 1 and footnote above). There is however an approximately rectangular sunken area (F3) with remnant timbers c.5m south of, and slightly lower than, the Underlay Shaft, which may be the buried remains of the Main Shaft. It may have additionally, or alternatively, been an ore processing area as a single metal screen is lying on the mullock c.5m to the southeast of this area, and the horizontal timbers may have been a floor foundation.

In front of the Underlay Shaft, mullock is spread out to the southwest in a c.45-40m deep fan which fills in the flats in this area (Inner Workings Mullock). The southern part of the mullock is of an irregular hummocky area, but with a long curved linear mound on the eastern edge and two short finger dumps on the southwest edge. The northeastern part of the fan comprises four subparallel, long narrow, finger dumps which butt up against the lower slope of the hill, resulting in the finger dumps having flattened noses. In the central part, and extending from the Underlay Shaft, is an area of mullock that is slightly higher and browner than the other mullock and which comprises two finger dumps (one extending to the southwest and one to the northwest) conjoined at the base and appearing to originate from the Underlay Shaft. It is difficult to associate the different mullock with a particular shaft, but the arrangement suggests that the southern mullock is oldest and comes from the Underlay Shaft and the brown pair of finger dumps are most recent and also come from the Underlay Shaft, while it is more likely the northern finger dump fan originates from a working slightly to the south, giving support for F3 being the infilled Main Shaft. If this is the case, it suggests that historically the Underlay Shaft was the first shaft, with the Main Shaft being worked later, then with a new period of working of the Underlay Shaft.

⁹ *The historical data provides relative levels for parts of the Underlay Shaft, the Main Shaft and Hanlon Adit (ie, 0m, 3m & 9m, to surface level, respectively). As the GPS data from the Jan 2013 fieldwork gives the relative height difference between what is interpreted as the Underlay Shaft and the only identified adit (interpreted as Hanlon Adit) is 9m, this interpretation would seem to be correct.*

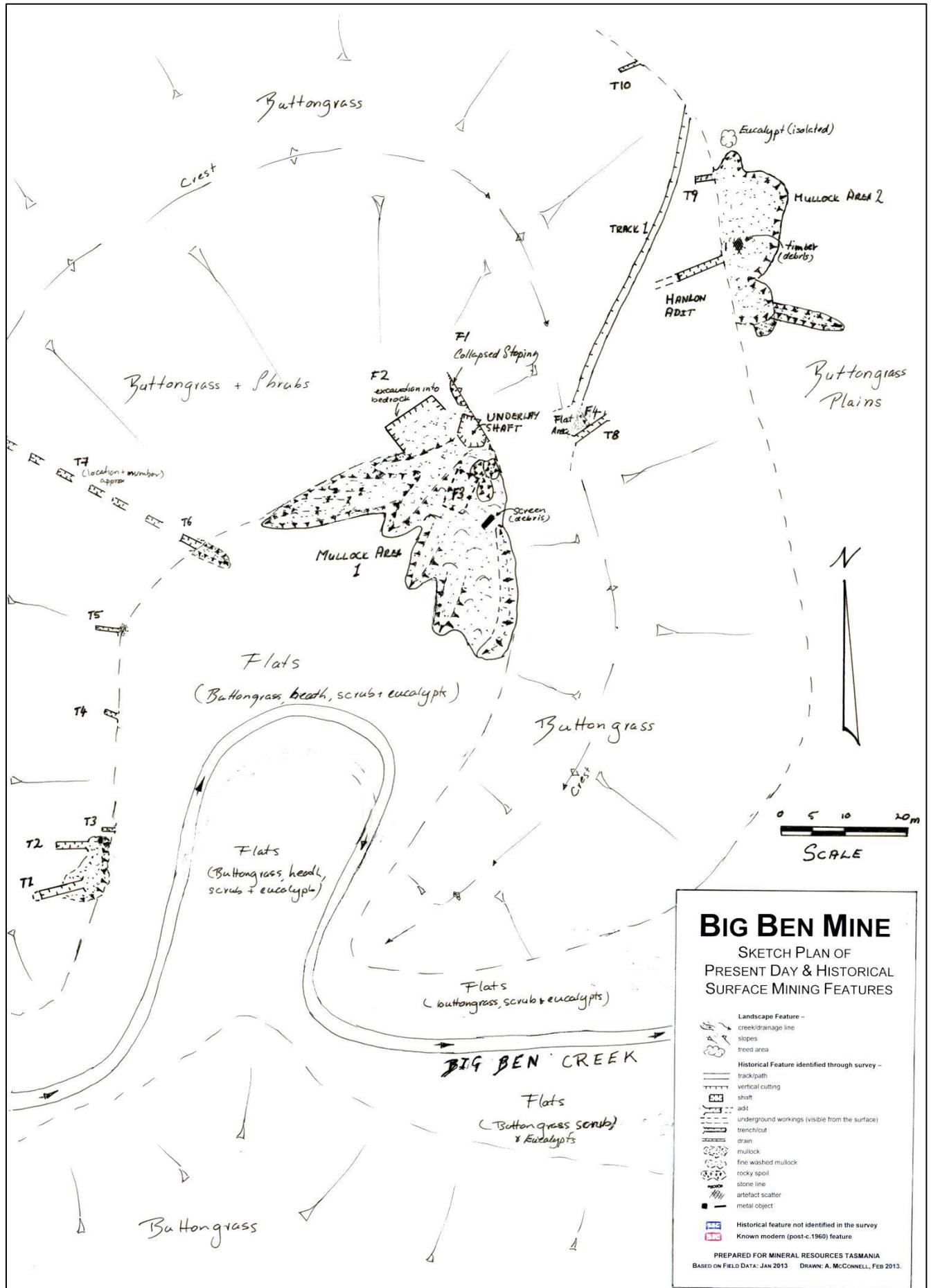


Figure 5 Sketch Plan of the Big Ben Mine showing the historical mine features identified through field survey, Jan 2013.

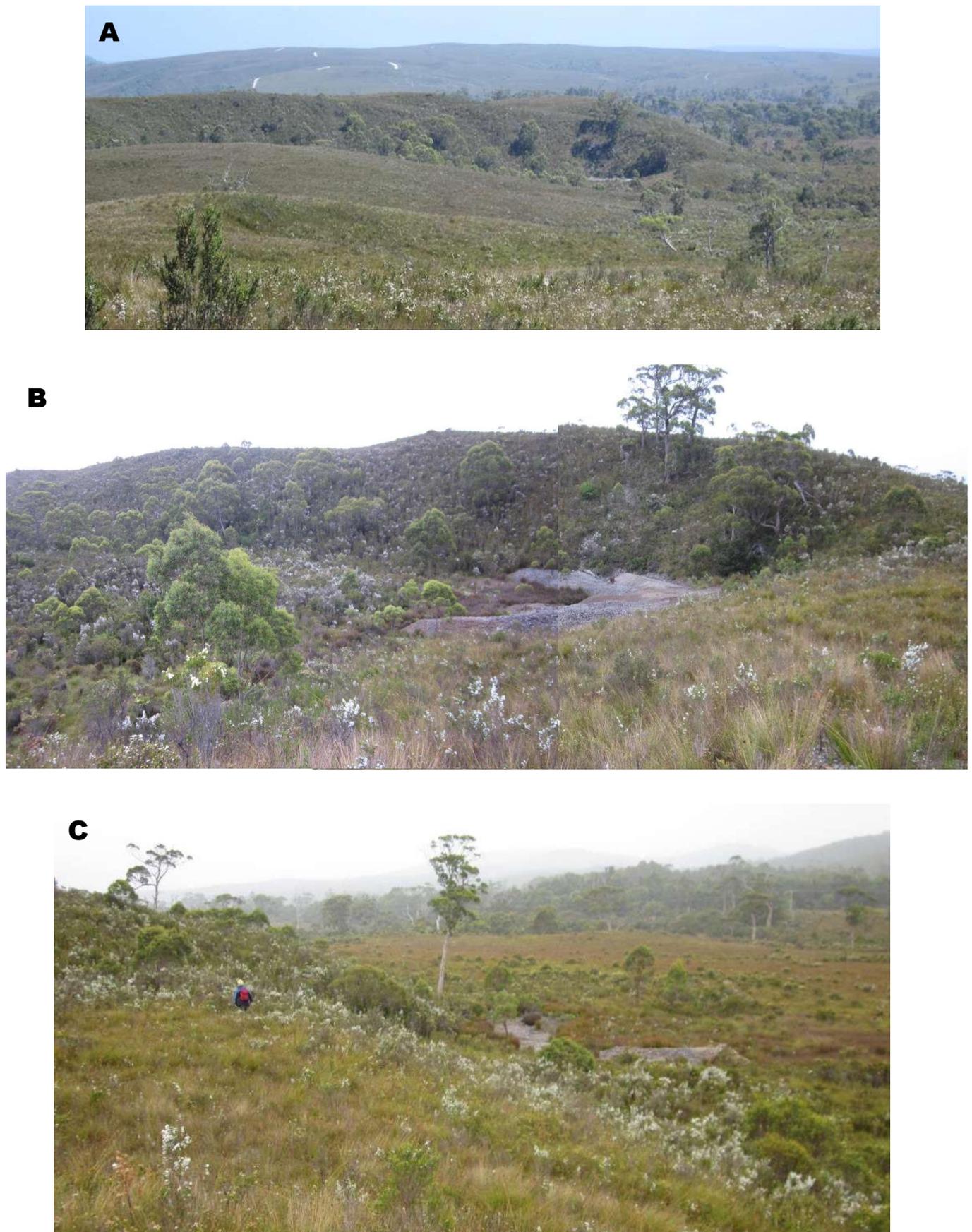


Figure 6 General views of Big Ben Mine Jan 2013: A – view north to inner side of crescentic hill (outer workings not visible on RHS hill); B – view N (from low ridge N of Big Ben Creek) to inner workings (RHS) with trenching not visible at base of slopes to L; C – view NE from hill crest to outer workings.

Table 1 Age, history, physical description, condition and significance of the identified historical features of the Big Ben Mine.
(Note – significance shown in *italics* is indicative significance only)

FEATURE	DATE CONST ^N	HISTORY	DESCRIPTION	CONDITION	SIGNIFICANCE
Underlay Shaft	c.1922 to 1926	- by 1926 - underlay shaft is sunk in ore body; 50' deep and on dip of 50°; a drive cut drive from the 50' level for 66' to NE (29°) where an ore vein located; the vein stoped to the surface over 43'; also S drive from shaft for 18' (interrupted by faulting) (MRT UR 1926/217-221); Blissett (1962, 213) describe the underlay shaft as 47' deep with a NNE drive of 200'	- irregular opening (max diameter c.5.5m) against hillslope in inner part (NE corner); opening is near vertical on all sides but slopes to E, undercutting the E edge; shaft has partly buried, in situ? timber framing remnants and a length of iron water pipe (remnant of collar?); associated with a linear cut (slightly underhung) into bedrock the E side which runs N (bearing 350°) from the Underlay Shaft for c.8-10m, and which has an area of collapsed near surface stoping near the N end (see F1)	- the shaft appears to be moderately well preserved, but the collar is poorly preserved and the shaft appears to be largely infilled with mullock (underground workings not inspected); no apparent post-mining disturbance	▪ Moderate - high
Vertical Shaft	pre- 1929	- by 1929 - there is a vertical shaft (also termed the 'main shaft' sunk 37' through tillite); the collar of the main shaft is 10' lower than the underlay shaft; the main shaft is not connected with the other workings (MRT UR 1929/32-34)	▪ <i>not relocated (appears likely to be buried by mullock – possibly sunken area F3)</i>	▪ <i>not relocated</i>	▪ <i>moderate-low</i>
Inner Workings Mullock	c.1922 to 1926	- presumed to be associated with the mining of the Underlay Shaft and Main Shaft (although it is difficult to determine what mullock comes from what shaft) which were worked from c.1922/23 to c.1935/36 (MRT UR 1926/217-221; MRT UR 1929/32-34)	- fan shaped area of mullock c.45m wide x 40m deep (with the Underlay shaft (& Main Shaft?) at the apex; comprises 3 sets of mullock (of different periods?) – 1. a hummocky area of mullock to S which comprised several round dumps, a long linear dump along the E (hillslope) edge and 2 broad finger dumps on the SW edge; 2. a set of 4 long finger dumps on the NW edge; 3. a fanned pair of shorter finger dumps of a browner material running SW from the Underlay Shaft (most recent?); - the arrangement suggests areas 1 and 3 derived from the Underlay Shaft and 2 may derive from the Main Shaft; - some artefacts associated, including a metal screen and various metal machinery fittings	- appears to be well preserved, with no later (post-mining) modification; <u>appears to have some acid drainage seeping out on SW edge</u>	▪ moderate - high

Hanlon Adit	c.1922 to 1926	- Hanlon Adit exists in 1926, but is not described (MRT UR 1926/217-221); in 1929 - Hanlon Adit has been driven WNW for c.100' with short N and S drives on the lode; the adit level is c.20' above the underlay shaft 47' level and is connect to that level by a winze and stopes (MRT UR 1929/32-34)	- assumed to be the adit that forms the main part of the outer workings as this is the only adit identified at the site – c.9m long x 3' wide entrance excavated from the base of the hill at an angle into the hillslope (bearing 280°)	- entrance intact but with vegetation growing in it; <i>not inspected beyond the portal.</i>	<ul style="list-style-type: none"> ▪ moderate ▪ moderate
Outer Workings Mullock	c.1922/23	- presumed to be associated with the Hanlon Adit which was worked from c.1922/23 to at least 1929 (MRT UR 1926/217-221; MRT UR 1929/32-34)	- outside the Hanlon Adit and extending to N & S is a c.30m (N-S) x 15m (E-W) area of mullock which is a low platform with some slightly mounded areas and a c.10m long finger dump (bearing 273°) that runs off the SE corner of the mullock; the mullock also has some scattered artefacts (not in situ) –timber fragments, part of a metal ore bucket?; other fragmented metal, pieces of gci sheet and broken glass	- appears to be well preserved, with no later (post-mining) modification	<ul style="list-style-type: none"> ▪ moderate
Track 1	nd	<i>no data (presumed to have been cut to connect the inner and outer workings (or to access the crest with ore being brought up by tramway or aerial system (no on-ground evidence for transport on the inner (W) slope)).</i>	- benched track that sidles from the N end of the outer workings (in area of T10) c.SW (bearing c.15°) onto the hill crest at the point between the inner and outer workings (c.50m long); the formation is c.5-6' wide and the cutting into the slope is c.2'6" high	- well preserved (but has revegetation); no apparent post-mining disturbance	<ul style="list-style-type: none"> ▪ moderate
F 1 Collapsed stoping	c.1922-1926	- presumed to be associated with the nearby underlay shaft which had a stoped drive cut from the 50' level, with stoping cut to the surface over 43' (MRT UR 1926/217-221)	- a narrow linear area (c.1.5m long x c.1m wide) of collapse (collapsed stoping?) in hillslope c.8-10m N of the Underlay Shaft and c.3-4m above it; on the W side of a linear cut (slightly underhung) into bedrock which runs N (bearing 350°) from the Underlay Shaft to c.1-2m N of the collapse features	- heavily vegetated; appears to be no later (post-mining) modification	<ul style="list-style-type: none"> ▪ moderate-low
F 2 Large square cutting	nd	<i>no data (possible machinery (eg, winder & engine) location)</i>	- flat floored rectangular area c.9m wide by 5m deep) cut N into the hillslope immediately W of the linear cut and immediately NW of the Underlay Shaft; the excavated area has a very high (c.3m) N/headwall	- revegetating with trees and shrubs; appears to be otherwise well preserved, with no later (post-mining) modification	<ul style="list-style-type: none"> ▪ moderate-low
F 3 Sunken area with timber	nd	<i>no data (possibly site of Main shaft &/or of an ore crusher/jig)</i>	- approximately rectangular depression c.6m x 4m located slightly below and c.5m SSW of the Underlay Shaft in the mullock area; the depression has sloping sides and a flat floor and remnants of a criss-cross framework of timbers (roundwood); some associated metal (gci sheet	- appears to be well preserved, with no later (post-mining) modification	<ul style="list-style-type: none"> ▪ moderate-low

			fragments, part of an ore bucket, c.4-6" water pipe sections – interpreted as a the probably foundations for a shed &/or machinery, or remnants of the Main Shaft collar (if the Main Shaft, then it has been filled in)		
F 4 Platform	nd	<i>no data (possibly ore temporary storage for transported ore) (less likely a platform for post-mining exploration drilling)</i>	- a small, roughly levelled, approximately square area of c.5m x 5m on the crest of the ridge between the inner and outer workings; abuts T8 on the S side and adjoins T1 on the N side, and is built up on the E edge	- appears to be well preserved, with no later (post-mining) modification; becoming revegetated	▪ moderate-low
Trenches (N Hanlon Adit)	c.1922 to 1926	- 2 trenches (60' and 70' long) N of Hanlon Adit (on lease 8912M) also expose the ore body ((MRT UR 1926/217-221).	▪ <i>not relocated</i>	▪ <i>not relocated</i>	▪ <i>low</i>
Trenches (Big Ben Creek)	c.1922 to 1926	- by 1926 – . 1 trench noted 'on the south bank of Big Ben Creek near its point of confluence with Barnetts Ck; and . several trenches noted 'on the hill ridge at the northern boundary of the lease (MRT UR 1926/217-221)	▪ <i>not relocated (possibly includes T7 & T8)</i>	▪ <i>not relocated</i>	▪ <i>low</i>
T 1	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase.	- large, deep, horizontal floored, vertical sided trench cut back into the inner hillside just above the base with small mullock platform in front and part way up slope; 3' 6" wide x c.10m long; has short section of underground excavation at W end which is c.7' high with an irregular roof; bearing c.280°.	- intact but with vegetation growing in it; <u>- some red (acid?) water pooling in head of trench and possibly seeping out.</u>	▪ <i>low</i>
T 2	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase.	- deep, wide, horizontal floored, vertical sided trench cut back into the inner hillside just above the base with small mullock platform in front (part of T1 mullock); 5' wide x 8m long with headwall c.4m; bearing c.270°.	- intact but with vegetation growing in it.	▪ <i>low</i>
T 3	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase.	- very small, narrow, vertical sided trench cut back into the hillside at the base; c.1'6" wide x c.3-4' long.	- intact but with vegetation growing in it.	▪ <i>low</i>
T 4	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase.	- short, narrow, vertical sided trench cut back into the hillside at the base; 1'6" wide x c.8-10' long; bearing 300°.	- intact but with vegetation growing in it.	▪ <i>low</i>

T 5	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase	- vertical sided trench cut back into the hillside at the base with some mullock on the N side; 2' wide x c.8-10' long; bearing 280°	- intact but with vegetation growing in it	▪ low
T 6	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase	- short, vertical sided trench cut back into the hillside at the base; 3' wide x 6' long; bearing 300°; has a small finger dump in front onto the creek flats; top is c.3-4' wide and the dump is c.7m long, & on same alignment as the trench	- intact but with vegetation growing in the trench and on the finger dump	▪ moderate-low
T 7	nd (c.1922-1929?)	- presumed to be part of the initial exploration in the mine area or during its early phase; possibly one of, or part of, the several trenches noted on the hill ridge at the northern boundary of the lease (MRT UR 1926/217-221)	- a series of c.3' wide trenches cut into the hillside in a c.40-50m long line from T6 to the hill crest; bearing approx 300°; adjacent hillslope has considerable rock rubble (mullock appears to have been distributed downslope)	- intact but with vegetation growing in it	▪ low
T 8	nd (c.1922-1926?)	- possibly one of, or part of, the several trenches noted on the hill ridge at the northern boundary of the lease (MRT UR 1926/217-221)	- long, shallow, vertical sided trench cut across the hill crest between the inner and outer workings (runs from the crest E); 2' wide x c.2' deep x c.10-15m long; bearing 52°	- apparently intact but with vegetation growing in it (may have been infilled on W side of crest)	▪ low
T 9	nd (c.1922?)	- presumed to be initial exploration trenches in the mine area (it is not one of the 2 long trenches N of Hanlon Adit (see above))	- short, vertical sided trench cut at an angle into the hillside at the base; 3' wide x 8' long; bearing 255°; at N end of mullock from Hanlon Adit.	- intact but with vegetation growing in it	▪ low
T 10	nd (c.1922?)	- presumed to be initial exploration trenches in the mine area (it is not one of the 2 long trenches N of Hanlon Adit (see above))	- short, vertical sided trench cut at an angle into the hillside at the base – N of T9; 2-3' wide x 8' long; bearing 248°	- intact but with vegetation growing in it	▪ low

The only other main feature in this main area of workings is a rectangular opening with vertical walls which has been cut into the bedrock of the hillslope. This area (F2) is immediately to the northwest of the Underlay Shaft, has a flat floor and is c. 9m wide by 5-6m deep and up to c.3m vertical depth. This is possibly the location of winding gear for both or one shaft (although there is no evidence of foundations for such).

Along the base of the inner hillslope to its western extent (a distance of c.70-80m) is a series of trenches of variable size cut into the hillslope. The trenches are not equally spaced, but all are aligned approximately west to northwest. Six trenches (T1-6) were located at, or just above, the base of the slope and a set of trenches (T7) was also located in a line upslope from T6. Only the trenches around the base of the hill were recorded. The smaller trenches (T3-5) are cut in at the base of the slope and the larger trenches (3'+ wide by 5m+ long) are located c.2m above the flats and have some mullock at the entrance. The mullock from T6 is a short well-formed finger dump. These trenches are all vegetated, but otherwise are well preserved.

Immediately to the east of the main (inner) workings on the crest of the hill ridge is a flat area approximately 5m x 5m (F4), interpreted as an ore or other storage and working area. On the south edge of this is a shallow trench cut to the east from the crest (T8) and on the north edge of the platform is a benched track (Track 1) which sidles northeast down the eastern slope to the north end of the outer workings.

The outer workings lie c.50m northeast of the inner workings on the outer side of the hill. As with the inner workings, the trenching is mostly cut in from the base of the hill and there is an area of mullock that extends out over the buttongrass plain to the east. The only identified cuts were an adit, interpreted as Hanlon Adit, and two small exploratory trenches, c.12m and c.35m north of the adit (T9 & T10, respectively). The trenches and adit entrance are cut on similar west alignments to the trenches west of the inner workings, and are also well preserved with vegetation growing out of them.

The mullock in this area (Outer Workings Mullock) appears to have been derived from Hanlon Adit. It is bilobate, spreading to the northeast as irregular – low mounded mullock and to the southeast as a similar type of mullock, but with a c.10m long finger dump running off the outer edge. On the inner edge of the mullock, and just north of the adit there is a discrete mound with associated artefactual material (fragmented timber, metal (gci sheet and an ore bucket) and glass (bottle)) all of which is consistent with being part of the working mine. The artefacts do not appear to be in situ, but appear to have been heaped up in this location historically (as rubbish).

The nature and preservation of the underground workings was not investigated, hence is unknown.

The individual identified historic features are described in summary in Table 1, and a plan of the mine is provided in Figure 5.

The main impression from the field survey is that this mine site today is an extremely well preserved small mine site (where there was no/minimal ore processing), with no post-mining phase disturbance. The physical evidence of the mining is well preserved, although it now has vegetation reclaiming some of the disturbed areas, particularly the trenching and wetter cleared areas and areas of excavated rubble scree on the hillslope, which makes these workings less visible. The mine's setting in an area essentially of buttongrass means that the mullock is still highly visible. The mine can also be considered to have a slightly unusual setting, being located inside a crescentic hill with some, not visibly connected, workings on the outer side.

3.3 Cultural Significance

The Big Ben Mine Site

The Big Ben Mine is regarded as being of high local significance. This primarily derives from it being a very well preserved historic mining site (although with no equipment left on site) of the Zeehan Field.

As such it has high integrity, high scientific significance, and is a good representative example of a small silver-lead-zinc mine of its period (ie, 1920s-1930s and prior to greater post-WWII mechanisation). Its significance as a well preserved site is enhanced by the preservation of its essentially historical setting.

The Big Ben Mine site is not considered of high historical significance as it is one of many small mines of its period, and it is not known to have particular historical importance or associations. It was however important enough locally to have had a creek named after the mine. The mine may have local social significance as one of the mines of the Zeehan Field Mines, but this is not likely to be very high as it is not a well-known mine and, given its age, it is unlikely that there will be many local area residents who have connections with the mine. The mine can be considered to have some aesthetic significance given its unusual location nestled into the crescentic shaped hill on the edge of Big Ben Creek and its essentially natural buttongrass setting.

The Big Mine Site is also considered to have some additional cultural significance as one of the four known silver-lead mines at the north end of the Zeehan Mineral Field (ie, Big Ben Mine, Quigleys Mine, Barnetts Mine & the Montana SL Mine), a cluster of mines at the south end of the Montana Flats, all of which are relatively well preserved, and which as a set demonstrate how mine layout can vary in response to geology and landscape in a single small area. This associational significance only applies while the majority of these four mines remain largely undisturbed.

Individual Features of the Big Ben Mine Site

The cultural heritage significance of individual features has also been assessed (refer Table 1). In a number of cases however feature assessment is either not possible or is an indicative assessment due to insufficient information.

In assessing the significance of individual features, the range of Burra Charter values are used, but the assessment has focussed on the importance of that feature as a part of the full site in historical terms, how critical a component of the mine the feature was, and its present day scientific value (ie, ability to help interpret the mine's workings).

In the case of the Big Ben Mine, there are no individual features of very high significance, but all features have some significance as part of the mine because, with the site's excellent preservation, each feature assists in understanding the history of the mine. Should part of the mine be significantly disturbed, then the majority of the features of lower (mainly low) significance are unlikely to retain any significance as individual features. The most significant features of the site are the key preserved features – the Underlay Shaft and Hanlon Adit – and also the well preserved inner workings mullock with its three phases of deposition and also showing how the landscape determined the way in which the mullock was deposited.

3.4 Management Advice

The current assessment has been undertaken primarily to assist conserve the historic heritage values of the sites in relation to essential mine rehabilitation work. The mine rehabilitation is aimed at environmental remediation given the acid drainage and disturbed drainage, and also at human safety given the visibility of the site and the relative ease of access. Comment is also made on the interpretive potential of the site.

Environmental Remediation

The site appears to be stable and not eroding, particularly given that most features have been, or are partially, revegetated. There is no obvious evidence of erosion initiated at excavated or cleared points, and there is no obvious evidence of mullock being washed into Big Ben Creek or across the adjacent

buttongrass flats/plains. The only potential environmental issues identified through the heritage survey relate to acid drainage, and this appears to be minor – see Table below.¹⁰

Advice in relation to these specific issues is provided in the table below. This advice is generally aimed at avoiding impacts to the historic workings where possible, given that the Big Ben Mine has some historic heritage significance as a whole, and given that historic heritage is a non-renewable resource.

FEATURE	ENVIRONMENTAL/SAFETY ISSUE	MITIGATION ADVICE FOR HERITAGE PROTECTION
Inner Workings Mullock	- possible acid mine drainage (minor) from the inner workings mullock area (source not obvious - possibly rainwater and/or slopewash filtering through the mullock), with reddish water noted seeping from the south end of the southwest edge of this mullock onto the flats of Big Ben Creek	- if acid drainage needs remediation and the water source is primarily hillslope run off, consideration should be given to constructing a contouring trench around the slope above the mullock; - if remediation requires modification of the mullock, then this should be kept to a minimum, and drains with built up sides of spoil are preferable to broadscale reshaping of the mullock surface or modifying the mullock edge
Hanlon Adit	- possible acid mine drainage (minor) from this adit given there is a cluster of sedges on the inner side of the Outer Workings Mullock in the area of the adit (may alternatively be impeded slope run off)	- if acid drainage needs remediation, then the seepage from the adit should be diverted to the south by means of a small trench located at the base of the hill at the intersection of the mullock, and avoiding the mullock to the extent possible
Trench 1	- possible acid mine drainage (minor) from T1 where reddish water is pooled in the north end (source not clear, possibly seepage from bedrock), and may be seeping out onto the flats of Big Ben Creek	- if acid drainage needs remediation, then preferred mitigation approaches are 1. minimising flow by digging a drain upslope of the trench; and 2. if 1. is not adequate or appropriate, the mitigation works should avoid modifying the trench entrance to the extent possible

It should also be noted that in undertaking environmental remediation (and safety) works, it is important to avoid disturbing the historical features of the mine, and the mine site generally, through adjunct activities such as getting the equipment for the remediation work to the work site, and through associated activities such as sampling and monitoring. To limit such impacts –

1. The use of equipment on historic features should be kept to a minimum.
2. Existing tracks and other recently disturbed areas should be used to the extent possible, and the bulldozing of new tracks should be avoided. Where equipment needs to go into untracked areas, then it is preferable to ‘walk’ the equipment in without creating new bulldozed tracks, or if tracks are essential, they should be kept to a minimum and rehabilitated after use if they will not be needed again.
3. Sampling for remediation (and other sampling) should be kept to a minimum, to a minimum size and, where possible, avoid well preserved and significant features, and be covered in afterwards.

Safety

No major safety issues have been identified through the heritage survey. The key safety issue with such sites is usually uncapped shafts and openings into deep underground workings. At the Big Ben Mine the Main Shaft appears to be completely infilled (could not be located), and the Underlay Shaft is partially infilled such that it is not possible to fall down the shaft. It could however be difficult for someone to climb back out of the shaft if they fell in. The Hanlon Adit was not inspected in detail, but it potentially an internal shaft, winze and/or stoping. The adit is however hard to access due to the dense vegetation growth in its entrance. The only other potential issue is the opening into the stoping c.5-8m north of the Underlay Shaft. This is however up a steep vegetated slope and would be very difficult to accidentally fall into.

¹⁰ Note – observations on drainage are dry weather observations.

Presentation & Interpretation

The Big Ben Mine is considered to have some potential for interpreting small early-mid 1900s, pre-major mechanisation mines of the Zeehan Field. The potential mainly derives from the sites intactness and good preservation. The site also has a pleasant open natural setting.

This potential however is significantly reduced by the difficulty of access to the mine, which is a c.400m from the Corinna Road across untracked buttongrass flats with shrubby and heathy patches and across Barnetts Creek.

The assessment suggests that other mines in this area, in particular the Montana SL Mine which is a more complex and significant mine, and also Quigleys Mine which is more easily accessible via a track, are more suited to presentation and interpretation for the general visitor.

There is however no heritage reason that the Big Ben Mine should not have visitation as it appears to be reasonably robust for low level, unguided tourism. If there is visitation, it is probable that the scattered artefacts will be removed by visitors as 'souvenirs'. While it is desirable that the artefacts stay on-site, they are such that their loss would not constitute a significant site impact. Better preservation of promoted sites would be likely if the promotion was accompanied by 'minimal impact' guidelines.

4 QUIGLEYS MINE – DESCRIPTION, HERITAGE ASSESSMENT & MANAGEMENT ADVICE

Quigleys Mine is located approximately 2 km north of Zeehan and approximately 750m west of the present day Zeehan-Corinna Road. The site is bisected by a bulldozed track that runs approximately E-W from the Zeehan-Corinna Road. This historic mine is understood to have operated from 1908 to 1939, although operations were intermittent over this period.

The mine site is located just beyond the south end of the Montana Flats in an area of low hills. The site is located on a northwest facing slope on the east side of Barnett Creek. The general terrain is buttongrass moorland, but the creek valley and lower slopes of the hill have eucalypt forest-woodland with heathy – shrubby understorey.

Quigleys Mine has much the same geology as the Montana SL Mine. The local geology is essentially undifferentiated Precambrian rocks comprising mainly quartzites, siltstones and shales, and there are nearby overlying Permian tillites and associated glaciogene rocks (Geological Survey of Tasmania 1994). The mine appears to be on the same line of lode (the Big Ben lode) as the Big Ben Mine and Barnetts Mine, and is thought to be on the northern extension of Barnetts lode (Blissett 1962, 215). The ore body in the area of Quigleys Mine appears to have been small in extent, hence the mine was never a major mine.

4.1 History

Mining appears to have been carried out at this mine from 1908 to 1939, with the mine worked in two main periods (1908-1912 & 1922 – 1930), with a more minor final phase in c.1936-1939 (G. Dickens Research & Blissett 1962).

The mine is named after H. Quigley who found galena on the side of the track which passes through the mine site in 1908. This track was the ‘Cattle Track’ which was used to drive stock from the Van Diemens Land Company holdings in northwest Tasmania, via the coast then overland, to Zeehan from c.1878 (McConnell 2009).

A mining lease was taken up in 1908 by a party including Quigley, and the lease was worked to late 1912.¹¹ During this time work included development of an open drive off the track, a lower adit which was driven c.100’ and stoped for the last 40’; collapsed stoping that revealed a second line of lode that was then worked, sinking of a shaft (Kerslakes Shaft), surface cutting into a line of lode north of Kerslakes Shaft, and Wells Tunnel (a low tunnel of c.120’) (MRT UR 1891-1969/57, Twelvetrees & Ward 1910, Blissett 1962). These workings appear to all be relatively shallow, with Kerslakes Shaft being described as only 15’ deep in 1909 (Twelvetrees & Ward 1910, 140).

Between c.1913 and 1921 there are no reports of work being undertaken at Quigleys Mine. From 1922 however the mine was worked by T. Brown and G. Clarke (who held the lease until 1930). By 1926 they had enlarged the mine having discovered a richer shoot than had been worked by Quigley (MRT UR 1926/217-221). By this time the mine workings were aligned along two lines of lode. On Barnetts Vein (or line of lode) there was a 120’ length of stoping at the north end, a 40’ deep shaft, a 100’ line of holes

¹¹ *It is unclear what was worked by A.D. Sligo who had part of the mine lease area in the early phase of mining, and what was worked by Quigley: In 1910 Twelvetrees & Ward (1910, 139) differentiate Sligo’s workings from Quigley’s workings, with Quigleys workings being described by them as being “further north, where the track from Zeehan [the Pack Track] crosses the lode.” The mining lease plans however indicate that this area, a 40 ac lease, was held initially by Sligo, then taken over by Quigley in 1910 (to 1912). This suggests that Sligo was part of Quigleys 1908 -1912 mining party.*

and trenches and a 20' shaft, and the lower adit was extended with additional drives and crosscuts. By 1926 the western vein (or line of lode) workings included a 40' length of open stoping and a 'hollow shaft' (MRT UR 1926/217-221).

There are no further reports on mining until 1935, when G.H. Bell and party are actively working the mine on tribute, and are in the process of sinking a winze (MRT UR 1891-1969/57). In 1937-1939, W. Ledger is working a 5 ac lease in the mine area [this covers the main area of workings] (G. Dickens Research). This late 1930s phase of mining appears to be the last mining undertaken at Quigleys Mine.

No later exploration work is known, although BMR is known to have conducted geophysical surveys in this general area in 1954, but this was mainly focussed on the Montana SL Mine (Blissett 1962, MRT 89-3014).

There are no comprehensive production figures for Quigleys Mine. Production figures given by Blissett (1962, 216) for 1912, 1913 and 1925 note a total production figure of 51.75 tons, being 32.47 tons lead and 2,754 oz silver. It is likely however that the total production over the life of the mine was somewhat greater than this. The mine however was only ever a small enterprise.

4.2 Physical Description

Quigleys Mine comprises two areas of working – the Upper Workings and the Lower Workings. The Upper Workings consist of two lines of shafts and open and collapsed stoping, a drive and associated mullock on the upper slopes of a small hill. The Lower workings consist of an area of mullock with a distinctive fan of finger dumps, an adit, an excavated area thought to be for a waterwheel, and an area of disturbed drainage at the base of the slope on the east bank of Barnetts Creek. A benched formation appears to lead from the lower to the upper workings, and the upper and lower workings are bisected by a bulldozed track, understood to be the route of the late-1870s/1880s pack track known as the 'Cattle Track'. The area covered by the mine is relatively small - c.200m (N-S) by c.80m (E-W).

The workings survive essentially as archaeological remains, with no buildings left intact and no in situ equipment left on site. Although the site is re-vegetating, much of the evidence is well preserved and the mine does not appear to have been disturbed by post-mining activity or by natural processes.

The following provides a more detailed description of the upper and lower workings. The individual identified historic features are described in summary in Table 2, and a plan of the mine is provided in Figure 7. The nature and preservation of the underground workings was not investigated, hence is unknown.

Upper Workings

The upper workings comprise two lines of workings 15-20m apart, each on a bearing of approximately 20°. The upper, or easternmost, line is the longest (c.120m). At the north end is an open cut (drive) of c.10m length running south from the track that cuts through the site (F4). C.35m south of this is a c.20m long line of shallow open cutting and mullock. From north to south, this area contains a small collapse into underground stoping (S10), a partly collapsed shaft (S9), another opening into an underlay shaft or stoping (S8) and a rectangular shaft that is initially vertical then dips east (S7). Approximately 20m to the south of this area is some shallow stoping that appears to have been partly open (S2) as there is associated mullock (which appears to have been significantly eroded (washed downslope by natural processes or by processing). C.35m south of S2 is a shallow, vertical, square shaft with well preserved mullock (S1), which is interpreted as Kerslakes Shaft (see Section 4.1 and Table 2). There is also a short downslope trench (T5) immediately east of S1, and a long trench (T3) running downslope approximately halfway between S7 and S2. These two trenches appear to be costeans. There is a third smaller trench (T2) running around the south edge of S7 which is interpreted as a diversion drain for collecting surface runoff from above S7.

The second line of workings is much shorter (c.40m). It comprises a c.25m long line of shafts and continuous mullock below the main area of shafts/stoping and mullock in the upper eastern line of workings, and an isolated shaft (S3) with associated mullock and a probable water diversion drain (T4) c.8-10m south of the main area of workings. The main area of workings comprises, from north to south, a c.7m x 2.5m x 3m deep pit (possible infilled shaft) (S6) with a small vertical timbered shaft in the northwest corner, and two rectangular shafts (S5 & S4). The associated mullock has a considerable amount of washing downslope of it and a long linear mound of mullock on the upslope edge. There is a second mound of mullock behind which extends to the mullock from the east line of workings. It is possible that more working are buried under this area of mullock, or the mullock from the eastern line of workings above.

There is no equipment in the area, and no evidence of machinery beds. The only artefacts are scraps of rail iron and sections of corrugated iron sheet. Both types of artefact are heavily corroded.

The bulldozed track (former Cattle Track) runs from northeast of the upper workings, past the entrance to the open drive, then southwest below the upper workings to just south of the site where it crosses Barnett Creek, then heads approximately west.

Lower Workings

The lower workings are situated on the eastern slope of Barnett Creek below the bulldozed track. Immediately below the open drive c. 40m to the northwest is the entrance to an adit (Adit 1), presumed to be the lower adit mentioned in the historical literature. This adit has a short entrance (c.2.5m) aligned approximately southeast, and is blocked at the portal (although there is acid water seepage from it). It has a small bench at the entrance.

Approximately 5m northwest is what appears to be a diversion of Barnett Creek, and another c.5m north of the creek is the southern end of the mullock from Adit 1. This area of mullock is c.50m N-S by c.25m E-W. The southern end is relatively flat with several scattered mounds c.2-4m in diameter. The eastern edge, separated from the main mullock by a channel of Barnett Creek, has a lower flatter area of mullock with no features (possibly eroded by water). The southern central part of the mullock also has a low earth and rock mound which is grassed and an associated square timber stump (F3), possibly the remains of a building and fireplace (hearth or forge fire). The north two thirds of the mullock comprise a fan of finger dumps, with the stem at the south end and the ends to the north. The fan comprises at least seven separate finger dumps, with two of these being bifurcated (or additional dumps). All but the easternmost finger dump appears to have been truncated by erosion by a channel of Barnett Creek, which flows immediately to the northwest.

In the area of the lower workings Barnett Creek is a vegetated flat of braided channels, presumably a result of sedimentation from the mining. A single clearing c.7-8m diameter was identified on a flat in this braided area, but no structures or artefacts were located in this area.

Approximately 50-60m southwest of Adit 1 is a large vertical walled excavation back into the hillslope from creek level (F1) – c. 6m deep x 2 m wide and c.4m (12') high at the headwall (F1) with a line (barrier?) of packed excavated stone across the creek edge. This is interpreted as the water wheel site shown on the 1930-1960 MRT lease plan.¹² Running north from this along the diversion of Barnett Creek for c.25m is a c.5m wide flat, but there are no features evident on the flat except for a small trench (costean) (T1) running back into the hill from c.6m north of the water wheel site (F1)

Above the water wheel site, and running slightly upslope to the south, is a narrow benched formation (now revegetated) (F2). This is interpreted as a benched track or the tramway shown on one of the mining lease plans.

¹² *Given the nature of the feature and the apparent lack of a water race, a water wheel may never have been erected.*

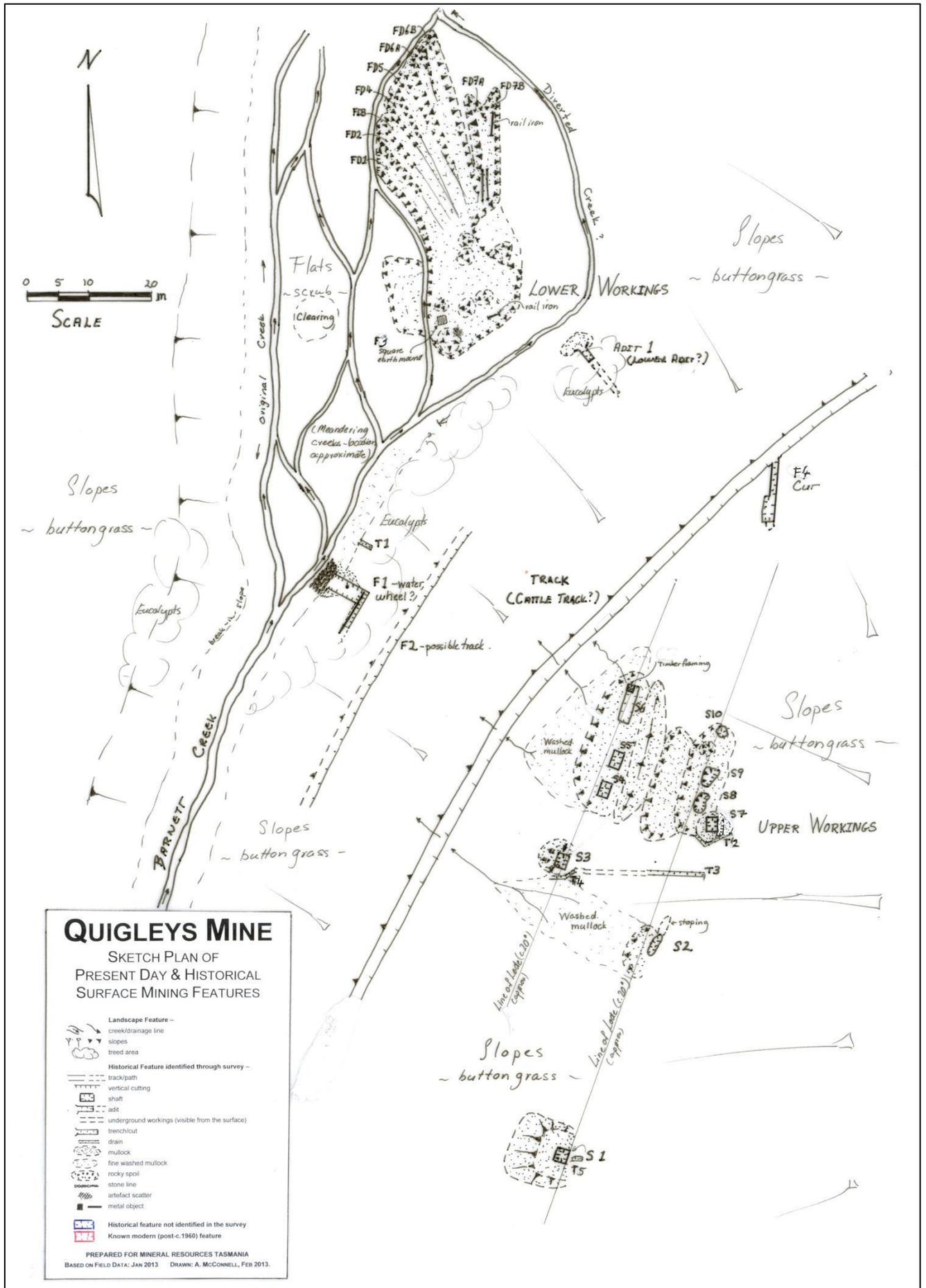


Figure 7 Sketch Plan of Quigleys Mine showing the historical mine features identified through field survey, Jan 2013 – Main and Southern Workings.

A**B**

Figure 8 General views of Quigleys Mine, Jan 2013: **A** – view northeast across Quigleys Mine with Barnett Creek on LHS and the Upper Workings clear on RHS (Lower Workings are obscured by vegetation); and **B** – view north across main part of the Upper Workings towards the Big Ben and Montana SL Mine, with the finger dump fan in the lower workings area just visible below the foreground workings which comprise S4 & 5 (shafts visible on LHS) to S10, and Barnett Creek flows from L to centre just above the visible workings.

Table 2 Age, history, physical description, condition and significance of the identified historical features of Quigleys Mine.
(Note – significance shown in *italics* is indicative significance only)

FEATURE	DATE CONST ^N	HISTORY	DESCRIPTION	CONDITION	SIGNIFICANCE
Wells Tunnel (north of Quigleys lease)	1908-10	- in existence by 1910; Twelvetrees & Ward (1910, 140) note that Quigleys workings also include 'Wells tunnel', noting it is on Crown land north of Section 3797M (on 8209M, 20ac); they describe it as 'a low tunnel driven SE for 120' '.	<ul style="list-style-type: none"> <i>not relocated (this northern area not surveyed)</i> 	<ul style="list-style-type: none"> <i>not relocated</i> 	<ul style="list-style-type: none"> <i>not assessed</i>
Adit 1 Lower Adit (on Barnetts Vein) (Lower Workings)	c.1908 – 1930 - ?	- in existence by 1910, at this time cut 66' through black slate to the ore body then driven for 40' with some stoping (4 stopes noted as being taken out), also connected by a pass to the upper adit at 20' above drive level [this is the open drive (F3) – see F3 below] (Twelvetrees & Ward 1910; Blissett 1962, 215); - in 1926 the adit is described as being 'on the N side of the track a few feet above creek level' and as exploring Barnetts Vein; it appears to have been extended – it has a SE crosscut which intersects the vein at 112' & stoped for 30' where ore was taken from, and has a drive of 25 to the N and a 150' long drive to S (no ore) (MRT UR 1926/217-221, 218)	- this adit is located on the south bank of what appears to be a diversion of Barnett Creek, and c.1m above and c.5m south of the creek; it has a short (c.2.5m), 3' wide entrance on bearing 212° with only a small amount of mullock in front (possibly stream eroded); the portal is very low and the adit cannot be entered (probably silted up), but there is a strong flow of orangey water coming from the adit; the mullock from the Adit appears to be deposited on the north bank of the creek diversion - <i>underground workings not inspected</i>	- moderately well preserved entrance area; adit not inspected but appears to be silted up; - orangey water flow suggesting acid drainage.	<ul style="list-style-type: none"> high-moderate (as one of the main and earliest workings at the site)
Adit 1 Mullock (on Barnetts Ck flats) (Lower Workings)	c.1908 – 1930 - ?	- this mullock derives from Adit 1 which was worked from c.1908 to c.1930 (and was possibly worked in 1936-39s but there is no record of this) (refer Adit 1, above)	- mullock area c.55m long (N-S) and c.20m wide (E-W) that extends north from c.5m north of the creek diversion; - comprises a southern area of low hummocky mullock which is cut through by a creek channel on the western side (this western area is lower and flatter), and a fan of 7 finger dumps of between 15m and 30m long, with 2 of the finger dumps being bifurcated to give the appearance of 9 finger dumps; the finger dumps are vegetated (implying they are relatively old features) and all but the	- very well preserved except for post-depositional truncation of the northern end of the finger dumps by Barnett Ck and the cutting of the southern area by a creek channel; revegetating (primarily with eucalypts).	<ul style="list-style-type: none"> high-moderate (as part of Adit 1 and given the well preserved complex splayed finger dumps) and other features (eg, in situ rail iron and F3)

			<p>easternmost finger dump pair has been truncated at the northern end by Barnett Ck;</p> <p>- the mullock also has scattered artefacts – mainly iron fittings (collected onto the southernmost mound?), some rail iron & a riffle plate (not in situ), although there is a pair of parallel iron rails at the south end of finger dump 7 (westernmost & most recent)</p>		
<p>Trenching, Holes & Shafts (on Barnetts Vein) (Upper Workings)</p>	1908	<p>- initiated in 1908 - "A lode was worked by Messers. H. Quigley & Party in 1908 and stoped to the surface in one section. Some years afterwards some ground caved away near the surface and revealed another lode carrying splendid values behind it; Much richer than the one previously worked" (MRT UR 1891-1969/57)</p> <p>- by 1910 there is cutting down into a lode c.50' N of Kerlakes shaft where the lode is quartz & pyrite (Twelvetrees & Ward 1910, 139).</p> <p>- in 1926 these workings are described as comprising 120' length of stoping to 25' depth; a 40' shaft at the N end of the N shoot; 100' of holes and trenches and a 20' shaft on the S shoot (MRT UR 1926/217-221, 218)</p>	<p>- the historic information indicates this is the eastern line of working in the upper workings area;</p> <p>- it is difficult however to reconcile the present day evidence (120' of evidence of stoping at the surface, comprising a single open stope with associated mullock (S2) and a northern elongate area of mullock (2 levels) with one shaft (S7), two open stopes (?) (S 8 & 9) and a collapsed stope (S10) in the upper mullock area) with the historic evidence (ie, no evidence of the 100' of holes and trenches?);</p> <p>- not described as a whole - refer descriptions of individual features below</p>	-	-
<p>Open Stoping & Hollow Shaft (western vein) (Upper Workings)</p>	c.1922 – 1930?	<p>- initiated only after 1922;</p> <p>- in 1926 these workings are described as being a 40' length of open stoping and a 'hollow shaft' [?] on a second lode (vein) 50' west of Barnetts Vein (MRT UR 1926/217-221, 218);</p> <p>- in 1962 reference is made to shallow workings from 1922-1930 on the western line of lode developed by T. Brown & G. Clarke (Blissett 1962, 215)</p>	<p>- the historic information indicates this is the western line of workings in the upper workings area (the distance between the two veins and the present day lines of workings is about the same, and assuming S6 is the 'hollow shaft' then the rest of the conjoined line of workings is c.40' long);</p> <p>- not described as a whole - refer descriptions of individual features below</p>	-	-
<p>S 1 Kerlakes Shaft? (on Barnetts Vein) (Upper Workings)</p>	c.1908	<p>- in existence by 1910; Kerlakes shaft is described as the southernmost opening at this time (c.22yds from S boundary of lease), and sunk to 15' onto the lode (the lode here is pyrite-galena and vertical</p>	<p>- rectangular shaft c.6' x 5' at the southern end of the upper workings (on the eastern line of workings); the shaft is near vertical but appears to dip slightly to the E; the shaft appear to be only c.4m deep (if this is Kerlakes Shaft then this may</p>	<p>- very well preserved on surface (underground workings not inspected)</p>	<ul style="list-style-type: none"> ▪ high-moderate (well preserved early feature)

		with a slight W underlay) (Twelvetrees & Ward 1910, 139)	be the base (= 15') not infilling; - has associated mullock platform surrounding it on all but the uphill side; the platform is c.3.5m wide x 10m long and on the outer edge (W) the platform is built up c.3m above the slope with a lower slope c.4m wide; there is a short cross trench on the E side (T5)		
S 2 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no definite historical information; thought to be part of the Barnetts Vein (eastern line) workings which was developed between 1908-1910 (see <i>Trenching, Holes & Shafts</i> , above)	- elongate opening (c.3m long x 1.5m wide) into underground workings (a shallow tunnel or blocked underground stoping); a shallow tunnel continues on the same line (c.20°) north (visible for only c.3m); associated mullock on the lower edge (over an area of c.3m wide x 7m long) indicated that this is an excavated hole or that mullock was removed from this hole post collapse; the mullock slopes downhill (W) and below the mullock there is a c.25m long band of washed mullock (fines) with a drainage line at the west end	- well preserved (although the mullock may have in part washed of the shaft edge mound and downslope)	<ul style="list-style-type: none"> moderate-high (well preserved early feature that clearly demonstrates the nature of the shallow lode and consequent shallow workings; relatively rare type of workings)
S 3 (Upper Workings)	?	- no definite historical information; appears to be part of the western line workings which was developed between 1922 - 1930 (see <i>Open Stoping & Hollow Shaft</i> , above), but does not fit that description – may therefore be part of the earlier workings, particularly given its location on/below T2, or may be part of the 1936-39 workings	- rectangular, vertical shaft c.6' x 5' at the southern end of the western line of workings; shaft appears open (depth unknown) and has some remnant timbering; has associated crescent shaped mullock heap surrounding it on all but the uphill side – on the downhill side the mullock is piled above (c.0.5-1m) the shaft collar level, extends c.4m downslope and is c.6m wide (N-S); there is a section of small trench c.4'-6' from the shaft on the SE side (T4) – interpreted as a drain to keep water from the shaft	- well preserved	<ul style="list-style-type: none"> moderate-high (well preserved early feature)
S 4 (Upper Workings)	1922-1930?	- no definite historical information; thought to be part of the western line workings which was developed between 1922 - 1930 (see <i>Open Stoping & Hollow Shaft</i> , above)	- vertical shaft c.6' x 5' in the western line of workings; originally rectangular but now partly collapsed (depth unknown); has remnant timbering; occurs in a continuous line of mullock	- moderately well preserved	<ul style="list-style-type: none"> moderate (as part of the line of workings – a relatively unusual, moderately well preserved shallow working)
S 5 (Upper Workings)	1922-1930?	- no definite historical information; thought to be part of the western line workings which was developed between 1922 - 1930 (see <i>Open Stoping & Hollow Shaft</i> , above)	- vertical shaft c.6' x 5' in the western line of workings; originally rectangular but now partly collapsed and partly blocked (depth unknown); has remnant timbering; has a section of corroded rail iron at the collar (probably not in situ & may not be related); occurs in a continuous line of mullock	- moderately well preserved	<ul style="list-style-type: none"> moderate (as part of the line of workings – a relatively unusual, moderately well preserved shallow working)

S 6 (Upper Workings)	1922-1930?	- no definite historical information; thought to be part of the western line workings which was developed between 1922 – 1930 – possibly the 'hollow shaft' (see <i>Open Stopping & Hollow Shaft</i> , above)	- large semi-rectangular opening with vertical edges at the N end of the western line of workings; size c.6-7m x c.2.5m (c.20' x 8') and c.3m deep – unclear if this is the original floor or the opening has been infilled; has a small (c.2' x 2' timbered shaft in the NW corner; occurs in a continuous line of mullock	- well preserved if this is how the workings were left (otherwise moderately preserved (ie, if the shallow underground workings have collapsed)	<ul style="list-style-type: none"> moderate (as part of the line of workings – a relatively unusual, moderately well preserved shallow working)
S 7 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no definite historical information; thought to be part of the Barnettts Vein (eastern line) workings which was developed between 1908-1910 – likely to be the 1926 40' or 20' shaft (see <i>Trenching, Holes & Shafts</i> , above)	- rectangular shaft c.6' x 5' in the eastern line of workings; the shaft is vertical for the first c.2-3m depth then appears to dip at c.45° to the E; there is remnant timbering in the shaft; has deposit below the shaft entrance at c.3-4m depth – may be floor/ledge or fill; unclear if the shaft is open or blocked; collar is c.1m below ground level on a small platform excavated into bedrock; occurs in a continuous line of mullock that also includes S8, S9 & S10	- well preserved	<ul style="list-style-type: none"> moderate (as part of the line of workings)
S 8 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no definite historical information; thought to be part of the Barnettts Vein (eastern line) workings which was developed between 1908-1910 (see <i>Trenching, Holes & Shafts</i> , above)	- a steeply inclined keyhole type entrance to a shaft or near surface stopping; dips to E (possibly an underlay shaft); entrance c. 4-5' high x c.4' wide; depth is unknown; in the eastern line of workings; remnant timbering; has 2 lengths highly corroded rail iron at entrance; occurs in a continuous line of mullock that also includes S7, S9 & S10	- moderately well preserved	<ul style="list-style-type: none"> moderate (as part of the line of workings)
S 9 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no definite historical information; thought to be part of the Barnettts Vein (eastern line) workings which was developed between 1908-1910 (see <i>Trenching, Holes & Shafts</i> , above)	- semi-rectangular shaft at collar (partly collapsed), c.5-6' x 4- 5' opening with vertical edges on the E side; shaft is filled and is now <3' deep; several corroded gci sheets are accumulated in the depression; occurs in a continuous line of mullock that also includes S7, S8 & S10	- moderately-poorly preserved (infilled)	<ul style="list-style-type: none"> moderate (as part of the line of workings)
S 10 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no definite historical information; thought to be part of the Barnettts Vein (eastern line) workings which was developed between 1908-1910 (see <i>Trenching, Holes & Shafts</i> , above)	- collapsed stope – small (c.12m diam) opening into shallow stopping; depth unknown; occurs at the N end of a continuous line of mullock that also includes S7, S8 & S9	<ul style="list-style-type: none"> not assessed as original nature unclear 	<ul style="list-style-type: none"> moderate-low (as part of the line of workings)
T 1 (Lower Workings)	1908-1912?	- no historical information; likely to be part of the initial exploration.	- c.2' wide trench (costean) cut back into hillslope from base of slope on creek flat edge; 5-10m N of F1	- well preserved; is revegetated	<ul style="list-style-type: none"> low
T 2 (Upper Workings)	1908-1912 &/or 1922 - 1930	- no historical information; appears to be a drain for S&, therefore likely to be of the same date.	- c.2' wide x c.1' deep angled trench cut around the SE and SW side of S7 (presumed to be a drain to stop water entering S7)	- appears well preserved; is revegetated	<ul style="list-style-type: none"> low

T 3 (Upper Workings)	1908-1912 ?	- no historical information; as it appears to be a costean on Barnetts Vein it is likely to be part of the initial exploration.	- c.2' wide x c.2-3' deep trench (costean) that runs downhill (c.280°?) across the eastern line of lode and possibly originally across the western line of lode (where S3 is now located); has a line (Low mound) of mullock down the N side	- appears well preserved; is revegetated	▪ low
T 4 (Upper Workings)	?	- no historical information; appears to be a drain for S3, therefore likely to be of the same date.	- c.2' wide x c.1-2' deep angled trench cut around the SE and S side of S3 (presumed to be a drain to stop water entering S7); possibly connects to T3 or post-dates it	- appears well preserved; is revegetating	▪ low
T 5 (Upper Workings)	c.1908	- no historical information; as it is associated with Kerslakes Shaft (S1) which was in existence by 1910, it is likely to be part of the initial exploration.	- a short length of c.2' wide trench (costean) that runs downhill almost to S1 (on the eastern line of lode) – probably the original costean that located the lode on which S1 was sunk	- appears well preserved; is revegetated	▪ low
F 1 Water Wheel (Lower Workings)	1936-1939?	- water wheel shown on E side of Barnetts Ck in lease 18M/47 (5ac) [held by Ledger in 1937-39) on the 1930 to 1960 lease plan (G. Dickens research); - the extant remains suggest the site may never have been completed and a waterwheel may never have been installed.	- excavation back into the hillslope on the S side of Barnetts Ck at point of diversion; cutting is c. 6m deep x 2 m wide and c.4m (12') high at the headwall; the headwall has a bench at the rear near the top - presumably the water ingress point (?the end of a water race (but no evidence of its continuation)) which has a length of water pipe lying on it (appears too small diameter to feed a wheel?); there is a ridge of packed rock (cobble size) at the creek edge (c.2.5m wide by 0.5-1m high) (presumably to keep water from flowing in to the waterwheel cavity from the creek?); the waterwheel cutting is partly infilled and there is some length of water pipe, including 1 vertical section – unclear if in situ or not?).	- moderately well preserved water wheel setting (no water wheel remains evident; some wall collapse and partly revegetated)	▪ high-moderate (although the waterwheel is not preserved, waterwheels are not common features on the Zeehan Field; a significant site element)
F 2 Tramway? (Lower Workings)	1936-1939?	- lease 18M/47W (5ac) being worked by Ledger (Montagu 116/17); the same plan shows a tramway running from the middle of the W side NE into the lease (G. Dickens research)	- line of faint benching noted from just N of the Water Wheel location (F1) and above F1, and climbing gently to the S (presumably to join the Pack Track), formation c.4-6'; in approximate position of the tramway shown on 1930s lease plan	- poorly preserved (faint, only a section located, and revegetated)	▪ moderate (as an unusual small mine feature and significant site element)
F3 (mound) (Lower Workings)	c.1908 – 1930	- no historical information; given its location it is likely to be associated with the working of Adit 1 (lower adit)	- low mound of rock and earth, c.1m x 1m x 0.5m high, that is grassed over, with the stump of a squared timber post just beyond the SW edge – interpreted as possible hut remains with chimney base/forge.	- original structure poorly preserved (charcoal on post stump suggests feature possibly destroyed by burning)	▪ <i>not assessed as feature not fully assessed</i>

<p>F 4 Open Drive ? (on Barnetts Vein) (Upper Workings)</p>	1908	<p>- possibly feature described as follows: . 1908-10 – ‘an open drive south put in for a chain from the track’, a pass from this drive connects with a lower tunnel [lower adit], some stoping has been done, and a little ore sent from here (Twelvetrees & Ward 1910, 139); . an open drive cut south for 20 yds from a track off the Corinna Track; connected with an adit 50' below (Blissett 1962, 215)</p>	<p>- a c.10.5m long x 1.5-2m high open cut area that starts as a c.2'8" wide trench on the S side of the track, widening to a 8'6" long x 3-4' wide opening at the S open end, with an apparent underground continuation of the 2'8" wide trench beyond for c.4-6'; cutting possibly contains entrance to stoping under fill on W side of wider area or blocked underground S end?; bearing of cut 184°; cut along the strike of the rock which dips E at c.80°.</p>	<p>- open area relatively well preserved, but underground workings (if they occur) are blocked off and the condition cannot be assessed)</p>	<ul style="list-style-type: none"> ▪ moderate-high (as a moderately well preserved, distinct early feature)
<p>Pack Track (Cattle Track) (near Upper Workings)</p>	c.1878	<p>- probably in use from 1878; a surveyed and cut route from at least 1883/4. - the Cattle Track was developed and used mainly for getting cattle to the mining fields south of the Pieman from the north, but also described as being used 'by packers' to take provisions and mail to Zeehan and the North Heemskirk Field, and as the main line of communication in the region because of its directness. - the route ran inland from the coast then headed east via Donnelly's Lookout to Zeehan (joining the later more inland Corinna Track). - the 1914 track is described as narrow, and it is noted that there has been little attempt to grade it, which is a problem in the eastern part (McConnell 2009, based on Waterhouse 1915 & Witham 1982).</p>	<p>- benched bulldozed track c.2.5m wide in area of Quigleys Mine and out to the Zeehan-Corinna Rd; no evidence of other tracks in the area, so presumed to follow the original route of the Cattle Track pack track; worn to bedrock in places, starting to revegetate.</p>	<ul style="list-style-type: none"> ▪ <i>not assessed</i> (bulldozed in section between Barnetts Creek and Corinna Road, but appears to have retained the original route 	<ul style="list-style-type: none"> ▪ <i>high historical significance at a local/regional level.</i> ▪ <i>possible regional and state level significance as part of the network of west coast mining tracks that were critical in developing the west coast mining fields.</i>

4.3 Cultural Significance

Quigleys Mine Site

Quigleys Mine is regarded as being of high local significance. This primarily derives from it being a very well preserved historic mining site with a variety of features that demonstrate mining techniques of the time (although with no equipment left on site) on the Zeehan Field. It also has some slightly unusual well preserved features such as two lines of partly open shallow underground workings and a complex well preserved set of finger dumps.

As such it has high integrity, high scientific significance, and is a good representative example of a small silver-lead-zinc mine of its period (ie, c.1900s-1940 and prior to greater post-WWII mechanisation). Its significance as a well preserved site is enhanced by the preservation of its essentially historical setting.

Quigleys Mine is not considered of high historical significance as it is one of many small mines of its period, and it is not known to have particular historical importance or associations. The mine may have local social significance as one of the mines of the Zeehan Field Mines, but this is not likely to be very high as it is not a well-known mine and, given its age, it is unlikely that there will be many local area residents who have connections with the mine.

Quigleys Mine is also considered to have some additional cultural significance as one of the four known silver-lead mines at the north end of the Zeehan Mineral Field (ie, Quigleys Mine, Big Ben Mine, Barnetts Mine & the Montana SL Mine), a cluster of mines at the south end of the Montana Flats, all of which are relatively well preserved, and which as a set demonstrate how mine layout can vary in response to geology and landscape in a single small area, and in the case of the Big Ben Mine, Quigleys Mine and Barnetts Mine, within the same, relatively short mining period. This associational significance only applies while the majority of these four mines remain largely undisturbed.

Individual Features of Quigleys Mine Site

The cultural heritage significance of individual features has also been assessed (refer Table 2). In some cases however feature assessment is an indicative assessment due to insufficient information.

In assessing the significance of individual features, the range of Burra Charter values are used, but the assessment has focussed on the importance of a feature as part of the full site in historical terms, how critical a component of the mine the feature was, and its present day scientific value (ie, ability to help interpret the mine's workings).

In the case of Quigleys Mine, there are no individual mine features of very high significance. The track that passes through the mine site (ie, the Pack Track/Cattle Track) however is potentially of very high historical significance as one of the two main early access routes to the Zeehan Mineral Field (and to the Heemskirk Tin Field), and potentially has high overall cultural significance.

All the mine features however have some significance as part of the mine because, with the site's excellent preservation, each feature assists in understanding the operation and history of the mine. Should part of the mine be significantly disturbed, then the majority of the features of lower (mainly low) significance are unlikely to retain any significance as individual features. All key features however are significant and warrant preservation if possible (ie, the Lower Adit (Adit 1) and associated mullock area containing the finger dump complex (and F3), the Water Wheel location (F1), Kerslakes Shaft (S1), shafts S2 & S3, and the complex of shafts, and open stope and associated mullock at the north end of the Upper Workings (area of S4 – S10). It should be noted that the area of wash (finer tailings) below S2 and the S4-S10 complex is not considered to have cultural significance.

4.4 Management Advice

The current assessment has been undertaken primarily to assist conserve the historic heritage values of the site in relation to essential mine rehabilitation work. The mine rehabilitation is aimed at environmental remediation (primarily of acid drainage), and also at human safety given the ease of access to the site and its high visibility. Comment is also made on the interpretive potential of the site.

Environmental Remediation

The site appears to be relatively stable. The two exceptions to this are the washing of the mullock in the Upper Workings (except for S1 & S3), presumably by surface water flow, and the erosion of the north end of the Lower Workings finger dump fan by Barnett Creek, presumably at times of high water. In relation to the finger dump fan, it is not clear as to whether this erosion is historical, or whether there is still active erosion during high flow periods.

Acid drainage at the mine site appears to be minimal.¹³ The only acid drainage noted during the survey is that from the Lower Adit (Adit 1) in the Lower Workings, with the acid water flowing into what is interpreted as a diversion channel, and presumably via this channel back into Barnett Creek proper. There is no evidence of acid mine drainage from the shafts, drives, trenches and open and collapsed stoping of Upper Workings. This is to be expected given the relatively high situation of these workings in the landscape and their apparently shallow nature. There may however be some acid leachate from the associated mullock.

Advice in relation to these specific issues is provided in the table below. This advice is generally aimed at avoiding impacts to the historic workings where possible given that Quigleys Mine has some historic heritage significance as a whole and given that historic heritage is a non-renewable resource.

FEATURE	ENVIRONMENTAL/SAFETY ISSUE	MITIGATION ADVICE FOR HERITAGE PROTECTION
Lower Adit (Adit 1)	- acid mine drainage which is flowing into a channel of Barnett Ck, and possibly via this into Barnett Ck	- if acid drainage needs remediation, then the seepage from the adit should be treated downstream in the N flowing section of the diversion channel (or further downstream) or adjacent, but avoiding impacting the mullock from the Lower Adit.
Lower Adit Mullock (with finger dump complex)	- there is possible acid drainage contamination of Barnett Ck in 2 forms from this mullock area – 1. addition of auriferous tailings to Barnett Ck by the erosion of the mullock (N end of finger dumps & channel across W side); 2. leachate from the mullock which is enclosed by channels of Barnett Ck on all sides	- as the finger dump complex is a rare well preserved feature this should not be modified (nor other key features such as F3), and alternative options should be considered such as rock armouring the eroded noses of the finger dumps (this could be done with limestone to help decrease water acidity) and/or diverting water from the channel which is eroding the dump; - in relation to possible leachates, if this is the case, then the preferred treatment is off the mullock (although the lower W area separated by a channel could be sacrificed); - as most of the leachates will be carried by the channels of Barnett Ck, from a heritage perspective modification of the channels of Barnett Ck (eg, to contain flow in the probable original (and main) western channel would be preferred to additional channelling in the area of historic features, or damming that might impact on the historic features. (Note – 1. the mullock deposit should not be used for earth for this; 2. The clearing is not thought to have particular cultural significance and does not need to be preserved, although there may be buried historical features in this area that should be reported if they occur)
Upper Workings (all) – mullock	- possible acid drainage from leachates through the mullock in this area , particularly below S2 and the S4-S10 complex where there is clear evidence of mullock washing and drainage lines	- if acid drainage needs remediation, then preferred mitigation approaches are those which avoid disturbing the in-situ mullock (eg, a contoured ditch and ridge with limestone to catch and neutralise wash and surface drainage, &/or a diversion drain above the area of workings)

¹³ Note – observations on drainage are dry weather observations.

It should also be noted that in undertaking environmental remediation (and safety) works, it is important to avoid disturbing the historical features of the mine, and the mine site generally, through adjunct activities such as getting the equipment used for remediation to the work sites, and through associated activities such as sampling and monitoring. To limit such impacts –

1. The use of equipment on historic features should be kept to a minimum.
2. Existing tracks and other recently disturbed areas should be used to the extent possible, and the bulldozing of new tracks should be avoided. Where equipment needs to go into untracked areas, then it is preferable to ‘walk’ the equipment in without creating new bulldozed tracks, or if tracks are essential, they should be kept to a minimum, avoid the historic features and new tracks should be rehabilitated after use if they will not be needed again. Less care is needed for the Pack Track/Cattle Track which has already been bulldozed (but the route should not be modified).
3. Sampling for remediation (and other sampling) should be kept to a minimum, to a minimum size and, where possible, avoid well preserved and significant features, and be filled in/rehabilitated afterwards.

Safety

There are no apparent safety issues in relation to the Lower Workings, although there is some potential for those exploring the area to fall into the water wheel area excavation from above. In the area of the Upper Workings, there appear to be no safety issues in relation to the open cut/drive (F4) and if this has connecting passages to lower underground workings these appear to be well blocked and hidden. The open shafts and stopes however do have some associated safety risks with the potential for people to fall into these open workings. The workings however are mostly relatively shallow (c.3-4m) and a number could be climbed out of.

If safety measures other than warning signs are deemed necessary, then from a heritage perspective, measures which still allow an appreciation of the Upper Workings and minimise the impact to the historic features is most desirable. The most obvious approach would be to fence off the key area of workings (ie, area of S4 – S10) and separately fence off S1, S2 and S3. If the area or separate areas are fenced, it is preferable for heritage conservation reasons to include the full mullock area inside the fences (to avoid disturbing these further).

Presentation & Interpretation

Quigleys Mine is considered to have moderately good potential for interpreting small early-mid 1900s, pre-major mechanisation mines of the Zeehan Field. The potential derives from 1. the site’s intactness and good preservation, 2. ready pedestrian, bicycle and 4WD access to the site via the Pack Track/Cattle Track which runs between the Upper and Lower Workings, and 3. the good visibility of, and access to, most of the sites features due to the terrain and the largely heathy and moorland vegetation. The site also has a pleasant, open, natural setting with good views to the north and to the Heemskirk Range.

The assessment suggests that Quigleys Mine is the second of the four assessed mines in the area most suited to interpretation after the Montana SL Mine which is the most complex and significant of the four mines and which is most easily accessible. Presentation of Quigleys Mine could be enhanced by presentation of Barnetts Mine, which is only a short distance to the south, for more independent and adventurous visitors (see Section 5.4).

If Quigleys Mine is promoted for historic mine tourism, then there are some issues that will need to be considered. These are briefly as follows –

1. The potential safety issues noted above will need to be assessed and addressed.
2. There will need to be provision of access and/or directional signing to and from the access track and the Upper and Lower Workings and the key features in each area.

3. Access should result in minimal disturbance of the site and its setting and should where possible be only a cut line in the vegetation or a line of posts in unmodified vegetation, and only where essential should it be a benched footpath (and in such cases it should be kept to a minimum width). The remnant track formation (F2) could be used, but should not be physically modified (and its continuation might need to be established). Consideration may also need to be given to some bridging over the channel between the Lower Adit and the mullock from the adit.
4. The access track which is a significant historical feature in its own right should also be interpreted.
5. Artefact collection from the Lower Workings mullock may be an issue. This is best addressed by moving significant minor (moveable) artefacts to a less visible location (and documenting this), and advising visitors that artefacts should not be collected for heritage and interpretation reasons.
6. Consideration should also be given to providing 'minimal impact' guidelines to visitors (at the site and/or generally). Such approaches tend to engender better visitor behaviour and consequently better site preservation.

5 BARNETTS MINE – DESCRIPTION, HERITAGE ASSESSMENT & MANAGEMENT ADVICE

Barnetts Mine is located on Barnett Creek approximately 2 km north of Zeehan and c. 200m south of Quigleys Mine on the bulldozed track that runs approximately E-W from the Zeehan-Corinna Road (and is the route of the historic Cattle Track).

This historic mine is understood to have operated from c.1890 through to c.1951, although operations were intermittent over this period and mining appears to have only occurred for a small number of years in total over this period (possibly only c.12-14 years). The main period of mining was 1908 to 1915, with additional mining being carried out in c.1890, 1933 to 1935, and 1947 to 1950.

The mine is located just beyond the south end of the Montana Flats in an area of low hills. It is situated in the valley of Barnett Creek in a north flowing section and at (and below) the junction of a minor, unnamed eastern tributary creek. The higher terrain is buttongrass moorland, but the creek valley and lower valley slopes have a eucalypt forest-woodland with heathy – shrubby understorey or a mixed forest type vegetation with open understorey where undisturbed.

Barnetts Mine has essentially the same geology as the Montana SL Mine and other two smaller mines described in this report (ie, Big Ben and Quigleys Mines). The local geology is undifferentiated Precambrian rocks comprising mainly quartzites, siltstones and shales, and there are nearby overlying Permian tillites and associated glaciogene rocks (Geological Survey of Tasmania 1994). Twelvetrees & Ward (1910, 138) note that the local bedrock is a ‘light sandstone’ that strikes approximately west and dips north. The mine appears to be on the same line of lode as the Big Ben Mine and Quigleys Mine (named variously the Big Ben Lode or Barnetts Lode) (Blissett 1962, 215).

5.1 History

The area of Barnetts Mine is the area of the first lease taken up in the northern part of the Zeehan Mineral Field Area. This lease was taken up in 1888 by a J. Adams (Blissett 1962, 214), based on some galena being found in the locality when the creek was being prospected for gold (Twelvetrees & Ward (1910, 137). The mining lease was acquired by the Colorado Mining Association in 1890, but abandoned in the same year. In this year or in the period up to 1898, when there is understood to have been some further prospecting carried out, it is possible that an initial adit was driven – as Twelvetrees & Ward (1910, 137) note that in this early period a “start was made to drive on a small vein”.

In 1898 a mining lease over the northern part of the mine area was taken up by the North Oonah Mining Company who sank a shaft ‘near the south bank of Barnett Creek’ (Blissett 1962, 214). This appears to be the start of the main period of working of Barnetts Mine. It is unclear how long the North Oonah Mining Company worked the mine, but in 1908, a new lease was taken out by C.H. Barnett and the mine appears to be more or less continuously operated until 1915, although Barnett died sometime between 1913 and 1915, after which the Zeehan-Montana Company took over operations, but only until 1915.

The key mine features that are extant today appear to have been developed in this period of mining, ie, c.1898 – 1910. Over this period the mine operation appears to have included sinking Shaft 1, development or continuation of the main Adit (Adit 1?) producing £120 of ore only 60’ in, and development of a second adit (Adit 2?) which is driven to 200’ (Blissett 1962, Twelvetrees & Ward 1910). In the period 1898 to 1915, the ore was not processed on site. Instead it was “packed a mile to the

Western Tramway (Granville Tramway) (presumably via the pack Track/Cattle Track to the north of the mine), and then trammed 2 miles to the Montana Mine¹⁴ (Twelvetrees and Ward 1910, 138).

By 1910 the open cut was in existence (Twelvetrees & Ward 1910, 138) and near surface ore had also been found some 700' further south (ie, approximate location of Adit 2 and Shaft 2). The southern exposure of ore was located 5' below the surface through trenching (and was termed optimistically or ironically the 'Big Blow') (Twelvetrees & Ward 1910, MRT UR 1926/217-221, Blisset 1962).

Twelvetrees & Ward (1910) however note that the lode is problematic as it is crossed by a dyke of 'granite porphyry' and is faulted. This report suggests that there was some working of this ore by 1910 (most likely via Adit 2).

By 1915 the mine ore body was found to be small – “not more than 30 feet long and 10 feet high” – and consisting of quartz, pyrite and galena with some siderite (Blisset 1962, 214; Twelvetrees & Ward 1910, 138). The ore body is also described as 'very narrow' and “not wider than three feet at any point” (MRT UR 1926/217-221, 218).

Mining appears to have ceased around 1915 for some years, with only sporadic prospecting (including by T. Brown, G. Clarke and A. Cornish). It is not known when mining re-started, but in 1933 to 1935 the mine is being worked on tribute by C.H. Bell and S.G. Bell. The Bells sank a shallow shaft in this period, which is most likely the shaft on the hill to the southwest (Shaft 2) on the Big Blow.

It is unclear if the mine is worked continuously or intermittently from 1935, but a new mining lease is taken out in 1945 by W.E. Higgins and again in 1947 by R.S. Laffer (Blissett 1962 and G. Dickens research (mining plans)). Laffer is understood to have carried out some development work on the 'No. 2 drive' (Adit 2) and No.1 Adit, but to have found little ore (Blisset 1962).

It appears that Laffer's mining lease expired in 1951, and no further mining or mine development occurred after the expiration of the lease. No later exploration work is known of except for the geophysical surveys conducted by BMR over the broader area in 1954, and which were focussed on the Montana SL Mine (Blissett 1962).

There are no comprehensive production figures for Barnetts Mine. The production figures given by Blisset (1962, 215) indicate that production was limited to a small number of years of this period (1910, 33, 34, 35 & 49), and give a total production from the mine of 118.9 tons (60.4 tons lead, 7,231.8 oz silver). This however appears not to be the total production, as active mining and ore production is known to have occurred in other years (eg, 1908-1915) (Blisset 1962, 214). The mine however was only ever a small enterprise.

The initial association of Barnett with the mine is unknown. The lease information, Twelvetrees a& Ward (1910) and Blisset (1962) suggest that it was as late as 1908, and started with the start of the main period of operation of the mine, but MRT UR 1926/217-221 suggests it was Barnett who made the first mineral find in the area. This is considered most likely given that the creek is named after him.¹⁵

5.2 Physical Description

Barnetts Mine is located along a relatively straight, N-S running section of Barnett Ck. The north end of the mine is located at the junction with a tributary flowing in from the east, and the south end of the mine is located in the creek valley and on the ridge crest to the west approximately 150-180m to the south. The total mine area can be regarded as c.200m (NE-SW) by c.120m (NW-SE), straddling Barnett Creek and in the form of discrete mining features.

¹⁴ *Ie, the Montana No1 or No.2 Mines near Zeehan, not the Montana SL Mine.*

¹⁵ *An association begun only in 1908 after several others have held leases over the mine is considered less likely to result in the creek being named after Barnett.*

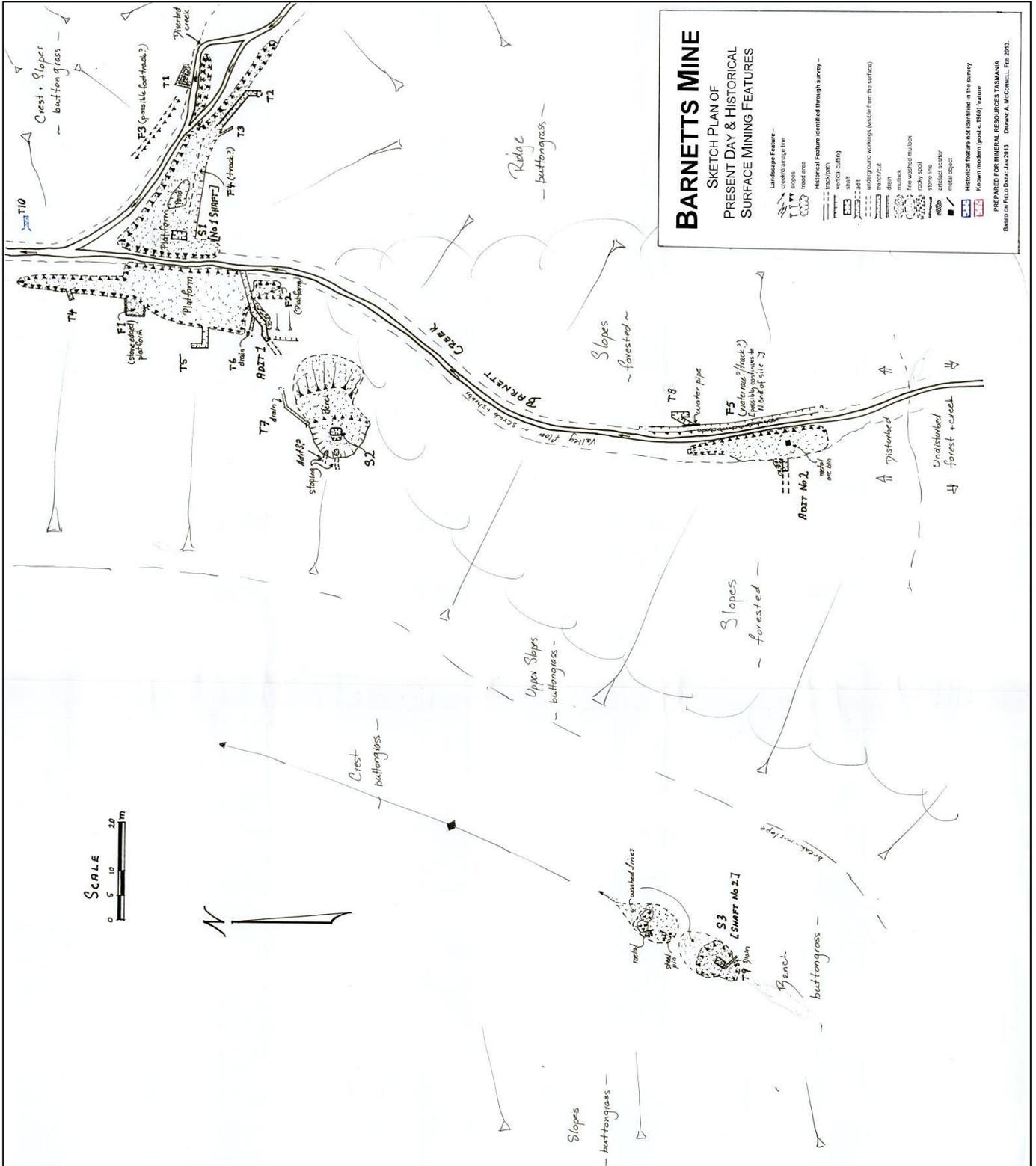
The northern part of the mine, which is the earliest, consists of a triangular area of mullock, the No. 1 Shaft and associated trenches which sit inside the junction of Barnett Creek and the eastern tributary, and an elongate area of mullock associated with the No. 1 Adit opposite along the west bank, Adit 1 to the southwest of the mullock, and the Open Cut and associated talus slope approximately 20m further to the southwest and some 12m vertically above the valley floor on the lower part of the western slopes of Barnett Creek valley.

In the area of the No. 1 Shaft (S1), which is located in the centre of a flat mullock bench, there is a water filled depression to the east and a level track formation (F4) leads east for some 20-25m to the eastern tributary where there are two finger dumps into the tributary (and which have disturbed the drainage in this area) and a large trench (similar to an adit entrance) (T2) and a small costean type trench (T3) into the west hillslope. The south edge of the mullock platform (and track) is cut into the hillslope. A 1947 survey plan indicates that the eastern tributary was diverted north and east by means of a large trench. This is not evident today, but is presumed to be the current channel which has been modified over time by creek flow. On the east bank there is a right angled trench (T1) with associated quartz rubble just above the valley floor, and a narrow, weakly benched formation (F3) that is possibly the historic access track north to the Cattle Track that runs through Quigleys Mine. All the features are relatively well preserved, but there is some revegetation of the mullock and dry cuttings and dense shrub regrowth in the wet depressions and creek. The No.1 Shaft and associated features are early features dating to 1898 or 1908-1910.

On the opposite (west) side of Barnett Creek is a c.50m long extent of mullock, presumably derived from the No. 1 Adit (Adit 1). This is a low undulating area with a long, well preserved finger dump running off the north end. The No.1 Adit entrance runs west at the south end of the mullock and is driven into the western valley slope. This adit is unusual for its long twisting entrance and the presence of packed excavated rock on parts of both edges of the entrance. Also in this area are two low, flat, rectangular hut size areas (F1 & 2), one of which is partly buried by the mullock; a small number of trenches (T4-6), one of which is also partly buried by mullock; drains and a cutting into the slope leading south away from the portal of the No.2 Adit. All the features appear well preserved, but there is some revegetation of the disturbed ground, in particular depressions such as the adit entrance and along the creek bank. This area is likely to be the earliest area of working with the adit possibly initiated in 1890, but with the main mining of the adit undertaken in the 1908-1915 period.

There is a large area of cutting into bedrock and spoil above and slightly south of the No. 1 Adit area. This is referred to historically as the 'Open Cut'. The area of the Open Cut is c.22m long (downslope) by c.15m wide. The Open Cut consists of an upper area that has been cut back into the slope into bedrock for some 8m, a 6m wide bench below it and a talus slope of very coarse mullock (cobble size) from the cut below that. The upper area is cut back in a curved headwall which has two openings, one of which is stoped and one of which appears to be the remains of an adit (Adit 3?). There is a shaft (S2) in the centre of the floor of the quarried area which appears to be an entrance into stoping. The Open Cut and associated features are all well preserved, but there is some light revegetation of the cut floor and bench below. This open cut appears to have been largely developed between 1908 and 1910, but the shaft (stoping) appears to have been sunk in 1933-35.

The southern part of the mine is not visible from the northern part. The No. 2 Adit (Adit 2), which is also located in the valley floor on the west side of Barnett Creek, is approximately 120m upstream. The valley is very narrow in this area, with only a c.5-7m wide flat on the west side. The No.2 Adit has been cut back into the hillslope from the west edge of this flat, and the mullock has been deposited across this flat, for 10m to the south of the adit and for c.12-15m to the north, with a short finger dump leading of the north end. On the opposite side of the creek running along the bank and c.1-1.5m above the creek is a c.4' wide cut bench (F5). This was followed for c.35m and can be seen to have stone edging and stone packing in places. It is unclear what this feature is but it is most likely the access track from the north end of the mine, and may alternatively, or also, have been used to pipe water to the north end of the



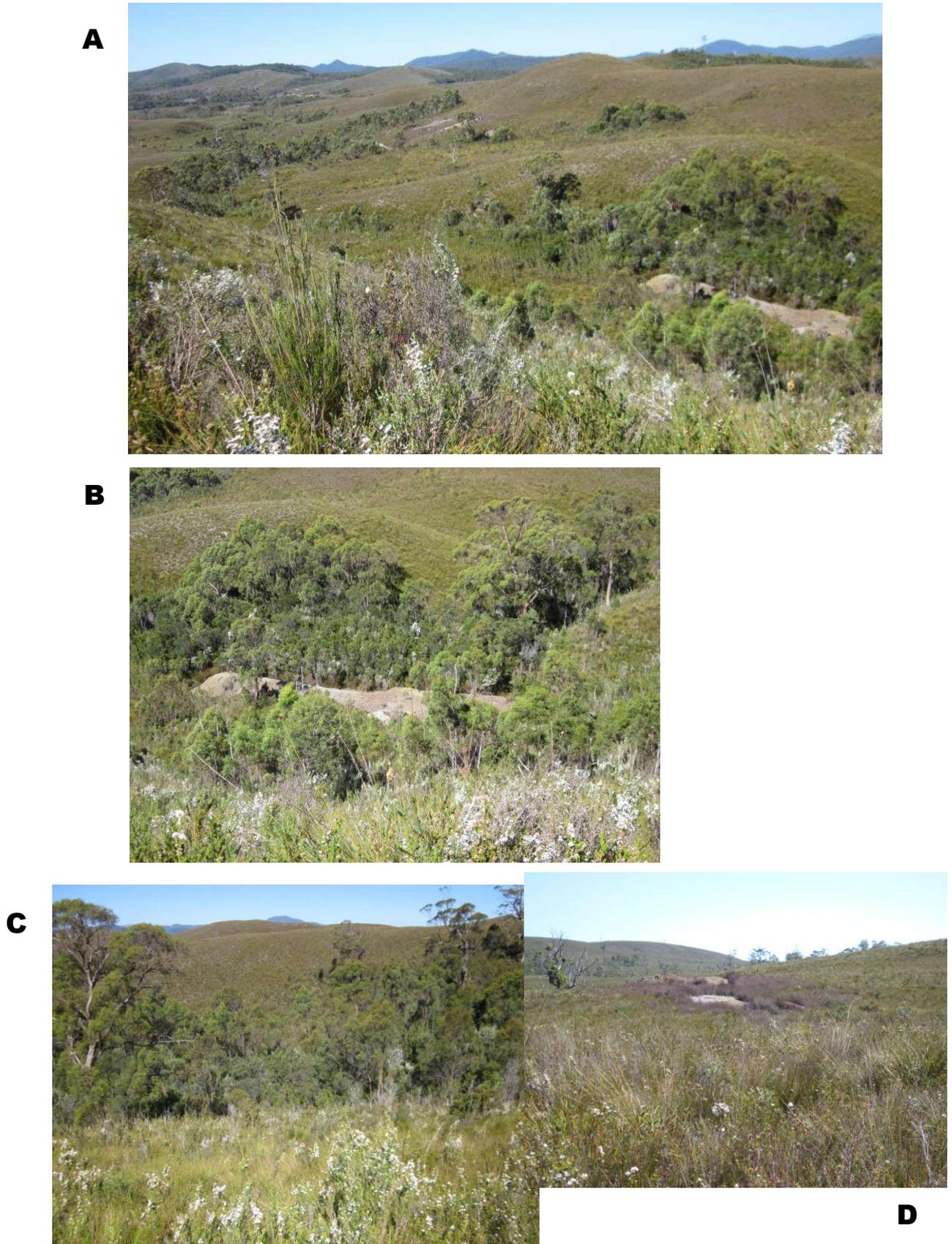


Figure 10 General views of Barnetts Mine, Jan 2013: A – view northeast from ridge above Open Cut with mullock from Adit 1 below on edge of Barnett Ck (RHS) and Quigleys Mine in the distance (centre); B – view down onto the northern workings from the ridge to the west – visible mullock relates to Adit 1, with Barnett Ck beyond and the eastern tributary coming in from the upper RHS; C – view from ridge crest east into the Barnett Ck valley and location of Adit 2; and D – view south along ridge crest west of Barnett Ck to area the of S3 (No.2 Shaft).

Table 3 Age, history, physical description, condition and significance of the identified historical features of Barnett's Mine.
(Note – significance shown in *italics* is indicative significance only)

FEATURE	DATE CONST ^N	HISTORY	DESCRIPTION	CONDITION	SIGNIFICANCE
S1 No. 1 Shaft (main shaft ?)	1898	<ul style="list-style-type: none"> - the North Oonah Mining Co. sink a shaft near the south bank of Barnett's Creek in 1898; operates to 1899 (Blisset 1962, 214); - a 'cut drain' shown on a 1947 lease survey plan (Montagu 116/2) indicating that the eastern tributary was diverted N of its original junction (in the area of S1); - shown as 'No. 1 Shaft' on the 1950 17M/45 lease plan (MRT) 	<ul style="list-style-type: none"> - S 1 is an approximately rectangular and vertical shaft of c.6' x 5' that is set into a flat area that has been excavated back into the hillslope on the S side of the junction of Barnett Ck and an eastern tributary; - the junction appears to have been modified (pushed N) by the dumping of mullock from the shaft (the historical information indicates that the tributary was diverted via a 'cut drain'); the mullock now forms a flat triangular bench that is c.15m N-S x 30m E-W with two, possibly 3 finger dumps off the E end into, and disturbing, the drainage of the tributary creek – 1 finger dump runs SE (124°) along the edge of the hillslope and is c.15-20m long, and the other runs E (70°) across the tributary valley and is c.15m long; - also associated is F4, a track or tramway for dumping mullock, and a depression in the central part of the flat mullock platform in the area between the two creeks. 	<ul style="list-style-type: none"> - shaft is in moderate-poor condition – collar is not well preserved,; appears to be largely filled in (likely to be flooded to creek level), and there is vegetation growing out of it; - mullock is in good condition – features are very well preserved; has some light vegetation regrowth 	<ul style="list-style-type: none"> ▪ high (very early feature, with partial preservation)
S2 (shaft in Open Cut)	(post 1910?)	see Open Cut			
S3 No. 2 Shaft	1947-51	<ul style="list-style-type: none"> - by 1926, a 5' deep trench 700' SW and 100' higher than the No. 1 Adit has been opened and ore exposed(MRT UR 1926/217-221); assumed to be the long 'cut trench' at the S end of the lease on the ridge above the slopes on the W side of Barnett's Ck shown on a 1947 lease survey plan (Montagu 116/2); the 1947 plan does not show a shaft in the area; - shown as 'No. 2 Shaft' on the 1950 17M/45 lease plan (MRT) 	<ul style="list-style-type: none"> - approximately vertical, irregular to rectangular, 6' x 5' shaft; depth not evident; shape suggests it is largely stoped from near surface; some shaft timbering remains in situ (both horizontal and vertical members); - situated on a bench/ gentle ridge crest above a steep slope of, and c.110m from, Barnett Ck; the shaft is surrounded on all sides by a low mullock mound of total diameter c.8m; the surrounding mullock has washed to the N (along ridge crest) for c.4.5m; c.2m N of this is another c.8m diameter area of low, slightly mounded mullock with another area of washed mullock extending c.5m N; the N area of mullock has a small right angled flat floored excavated area and some upright steel pins adjacent 	<ul style="list-style-type: none"> - shaft is in moderate-good condition – collar is not well preserved but the shaft appears relatively well preserved, dry and has some remnant timbering; - mullock is in good-moderate condition – features are well preserved, but there has been some erosion by rainfall; has some light vegetation regrowth; also equipment has been removed 	<ul style="list-style-type: none"> ▪ moderate-high (later but well preserved feature)

			<p>suggesting that this area was used to crush ore and these features indicate the location of the crushing equipment;</p> <p>- no evidence of the pre-1925 trench in the area</p>		
Adit 1 No 1 Drive	c.1890	<p>- in 1890 a start is made on a drive 'on a small vein' (which predates Barnett's lease) (Twelvetrees & Ward 1910);</p> <p>- by 1910 Barnett has put in a drive of 60', with direction noted as SSW (200°) (Twelvetrees & Ward 1910) [it is unclear if this is in Shaft 1 or is Adit 1, but comment in MRT UR 1926/217-221 confirms this drive to be an adit – probably the development of the 1890 drive];</p> <p>- by 1910 the SSW drive is driven another 20', but the ore is lost, and consequently a rise and a winze is excavated and there is some stoping (Twelvetrees & Ward 1910);*</p> <p>- by 1910 a vertical shaft is also sunk 37' from the level below the rise 'to the open cut' where 'solid pyrite' is encountered (Twelvetrees & Ward 1910, 138) {this is presumably the same 37' shaft as mentioned in Blisset (1962, 214)};*</p> <p>- in 1949-50 Laffer extends the adit 36' (Blisset 1962, 215).</p> <p>- shown as 'No. 1 Drive' on the 1950 17M/45 lease plan (MRT)</p> <p>* - it is unclear if this work is at Adit 1 or some other location; it is attributed here to Adit as it doesn't appear to fit with the histories of use of other features, but it may relate instead to S1 (No. 1 Shaft).</p> <p># - there is also some confusion about the date the rise and winze were excavated – Twelvetrees & Ward (1910) report this work in 1910, but Blisset (1962) reports it as being during the period in which the Zeehan-Montana Co. operated the mine, ie, 1913-1915.</p>	<p>- this adit has along entrance c.3' wide which starts on the W edge of Barnett Ck, runs approximately W into the hillslope in a relatively straight line for c.8m, then bends S, then N then S over the next c.7m to the portal; there are a couple of upright timbers still in-situ at the portal and there is some in-situ angular rock stacked in a low wall on the N side of the entrance on the adit floor;</p> <p>- the adit is driven at 240°; the adit appears to be open for at least 10m+; there is rock rubble on the floor at c.10m which may block the adit, and in front to the portal water is pooled (depth not determined) which is seeping out the entrance; water may be slightly acidic given orangey colour;</p> <p>- the mullock from the adit is presumed to be the mullock heap immediately to the N along the W side of Barnett Ck; the main area of mullock is c.25m long (N-S) x c.12m wide (E-W) and is low and undulating with several isolated low mounds on, and has a single finger dump running N c.20m from the N end of the main area of mullock (at 0°); the mullock appears to have partly buried two trenches (T4 & 5) and one low earth platform (F1); there is a light scatter of artefacts – primarily fragmented timber and iron, and including 1 riffle plate;</p> <p>- associated with the adit is a low cut along the hillslope running S from the portal, a band of stacked angular stone down part of the S side of the entrance (presumably from the adit) with some mullock above the stone, and a narrow trench which intersects the entrance on its N side where it first bends (T6)</p>	<p>- the adit is in moderate-good condition – entrance well preserved with some timbers and stone walling; and the adit is intact for some distance inside the portal; some vegetation growing in the entrance;</p> <p>- mullock is in good condition – features are very well preserved; some light, patchy vegetation regrowth;</p> <p>- the adit floor is flooded with orangey water which is seeping out – possible acid drainage issue</p>	<p>▪ high (early feature, with good preservation; also slightly unusual in form and associated features)</p>

<p>Adit 2 No 2 Adit</p>	<p>1913 -></p>	<p>- by 1913 'a short adit, noted as the 'No.2 drive', is driven (with ore encountered 18' below the outcrop) (Blisset 1962, 214); - by 1913-15 – the No. 2 drive is driven to 200', with ore bodies intersected at 30' and 176' and driven for short distances (Blisset 1962, 215); - by 1926 it is noted that the 'section of vein in the No. 2 shaft has been 'explored at adit level' and has not proved to be of value) (MRT UR 1926/217-221); - in the period 1949-1951 development work is carried out by Laffer (on the northern drive of the ore body located at 176' (on the No.2 drive), but little ore found (Blisset 1962, 214); - shown as 'No. 2 Drive' on the 1950 17M/45 lease plan (MRT)</p>	<p>- this adit is located c.6m W of Barnett Creek on the W edge of the valley floor just above the break in slope; - the entrance is short (c.2-3m) and 5' wide and on a bearing of 250°; the portal headwall (floor to surface) is c.2.25m high and the adit opening is 1.4m high at the portal; there is mullock above the N edge of the entrance; the adit appears to be open but has a flooded floor; the water is likely to be acidic given the orangey colour; - at the front of the adit entrance and extending to within 1-0.5m of Barnett Ck is a platform (flat area) of mullock; this is 5m wide and extends c.28m along the creek (N-S); the platform is c.5m wide x c.22.5m long with a short (c.5.5m long) finger dump extending off the N end and running parallel to the creek; - the only artefactual material noted in the area is metal bin (ore bucket?) c.2' x 2'9" square at the opening.</p>	<p>- the adit is in moderate-good condition – entrance relatively well preserved and the adit is intact for some distance inside the portal; some vegetation growing in the entrance; - mullock is in good condition – features are very well preserved; has moderate shrubby vegetation regrowth; - the adit floor is flooded with orangey water which is seeping out – possible acid drainage issue</p>	<ul style="list-style-type: none"> ▪ high-moderate (key element of site, not early, but relatively well preserved)
<p>Adit 3</p>	<p><1926 (prob <1910)</p>	<p>- an 'upper adit' (30' above the No 1 Adit) which 'did not reveal profitable ore' is mentioned by MRT UR 1926/217-221.</p>	<p>- the description suggests that this adit was in the area of the Open Cut (see below); - considered to be evident as a tunnelled drive bearing W from the Open Cut; has clearly had the entrance, portal and near surface end destroyed by the open cut workings; only c. another 5m length of the drive remains</p>	<ul style="list-style-type: none"> ▪ <i>remnant only – largely destroyed by historic mining</i> 	<ul style="list-style-type: none"> ▪ <i>moderate</i>
<p>Open Cut</p>	<p>by 1910</p>	<p>- Twelvetrees & Ward (1910, 138) comment on a shaft being sunk from "the level below the rise to the open cut"; - a shallow shaft is sunk by C.H. Bell and S.G. Bell (1933-35) (Blisset 1962, 214) – probably the shaft with underground stoping (S2) shown in the Open Cut area on the 1950 mine lease plan for lease 17M/45 [S 1 is much earlier and S3 appears to be later (c.1947-51)]; - shown as 'Open cut' on the 1950 17M/45 lease plan (MRT); shown as a triangular area with scree apron to NE [relationship is not quite as per present day evidence]; the shaft in the open cut is shown as stoping (to the E)</p>	<p>- a concave area c.11m wide by 8m deep cut back into the hillslope into bedrock above and c.20m SW of the portal of Adit 1; the floor of the cut is approximately level and there is a central vertical shaft in the floor (S2) and two lines of stoping back into the cut to the W (one is possibly the remains of an adit (Adit 3)); from the NE edge there is a small trench (drain) which runs downslope to the NE (T7); below this main cut is another slightly lower bench c.10m N-S and 5m wide; and below this (ie, E) is a massive talus slope of mullock from the open cut which extends c.10m+ downslope to within c. 15m of Barnett Ck; - S 2 is a large (c.6' x 8') irregular to rectangular opening; the shaft is vertical but appears to open out c.1m below the surface (stoped?); the present floor of</p>	<p>- the open cut appears to be in good condition – appears to be undisturbed post-mining, and features are well preserved; has moderate – light shrubby vegetation regrowth in the open cut and on bench below and minimal vegetation on the scree slope; - S2 is relatively well preserved with some remnant timbering</p>	<ul style="list-style-type: none"> ▪ high (well preserved, and unusual feature for a mine of its type)

			the shaft is only c. 3-4m indicating that the shaft/stoping is largely infilled/blocked; the shaft has remnant timbers (horizontal)		
trenches & pits	c.1913	- numerous trenches and pits dug in the general area by the government (Blisset 1962, 214) – it is unclear if any are cut in the area of Barnett's Mine	all identified trenches are described in T1 – T9 below	-	-
cut drains	pre 1947	- two features are shown on a 1947 lease survey plan (Montagu 116/2) – <ul style="list-style-type: none"> ▪ a cut drain diverting the eastern tributary of Barnett Ck slightly E and N; and; ▪ an approx N trending 'cut trench' on the flatter ridge crest W of, & above, Barnett Ck in the area of S3; 	- refer S1 description - refer S3 description	-	-
T 1 (Shaft 1 area E)	?	no historical information	- approx right angled trench on N side of tributary of Barnett Ck just above the junction; the trench is 1' 8" wide; and the south arm trends at 121° and is c.3.5m long, and the west arm at 195°; the area between the two arms is filled/surfaced with cobble size quartz blocks	- good condition – well preserved form; shrubby vegetation regrowth	▪ moderate-low
T 2 (Shaft 1 area E)	?	no historical information	- large trench with adit like entrance and short tunnel on S side of tributary of Barnett Ck above the junction and near E end of mullock; the entrance runs very obliquely to the hillslope at c.95°, then turns and is cut for a short distance at a deeper angle into the slope (at 175°)	- good-moderate condition – moderately well preserved form (appears to be some inwashing of mullock from the E edge; some shrubby vegetation regrowth	▪ moderate-low
T 3 (Shaft 1 area E)	?	no historical information	- small trench (9' long x c.2' wide) near the W end of T2, and cut diagonally into the hillslope (at 95°)	- good-moderate condition – well preserved form; shrubby vegetation regrowth	▪ low
T 4 (Adit 1 area N)	? c.1888-1908	no historical information	- a small trench cut from the edge of the W creek flats of Barnett Ck W into the slope for a short distance (at 251°); appears to be overlain by Adit 1 mullock implying it is an early (1888-1908) prospecting trench	- good-moderate condition – well preserved form; shrubby vegetation regrowth	▪ low-moderate
T 5	? c.1888-1908	no historical information	- a moderate sized right angled trench cut from the edge of the W creek flats of Barnett Ck W into the slope for a short distance; appears to be overlain by Adit 1 mullock implying it is an early (1888-1908) prospecting trench	- good-moderate condition – well preserved form; shrubby vegetation regrowth	▪ low-moderate

T 6	? c.1890-1910	no historical information	- a small shallow trench (probable drain) cut W off the N side of the entrance to Adit 1; possibly connects with T7; location implies that it is the same age as Adit 1	- good-moderate condition – well preserved form; has vegetation regrowth in trench	▪ low
T 7	? c.1898-1910	no historical information	- a small shallow trench running NE off the NE edge of the Open Cut cutting (& bench); probable drain; possibly connects with T6; location implies that it is the same age as the Open Cut	- good-moderate condition – well preserved form; has vegetation regrowth in trench	▪ low
T 8	?	no historical information	- short wide (c.3'+) trench with acute angle bend (30° then 90°) cut into the hillslope on the E bank of Barnett Ck just N of Adit 2	- good condition – well preserved form; shrubby vegetation regrowth	▪ low-moderate
T 9	?1933-35	no historical information	- a small shallow trench running SE off the SW corner of S3 across the mullock; probable drain; location implies that it is the same age as S3	- good condition – relatively well preserved form; no vegetation regrowth	▪ low
T 10	? c.1888-1908	- a short costean type trench is shown as being cut into the E slope of Barnetts Ck above the junction with the eastern tributary and c.40m N of Shaft 1 on a 1950 Lease 17M/45 plan; location and nature of trench suggests it is an early (1888-1908) prospecting trench	<ul style="list-style-type: none"> • <i>not relocated (area not examined)</i> 	▪ <i>not relocated</i>	▪ <i>low</i>
F 1 Platform	?	no historical information (<i>location indicates that it pre-dates the Adit 1 mullock which implies it relates to the very early mining (ie, c.1898 - 1910)</i>)	- low, flat stone (cobble sized rock) edged earth platform; c.4m x 2.5m; on flat valley floor area; partly buried by mullock (W side) from Adit 1; - probable hut or machinery/working platform	- good condition – well preserved form; no vegetation regrowth	▪ moderate-high (well preserved, and relatively rare type feature)
F 2 Platform	?	no historical information (<i>location indicates that it pre-dates or relates to the main phase of the use of Adit 1 which implies it relates to the period c.1898 - 1915</i>)	- low, flat earth platform; c.5m x 2m; just back from W bank of Barnett Ck on flat valley floor area; on S edge of, and possibly partly disturbed by, the entrance to Adit 1; there are some fragments of sawn timber and 1 piece of rusted gci sheet in the area of the platform; - probable hut or machinery/working platform	- good condition – well preserved form; no vegetation regrowth	▪ moderate-high (well preserved, and relatively rare type feature)
F 3 pack track to Cattle Track?	?	no historical information (<i>location indicates that it relates to working of S1 which implies it relates to the earliest period of mining – ie, 1898 - 1899</i>)	- faint line of benching c.3' wide climbing from the valley on the E side of the junction of Barnett Ck and its eastern tributary, NW around the hill above Barnett Ck; - probable foot and pack/bridle track from the mine to the Cattle Track	- moderate - poor condition – faint line of benching, difficult to follow	▪ <i>moderate (key feature but poorly preserved)</i>

F 4 Track?	?	no historical information	<p>- c.6' wide flat packed line on S side of mullock and cut into the hillslope on the s side with a cut c.1m high; runs from near S1 east to the 2 finger dumps at the east end of the mullock;</p> <p>- interpreted as the track or tramway formation for dumping mullock from S1</p>	<p>- good condition – well preserved form; only very light vegetation regrowth</p>	<ul style="list-style-type: none"> ▪ moderate (well preserved, but not key feature of mine)
F 5 track / pipeline formation	?	no historical information	<p>- 4' wide benched formation running up the E side of Barnett Ck from opposite Adit 2 towards Adit 1 and Shaft 1; length surveyed is c.30m, but is presumed to go all the way to the N end of the workings (ie, to approx. Adit 1); the formation sits c.1m above the creek bed and in places the outer edge has been built up from creek stone (cobble) and in places there is a stone line on the outer edge;</p> <p>- location and form suggests it was a pack track between the N and S ends of the mine, but at T8 there is a length of water pipe (iron, 3' diameter) across the entrance which suggests the formation may have been constructed to carry water pipe;</p> <p>- the nature of the benching and packed rock edging suggests it was constructed during an earlier phase of mining (1890s – 1915) rather than a later phase.</p>	<p>- moderate-good condition for section surveyed – relatively well preserved form and construction features; moderate-heavy shrubby vegetation regrowth</p>	<ul style="list-style-type: none"> ▪ <i>high (relatively well preserved, and unusual feature for a mine of its type)</i>

mine. There is also a wide trench (T8) cut into the east bank hillslope from the benched formation opposite the north end of the No. 2 Adit mullock. All the features in the area of the No. 2 Adit are well preserved, but there is some light-moderate revegetation of the mullock surface and denser revegetation in disturbed depressions, including the adit entrance. There is also a clear boundary in the surrounding vegetation between dense shrubby regrowth with eucalypts in the disturbed (previously cleared) area and mixed forest with open understorey in the undisturbed area c.20m further upstream. The No. 2 Adit appears to have been put in some time between 1910 and 1913 and it assumed that all the features in this area are of this period or relate to later historic mining.

The No. 2 Shaft (S3) is located directly above the No. 2 Adit, but approximately 100m to the west up on a broad ridge crest that is more of a bench in the area of the shaft. This higher area is one of buttongrass moorland in which the mullock from the No. 2 Shaft is highly visible. The workings here consist of two mounds of mullock, both irregular to rounded and c.8m diameter. The shaft is located in the centre of the southernmost mound with the collar slightly lower than the mullock. The northern mound is low and undulating has a shallow two-sided, flat floored depression of c.2m square with a vertical steel pin embedded in the mullock just off the SE corner (possibly the location of crushing equipment). Both mullock heaps appear to have had material washed off the north side (downslope direction of crest), each with an apron of finer material sitting below the mullock on the north edge of the mound. These features are all well preserved, and there is relatively little revegetation of the mullock (possibly due to the drier environment and later age (c.1947 to 1951) of this area of workings. There was no evidence of the long N-S trench shown on a 1947 plan, but possibly cut by 1926.

The mine has relatively little artefactual material. The only diagnostic artefacts are an ore bucket which is on the mullock just south of the No. 2 Adit and a riffle plate located on the mullock associated with the No. 1 Adit. The only other artefactual material noted was a light scatter of fragments of sawn timber and some gci sheet fragments on the mullock associated with the No. 1 Adit.

Distinctive features of the mine site are the lack of post-mining disturbance, the generally good preservation of the historic features, and the range of features, including the open cut and what appear to be hut platforms.

5.3 Cultural Significance

Barnetts Mine Site

Barnetts Mine is assessed as being of high local significance. This primarily derives from it being a relatively long lived (although intermittently worked) mine, a very well preserved historic mining site having had no post-mining disturbance, and the variety of features that demonstrate mining techniques of the time (although no equipment has been left on site) in relation to the Zeehan Field. The mine site has high integrity, high scientific significance, historical significance, and is a good representative example of a small silver-lead-zinc mine of its period (ie, c.1900s-1940 and prior to greater post-WWII mechanisation). Its significance as a well preserved site is enhanced by the preservation of its essentially historical setting.

The scientific significance derives from the age range of the features, their good preservation, and the presence of some slightly unusual, well preserved features, primarily the open cut and associated features and the connecting pack tracks.

The historical significance of the site derives from it being the site of the first mineral find in the north part of the Zeehan Field and its unusually long lived history in relation to this field for such a small mine, even if intermittently worked. Although a small mine, it was operated from the earlier part to the later part of the history of the Zeehan Field. If mining did commence in 1890 as suggested, then it is the oldest mine, or one of the oldest mines, in the north part of the Zeehan Field, predating the Montana SL Mine by one to four years. The fact that the local creek is named after C.H. Barnett who is understood to

have made the first mineral find in the area in 1888, which is comparatively early for this field (only six years after the first mineral find on the Zeehan Field), also contributes to the historical significance of Barnetts Mine.

Barnetts Mine may have local social significance as one of the mines of the Zeehan Field Mines, but this is not likely to be very high as it is not a well-known mine and, given its age, it is unlikely that there will be many local area residents who have a connection with the mine.

Barnett's Mine site is also considered to have some additional cultural significance as one of the four known silver-lead mines at the north end of the Zeehan Mineral Field (ie, Quigleys Mine, Big Ben Mine, Barnetts Mine & the Montana SL Mine), a cluster of mines at the south end of the Montana Flats, all of which are relatively well preserved, and which as a set demonstrate how mine layout can vary in response to geology and landscape in a single small area. This associational significance only applies while the majority of these four mines, in particular the three smaller mines, remain largely undisturbed.

Individual Features of Barnetts Mine Site

The cultural heritage significance of individual features has also been assessed (refer Table 3). In some cases however feature assessment is an indicative assessment due to insufficient information.

In assessing the significance of individual features, the range of Burra Charter values are used, but the assessment has focussed on the importance of that feature as a part of the full site in historical terms, how critical a component of the mine the feature was, and its present day scientific value (ie, ability to help interpret the mine's workings).

In the case of Barnetts Mine, there are no individual features of very high significance. All the mine features however have some significance as part of the mine because, with the site's excellent preservation, each feature assists in understanding the operation and history of the mine. Should part of the mine be significantly disturbed, then the majority of the features of lower (mainly low) significance are unlikely to retain significance as individual features.

All key features are significant and warrant preservation if possible. These features are the No. 1 Shaft (S1) and associated mullock, the creekside track (F4); the No. 1 Adit (Adit 1) and associated mullock and platforms (F1 & 2); the Open Cut and associated talus/mullock and shaft (S2); the No. 2 Adit (Adit 2) and associated mullock; and the No. 2 Shaft (S3) and associated mullock. It should be noted however that the area of washed tailings associated with S3 are not considered to have cultural significance.

A number of features – F1 (early stone edged hut platform), F2 (hut platform), F4 (benched track) and T1 (trenching with associated quartz rubble) – are relatively rare at such mine sites and are relatively well preserved, hence considered to be of at least moderate significance. These should also be preserved if possible.

5.4 Management Advice

The current assessment has been undertaken primarily to assist conserve the historic heritage values of the sites in relation to essential mine rehabilitation work. The mine rehabilitation is aimed at environmental remediation (primarily of acid drainage), and also at human safety given the relative ease of access to the site and its high visibility. Comment is also made on the interpretive potential of the site.

Environmental Remediation

The site appears to be relatively stable, including in the valley floor, where there is minimal evidence of erosion of the mullock by the creek. The only evidence of surface erosion at the site is the apron of finer washed material on the north edge of the two mullock heaps associated with the No. 2 Shaft (S3).

Acid drainage at the mine site appears to be minimal.¹⁶ The only probable acid drainage noted during the survey is seepage from the No. 1 Adit (Adit 1) and the No. 2 Adit (Adit 2) into Barnett Creek. The flow appears very slow, and is not as strongly coloured as the seepage at the Montana SL Mine. There may also be some acid leachate from the associated mullock, but no evidence for this was noted during the survey.

Advice in relation to these specific issues is given in the table below. This advice is generally aimed at avoiding impacts to the historic workings where possible, given that Barnetts Mine has some historic heritage significance as a whole and given that historic heritage is a non-renewable resource.

FEATURE	ENVIRONMENTAL/SAFETY ISSUE	MITIGATION ADVICE FOR HERITAGE PROTECTION
No. 1 Adit (Adit 1)	- probable slightly acid seepage from the adit along the entrance floor (& subsurface?), probably into Barnett Ck during periods of higher flow	- if acid drainage needs remediation, then the seepage from the adit should continue to be contained in the entrance trench, and mitigation works should occur at the end of the trench adjacent to Barnett Ck, and create as little physical disturbance of historic features as possible
No. 2 Adit (Adit 2)	- probable slightly acid seepage from the adit along the entrance floor (& subsurface?), then N and S around the W edge of the mullock and ultimately into Barnett Ck	- if acid drainage needs remediation, then the seepage from the adit should continue to be contained in the entrance trench, then diverted via a cut channel south between the base of the hillslope and the W edge of the mullock (& taking care not to disturb the mullock) and treated off the mullock on the natural valley flat surface
No. 2 Shaft (S3)	- some probable erosion of mullock from the two small mullock heaps; the mullock heaps are a considerable distance from watercourses and the material appears to be redeposited within c.6m of the mullock, implying a low environmental impact	- if acid drainage needs remediation, then preferred mitigation approaches are those which avoid disturbing the in-situ mullock and do not create substantive new features in the landscape.

It should also be noted that in undertaking environmental remediation (and safety) works, it is important to avoid disturbing the historical features of the mine, and the mine site generally, through adjunct activities such as getting the equipment used for remediation to the work sites, and through associated activities such as sampling and monitoring. To limit such impacts –

4. The use of equipment on historic features should be kept to a minimum.
5. Existing tracks and other recently disturbed areas should be used to the extent possible, and the bulldozing of new tracks should be avoided. Where equipment needs to go into untracked areas, then it is preferable to ‘walk’ the equipment in without creating new bulldozed tracks, or if tracks are essential, they should be kept to a minimum, avoid the historic features and new tracks should be rehabilitated after use if they will not be needed again.
6. Sampling for remediation (and other sampling) should be kept to a minimum, to a minimum size and, where possible, avoid well preserved and significant features, and be covered in afterwards.

Getting mechanical equipment into the No. 2 Adit area should only be undertaken if absolutely essential as the area is difficult to access and work in, and it will be difficult to avoid significant disturbance to the historic features if heavy equipment is used in the area (mechanical wheelbarrows may not be an issue).

Safety

The only apparent safety issues in relation to Barnetts Mine are the various vertical and near vertical openings and the adits.

Both the No.1 and No. 2 Adits are open near the portal and may be open for some distance. This needs checking. If the adits are open and considered a safety risk, then given the good preservation of the site,

¹⁶ Note – observations on drainage are dry weather observations.

the preferred approach to blocking the adits is gating or blocking them with fill (but not taken from the historic features).

The depth of the three shafts and open stoping in the Open Cut was also difficult to determine from the survey. The No.1 Shaft (S1) appears to be shallow and is likely to be filled with water to within c.1-2m of the mullock surface. The shaft in the open cut (S2) appears to be shallow, but there is vertical drop of at least 3m to the base. It is unclear how deep the open stoping in the cut headwall is. The depth of the No.2 Shaft (S3) was not determined, but it is near vertical and would be difficult to climb out of. Given the shafts and open stoping are small, discrete openings, the simplest and preferred method of closing these shafts, if required, is to cage or fence them. These approaches would have the least impact on the heritage and should be able to be carried out without having to use heavy machinery on the site. Also, all openings (other possibly than S1) have in-shaft features that would be destroyed by infilling the shafts, nor would they be visible if the shafts were to be capped or infilled.

Presentation & Interpretation

Barnetts Mine is considered to have moderately good potential for interpreting a small silver lead mine of the Zeehan Field, pre-major mechanisation. This potential derives primarily from the site's intactness and good preservation, but is also derived from the variety of features which can be interpreted, the discrete and easily interpretable nature of the key features of the site, and the aesthetic setting of the mine. Also, good views to the north (and to Quigleys Mine) can be obtained from the higher parts of the site and other surrounding hills. The mine however is some distance from an existing track and will require walking through c.200-250m of buttongrass moorland south from the Pack Track (Cattle Track) from approximately Quigleys Mine.

Given the above, Quigleys Mine is seen as having greater priority for presentation after the Montana SL Mine, with Barnetts Mine more suited to more independent visitation, if it is considered safe, or can be promoted safely. As noted in relation to Quigleys Mine (Section 4.5), Barnetts Mine is most suited to being an adjunct presentation to that mine, with the co-presentation of the two mines enhancing the experience for the more independent visitors.

Given the cost and disturbance associated with putting in access tracks, if Barnetts Mine is promoted for visitors, then it should be done without putting in access tracks and promoted as a harder level walk. Directional posts along the best route in and between key features could be considered if visitors getting lost is considered an issue. This type of infrastructure should have minimal impact on the site and can be easily removed if not wanted.

In summary, if Barnetts Mine is promoted for historic mine tourism, issues that will need to be considered include –

1. The potential safety issues noted above will need to be assessed and addressed.
2. Provision of route marking (but not track cutting) from the Pack Track (Cattle Track) to the mine site and between key features.
3. Provision of explanatory notes (and a map) for the site.
4. Consideration should be given to providing 'minimal impact' guidelines to visitors (at the site and/or generally). Such approaches tend to engender better visitor behaviour and consequently better site preservation.

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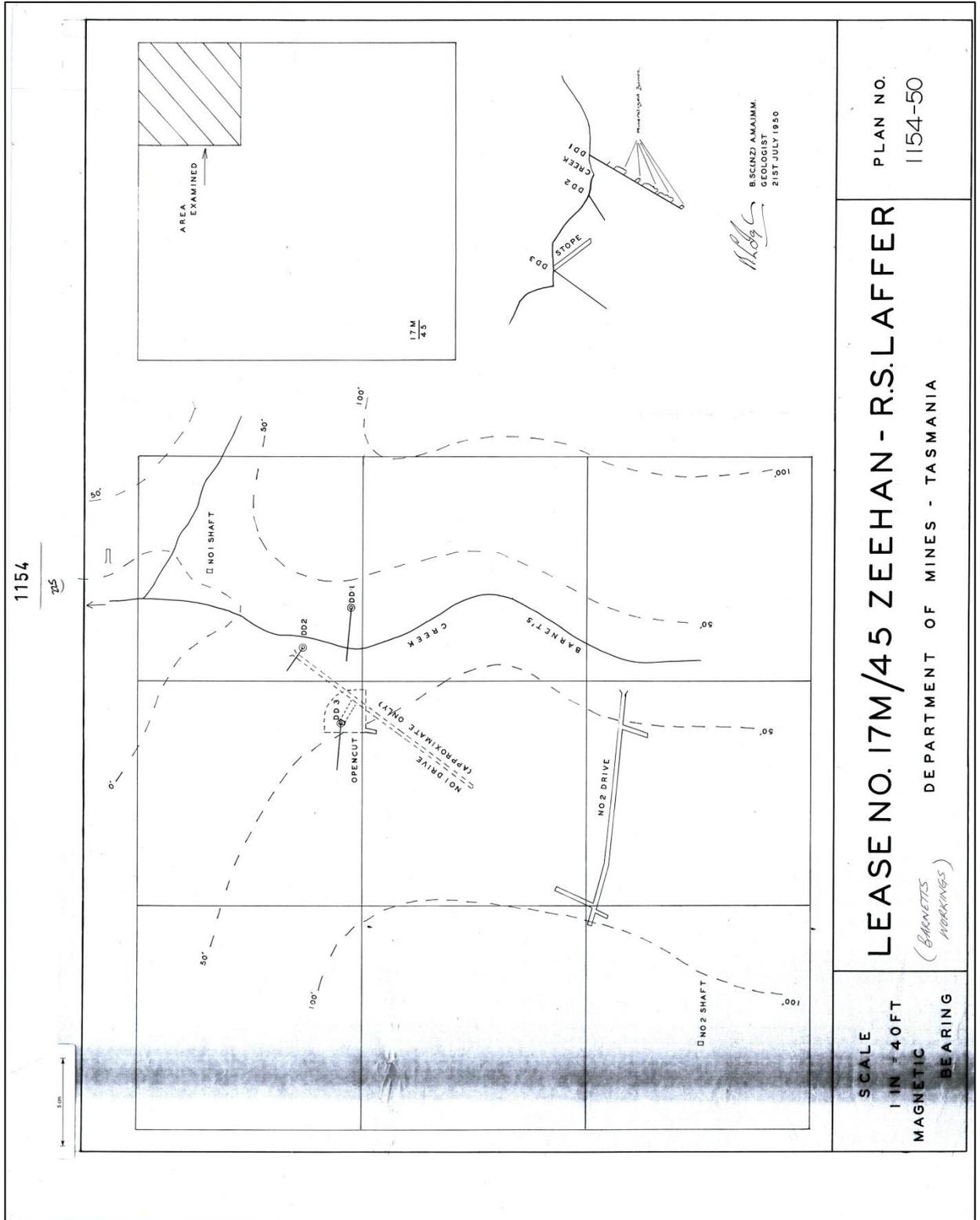
Glossary

associations	—	the special connections that exist between people and a place (and which may include social or spiritual values and cultural responsibilities for a place) (<i>Burra Charter</i> , 1999, 3).
authenticity	—	the ability of a place (or object) to provide knowledge and understanding of original and subsequent characteristics of the place from all sources of information (including meanings) (<i>Nara Document on Authenticity</i> , cited in Lennon 2002).
community	—	the public in general or in some cases (generally qualified) a particular group of people that have interests in common (<i>TWWHA Management Plan</i> 1999, 206). Two types of 'community' are generally recognised: 1. the <i>local community</i> – which is the community of a specific geographic locality; and 2. a <i>defined community</i> (or community of interest) – which is a community defined by its shared interest (eg, culture, beliefs, ethnicity, activity or experience) (Terry 2002)
compatible (use)	—	respects the cultural significance of a place (a compatible use involves no, or minimal impact on cultural significance) (<i>Burra Charter</i> , 1999, 2).
conservation	—	all the processes of looking after a place so as to retain its cultural and natural significance (<i>Burra Charter</i> , 1999, 2) (<i>Australian Natural Heritage Charter</i> 1996, 8)
conservation management plan	—	a document which details how to look after the values of a place which has natural and/or cultural significance.
cultural significance	—	aesthetic, historic, scientific, social or spiritual value for past, present or future generations; and which is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects (<i>Burra Charter</i> , 1999, 2)
fabric	—	all the physical material of a place, including components, fixtures, contents and objects (<i>Burra Charter</i> , 1999, 2).
heritage	—	a <i>value</i> that derives from the past (ie, is inherited or transmitted from the past), and may include cultural practices and traditions.
historic heritage	—	a <i>value</i> that is inherited or transmitted from the non-Aboriginal past; may include cultural practices and traditions.
integrity (cultural)	—	the extent to which the layered historic evidence, meanings and relationships between elements remains intact and can be interpreted (and in relation to cultural landscapes it is also the integrity of the relationship with nature that matters, not the integrity of nature itself) (Lennon 2002, 56).
maintenance (cultural)	—	continuous protective care of the fabric and setting of a place (to be distinguished from repair) (<i>Burra Charter</i> , 1999, 2) or its values.
meanings	—	that which a place signifies, indicates, evokes or expresses (and which generally relate to intangible aspects such as symbolic qualities and memories) (<i>Burra Charter</i> , 1999, 3).

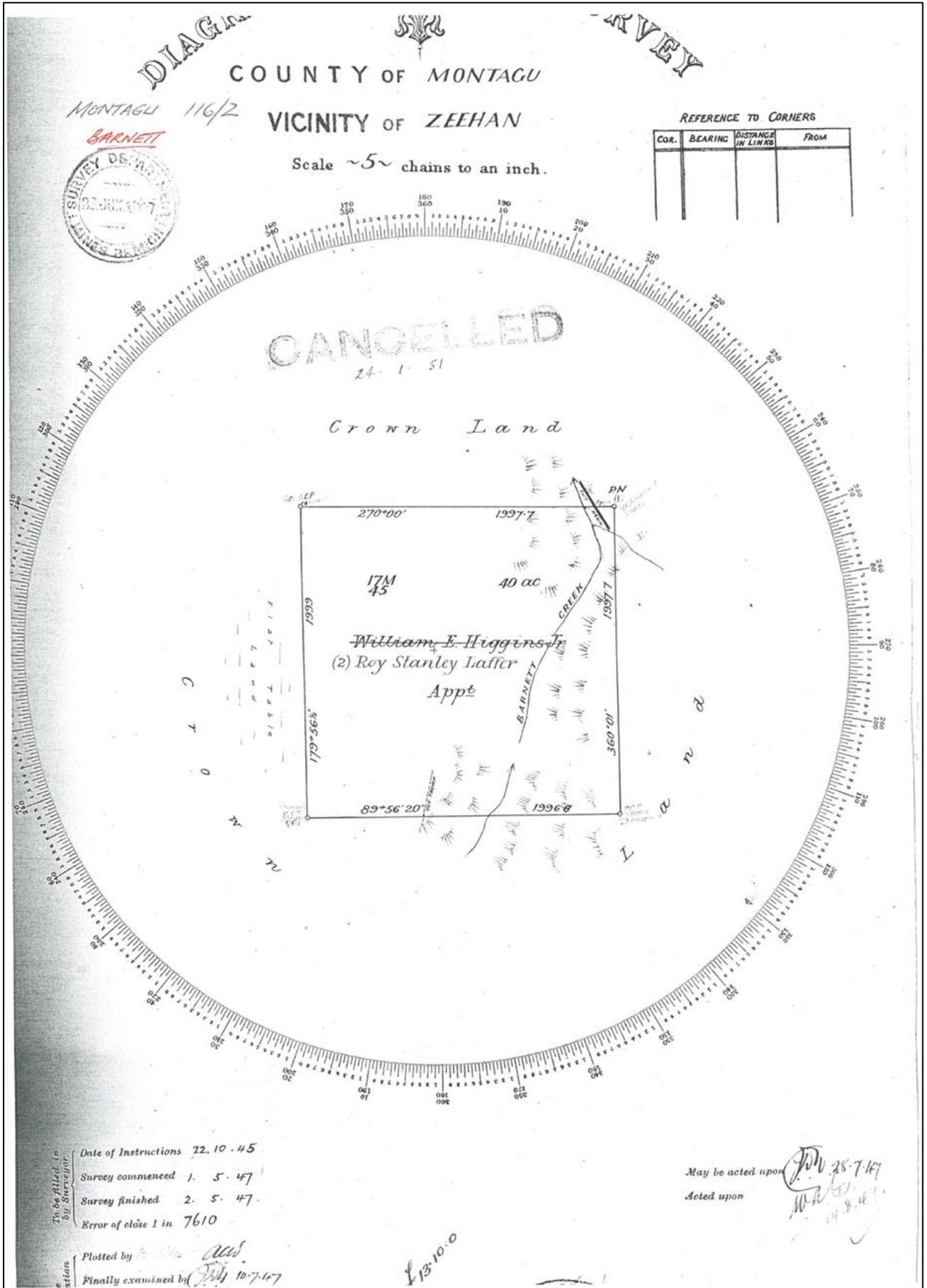
monitoring	—	ongoing review, evaluation and assessment to detect changes in condition, with reference to a baseline condition.
preservation (cultural)	—	maintaining the fabric of a place in its existing state and retarding deterioration (<i>Burra Charter</i> , 1999, 2).
protect	—	to keep safe from danger or degradation.
reconstruction	—	returning a place to a known earlier state (and is distinguished from restoration by the introduction of new material into the fabric) (<i>Burra Charter</i> , 1999, 2)
related place/object	—	place/object that contributes to the cultural significance of a place/object but is not at the same place (<i>Burra Charter</i> , 1999, 3).
repair (cultural)	—	return of fabric or values to closer to its original state; involves restoration or reconstruction.
restoration (cultural)	—	returning the existing fabric of a place to a known earlier state by removing accretions or reassembling existing components without the introduction of new material (<i>Burra Charter</i> , 1999, 2).
significance (general)	—	quality of having value (may be intrinsic value or attributed value).
value	—	physical or non-physical attribute of a place that has value or is valued at any level.

Appendix 1

HISTORICAL MAPS & PLANS



Barnett's Mine - 1910 lease plan [source – Mineral Resources Tasmania]



Barnetts Mine - 1947 survey plan [source – Mineral Resources Tasmania]

Appendix 2

HISTORICAL TIMELINES (FOR EACH MINE SITE)

BIG BEN MINE		
DATE	HISTORICAL INFORMATION	KEY EVENTS
1922	Discovery of the Big Ben lode; an outcome of Tasmanian Government prospecting in area (Blissett 1962, 212)	discovery
1922	An ore body was discovered in the Big Ben Mine area prospectors by G. Clarke and L.C. Blacklow (on Section 8912M (20ac)) (MRT UR 1926/217-221; Blissett 1962, 213). MRT UR 1929/32-34 notes that Clark and Blacklow 'carried out the first portion of the developmental work' and 'further developmental and mining work' was undertaken by the later West Coast silver Lead Co., but that after this company ceased operations the mine was transferred back to Clarke and L.C. Blacklow.	
1922-1926	By 1926 – . underlay shaft sunk in ore body, 50' deep and on dip of 50°; and a drive cut drive from 50' level for 66' to NE (29°) where a ore vein located; the vein has been stoped to the surface over 43'; also S drive from shaft for 18' (interrupted by faulting) ((MRT UR 1926/217-221 (lease 8912M)); (also - Prior to 1929 workings included a vertical shaft through tillite to 38' (also noted, but to 37', in UR 1929/32-34), an underlay shaft to 47' (also noted, but to 37', in UR 1929/32-34) with a NNE drive of 200'(Blissett 1962, 213) (also noted, but to 37', in UR 1929/32-34); 1926 - Mining started by the West Coast Silver Lead Co. who put down an underlay shaft (47' deep) and drive (Blissett 1962, 213). . ore body also exposed in the Hanlon Adit ((MRT UR 1926/217-221, (lease 8912M)); . 2 trenches (60' and 70' long) N of Hanlon Adit also expose the ore body (MRT UR 1926/217-221, (lease 8912M)). . on lease 8909M (southern part of mine and including the Big Ben Ck) by 1926 there has been considerable trenching but no ore extraction (trenches are noted 'on the south bank of Big Ben Creek near its point of confluence with Barnetts Ck – 1 trench) and 'on the hill ridge at the northern boundary of the lease – several) (MRT UR 1926/217-221)	start of mining
1926	Mining ceased due to low metal prices; the property is passed back to Clarke and Blacklow (Blissett 1962, 213).	
1928	The government offers assistance to extend the mine ('deepen a vertical shaft from 38' to 100') but this was not taken up (Blissett 1962, 213).	
1929	In 1929 access is described as being by the Granville Tramway (2' gauge) then a short connecting track to the mine (MRT UR 1929/32-34); as well as the main shaft and underlay shaft, Hanlon's Adit is also described in 1929 – driven WNW for c.100' with short N and S drives on the lode (MRT UR 1929/32-34)	
c.1929	a winze is sunk from the 47' level of the underlay shaft to c.7' below the 47' level and out a distance of c.17' (MRT UR 1929/32-34); 37 tons of ore are extracted from this winze 'before the mine closed down' (Blissett 1962, 213). In 1929 the owners (Clarke & Blacklow) intend to sink the main shaft to 100' and drive crosscuts to the lodes (c.25' and 50'); financial assistance is being sought from the government under the Aid to Mining Act (MRT UR 1929/32-34).	

DATE	HISTORICAL INFORMATION	KEY EVENTS
1929	Lease 10884M (5ac) taken out by J.A. Duff in October 1929 (G. Dickens research)	
1931	The mining lease is relinquished (Blissett 1962, 213).	end of mining?
1934(-1954)	Lease 10884M (5ac) taken out again by J.A. Duff and appears to be held until 1937 when it is transferred to M.K. Robertson (G. Dickens research)	
1935-36	A prospecting party (4 men) cut over 1,000 ft of trenches west of the Montana SL Mine (Blissett 1962, 212).	end of mining?
1937-39	Lease 11922M (35 + 40ac) taken out by A.A. Summerhayes (Aug 1937 – May 1939) (G. Dickens research)	
1946 -1947	A 75ac lease (28M/46)is taken out by J.A. Duff (this appears to be the consolidated lease of A.A. Summerhayes taken out in 1937-39) (G. Dickens research)	
1947 -1957	The 75ac lease (28M/46)is taken out by J.A. Duff in 1946 is transferred to M.K. Robertson who holds this lease (as well as a 5ac lease taken up in 1954) until Jan 1957 (G. Dickens research)	
1950 (1948?)	Prospecting by the EZ Co. – drilling of three unsuccessful diamond drill holes at the Big Ben lode – ML 17M/45 (over 500' to a depth of 200'), but failed to locate any ore (Blissett 1962, 213; MRT 89-3014, 593012).	
1954	BMR conducted geophysical surveys (SP, EM, ground magnetics and limited Pb geochemistry) for the Montana SL Mine in the area. (Blissett 1962; MRT 89-3014, 593012).	
1954-1957	Lease 10884M (5ac) transferred from J.A. Duff to M.K. Robertson; then held until Jan 1957) (G. Dickens research)	

QUIGLEYS MINE		
DATE	HISTORICAL INFORMATION	KEY EVENTS
1908	1908 - Galena was discovered on the side of a track passing through the property by H. Quigley; the lode was subsequently opened up by him in two short adits and a long trench (MRT UR 1926/217-221)	discovery
1908-1910	Lease 3797M (40ac) taken up by A.D. Sligo (Blissett 1962, 215)	mining starts (1 st phase mining – 1908-1912)
1908-1910	Workings included – 1908 – “A lode was worked by Messers. H. Quigley & Party in 1908 and stoped to the surface in one section. Some years afterwards some ground caved away near the surface and revealed another lode carrying splendid values behind it. Much richer than the one previously worked” (MRT 1936 (Dec) report, 57) 1908-1910- lower adit of c.60’ cut through black slate to the ore body which was driven for another 40’ stoped (Blissett 1962, 215) [probably the creek level N adit?] 1908-1910 - an open drive cut south for 20 yds from a track off the Corinna Track (Quigleys workings) (Twelvetrees & Ward 1910; Blissett 1962, 215); 1908-1910 - cutting down into a lode c.50’ N of Kerslakes shaft (& on Sligo’s lease) where the lode is quartz & pyrite (Twelvetrees & Ward 1910, 139). By 1910 Quigleys workings also include ‘Wells tunnel’ – on Crown land north of Section 3797M (on 8209M, 20ac) – a low tunnel driven SE for 120’ (Twelvetrees & Ward 1910, 140).	
1909	Kerslakes shaft, the southernmost opening at this time (c.22yds from S boundary of lease), is sunk to 15’ onto the lode (the lode here is pyrite-galena and vertical with a slight W underlay); sunk on Sligo’s lease (Twelvetrees & Ward 1910, 139)	
1910-1912	The lease (5194M, 40ac) is taken up by H.E. Quigley (Dec 1910 – Dec 1912) (G. Dickens research)	
1922-1930	Workings included in lease 8896M (40ac) and T. Brown and G. Clarke (Blissett 1962, 215); who hold the lease until November 1930 (G. Dickens research) Earlier, “Quigley drove alongside the richest shoot of ore which was discovered by T. Brown and G. Clarke: (MRT UR 1926/217-221, 218) By 1926 the workings on the lease are noted as including – . N end – 120’ length of stoping to 25’ depth; a 40’ shaft at the N end of the N shoot; 100’ of holes and trenches and a 20’ shaft on the S shoot (explores Barnetts’ Vein); . an adit ‘on the N side of the track a few feet above creek level’ which also explores Barnetts Vein [& possibly an extension of the 1908-10 creek level adit]; has a SE crosscut which intersected the vein at 112’ & where ore was taken from stopes 30’ in length; also a drive of 25 to the N and a 150’ long drive to S (no ore); second lode (vein) 50’ west of Barnetts Vein with a 40’ length of open stoping and a ‘hollow shaft’ [?](MRT UR 1926/217-221, 218) . In 1962 workings are noted as including – . shallow workings on a western vein . Quigleys old adit [lower adit?] drive southwards (poor results) (Blissett 1962, 215)	(2 nd phase mining – 1922-1930)
1930-1960	Water wheel shown on E side of Barnetts Ck in lease 18M/47 (5ac) [held by Ledger in 1937-39) on the 1930 to 1960 lease plan (G. Dickens research).	

DATE	HISTORICAL INFORMATION	KEY EVENTS
1936	1936 - noted that at 'G.H. Bell & Party's Mines, Government Tribute, Section 8896M, some good ore is showing in a winze that was being sunk at the time of our visit. They are now engaged in putting in plant to allow them to sink on it and open up other known ore going underfoot by cross cutting" [unclear what shaft/adit is being worked] (MRT 1936 (Dec) report, 57).	(3rd phase mining – 1908-1912)
1937-1939	Lease 11904M (71ac) held by J.H.C. Reid (Blissett 1962, 215).	
c.1937-1939	W. Ledger is working a 5ac lease (18M/47) within J.H.C. Reid's 71 ac lease (G. Dickens research); Lease survey plan ((Montagu 116/17) shows the lease boundaries are pegged by stones &/or iron pipe; Barnetts Creek in the NW corner, a tramway running from the middle of the W side NE into the lease, and the main pack track running through the middle of the site (G. Dickens research)	
1954	BMR conducted geophysical surveys (SP, EM, ground magnetics and limited Pb geochemistry) for the Montana SL Mine in the area. Follow up work by Montana SL Mine indicated that the anomalies were mainly due to graphite, with only minor Pb mineralisation (Blissett 1962; MRT 89-3014, 593012).	later exploration

BARNETTS MINE		
DATE	HISTORICAL INFORMATION	KEY EVENTS
1888	first lease taken up (also in the district) by J. Adams (931-97M (50 ac) (Blisset 1962, 214) Twelvetrees & Ward (1910, 137) suggest first mineral find was "a little galena ... when washing the creek gravel for gold"; MRT UR1926/217-221 suggests it was Barnett who located their source	first mineral find / first lease in district
1890	Lease acquired by Colorado Silver Mining Co; abandoned in the same year (Blisset 1962, 214); possibly at this time was the 'start made to drive on a small vein' [Adit 1?] (Twelvetrees & Ward 1910, 137)	start to mining?
1890-1897	lease pegged and prospecting but few details (Blisset 1962, 214)	
1898- 1899	Section 2448-93M (13ac) of the lease was taken over by the North Oonah Mining Co.; a shaft sunk near south bank of Barnetts Creek (Blisset 1962, 214)	initial mining
1908-1913/15	Lease 3835M (52ac) taken up by C.H. Barnett; £120 of ore taken from a SSW drive of 60' [presumed to be a new adit, not the main shaft?] (Blisset 1962, 214; MRT UR 1926/217=221); Twelvetrees & Ward (1910, 137) note that Barnett 'drove 60 feet' and found £120 ore. Barnett dies after 1908 (Blisset 1962, 214), presumably between 1913 and 1915 as he takes out a new mining lease on the area (6738M, 52ac) in Dec 1913 which becomes void in April 1915 (G. Dickens research).	
1913	Considerable government prospecting with numerous trenches and pits dug; also a short adit cut (with ore encountered 18' below the outcrop) (Blisset 1962, 214)	
1913-1915	After Barnett dies operations are carried on by the company, but production slowing as ore body found to be small (Blisset 1962, 214); after Barnett's death the Zeehan-Montana Company took up the operations, "but with disappointing results", it being found to be a small lens of ore; By 1910 a vertical shaft is sunk 37' from the level below the rise where 'solid pyrite' is encountered? [main shaft?] (Twelvetrees & Ward 1910, 138); post 1910 (1913-15?) probable period of working of the No. 2 drive which is driven to 200' (with ore bodies intersected at 30' and 176') (Blisset 1962, 215).	end of initial main period of mining
?	prospecting by T. Brown, G. Clarke and A. Cornish (Blisset 1962, 214)	
<1926	in 1926, a point where ore is revealed at the surface 700' SW and 100' higher (see also Twelvetrees & Ward 1910) [area of the No.2 Shaft?], known as the 'Big Blow' has been opened and the ore exposed in a 5' deep trench; local bedrock is sandstone (MRT UR 1926/217-221)	
1929-1930	Lease 10001M (40ac) held by J.A. Duff, but unclear if any mining (Blisset 1962, 214).	
1933-35	Duff's lease worked on tribute by C.H. Bell and S.G. Bell; shallow shaft sunk with financial assistance from the government (Blisset 1962, 214)	additional mining
1945	Lease 17M-45 (40 ac) taken up by W.E. Higgins (Blisset 1962, 214; G. Dickens research)	
1947	Lease 17M-45 (40 ac) is taken up by R.S. Laffer (G. Dickens research, plan Montagu 116/2, 1947)) (note - Blisset (1962, 214) states lease 17M-45 (40 ac) was transferred to R.S. Laffer – this appears to be incorrect). Lease survey plan (Montagu 116/2, 1947) shows a cut drain on the E side of Barnetts Ck at the N end of the lease and on the N side of the tributary at this point; also a long 'cut trench' at the S end of the lease on the ridge above the slopes on the W side of Barnetts Ck.	additional mining
1947-50/51	Development work carried out by Laffer (on the northern drive of the ore body located at 176' on the No.2 drive), but little ore found (Blisset 1962, 214)	end of mining

DATE	HISTORICAL INFORMATION	KEY EVENTS
1954	BMR conducted geophysical surveys (SP, EM, ground magnetics and limited Pb geochemistry) for the Montana SL Mine in the area. Follow up work by Montana SL Mine indicated that the anomalies were mainly due to graphite, with only minor Pb mineralisation (Blisset 1962; MRT 89-3014, 593012).	

Appendix 3

PHOTOGRAPHIC RECORD (JAN 2013)

This record is divided into the following sections

1. Big Ben Mine
2. Quigleys Mine
3. Barnetts Mine

All photographs were taken in Jan 2013.

A sketch plan of each of the above mine sites showing the locations of the various parts of the mines and the various features is provided in Figures 5, 7 and 9 of the main report, respectively.

1. Big Ben Mine



1.1 General view to Big Ben Mine (in middle distance hill) from the south (near Quigleys Mine).



1.2 View E across the Big Ben Mine.



1.3 View E across the east side of Big Ben Mine, into Mullock Area 2.



1.4 Mullock Area 2, view E.



1.5 Mullock Area 2, view S from north end.



1.6 Mullock Area 2, view N from SE finger dump; Hanlon Adit indicated by arrow.



1.7 Mullock Area 2, view S to finger dump on SE edge.



1.8 Mullock Area 2 - central mound with artefact scatter (view SW).



1.9 Mullock Area 2 – remains of ore bin in central area (view SW).



1.10 Mullock Area 1, view W from hillcrest.



1.11 Mullock Area 1, view N from hill crest.



1.12 Mullock Area 1, view S from underlay shaft.



1.13 Mullock Area 1, view SW from underlay shaft.



1.14 Mullock Area 1, view NW from underlay shaft.



1.15 Mullock Area 1, view N from near underlay shaft (underlay shaft is hole in central RH edge of mullock).



1.16 Underlay Shaft – view NE.



1.17 Underlay Shaft – view E



1.18 F1 – Stopping at NE edge of inner workings.



1.19 F2 – large rectangular cutting into hillslope, view N to cutting.



1.20 F3 – view N to probable shaft area (area of timbers).



1.21 F3 – probable shaft and/or machinery area (view SW).



1.21 F3 – probable shaft and/or machinery area (view NE).



1.21 Example of metal and timber artefacts in Mullock Area 2.



1.22 Mullock Area 1 – area of seepage into sedges on SW edge (view SW).



1.23 View N across Mullock Area 1 to visible ground disturbance (workings) on hillslope – possible area of T7.



1.24 T6 – large trench with small finger dump in front (view SW).



1.25 T6 – view NW into hillslope into trench.



1.26 T4.



1.27 T2 - view NW along trench.



1.28 T2 – view NW to trench headwall.



1.29 T1 – larger trench with short underground cut into headwall (view NW).



1.30 T1 – headwall cut, and pooled, mineralised water at base.

2. Quigleys Mine



2.1 General view NE to Quigleys Mine Upper workings and Cattle Track (LH edge). Lower workings are out of site on upper LH of photo).



2.2 – General view N from Cattle Track down to Lower workings (splayed finger dumps).



2.3 Upper Workings – general view W- N to Upper Workings from hillslope above.



2.4 View S along lower line of Upper Workings



2.5 Mullock on lower line of Upper Workings (view S).



2.6 View N along lower line of Upper Workings (S4 in foreground).



2.7 View NW down to S3 mullock & shaft.



2.8 S3 shaft - detail.



2.9 S4 shaft (view N)



2.10 S4 shaft - detail



2.11 S5 shaft - detail



2.12 S6 elongate cutting (shaft?) (view N).



2.13 S6 elongate cutting (shaft?) (view S).



2.14 S6 – air shaft (?) in NW corner.



2.15 S6 – air shaft (?) in NW corner - detail.



2.16 Upper Workings – upper line of shafts (view E – uphill).



2.17 Upper Workings – upper line of shafts (view S).



2.18 S10 – possible collapsed stope (view N)



2.19 View S to S9, and S8 (beyond).



2.20 S9 – blocked shaft/stoping (view S).



2.21 S8 – entrance to shallow stope (view E)



2.22 S8 – entrance detail.



2.23 – S7 – shaft (view E).



2.24 S7 – detail of shaft (blocked at c.3m depth)



2.25 S2 – view N across mullock to S2 opening (probable collapsed shallow stope).



2.26 S2 – view W downslope from opening to mullock and washed material below (note



2.27 S2 – view of stoping opening (view N).



2.28 S2 – view of stoping opening (view S)



2.29 S1 – view of mullock on W side of S1 (arrowed) (view S).



2.30 F4 – open cut from edge of Cattle Track (view S).



2.31 F4 – detail of s end of open cut (view S).



2.32 Lower workings – view N from Cattle Track to finger dump splay and adit 1 (arrow).



2.33 Adit 1 – water seeping from adit entrance (entrance blocked).



2.34 Mullock of Lower Workings – view E across mounded east end.



2.35 Mound in SW corner of Lower Workings mullock, with metal artefact accumulation (including a riffle plate and ore bin frame)



2.36 – Lower workings finger dumps (paired FD 7) (view N).



2.37 - Lower workings finger dumps (paired FD 6) (view NW).



2.38 - Lower workings finger dumps – creek eroded termination of one dump (view SW).



2.39 F3 – low mound (possibly a chimney butt or forge) with squared post (see tape measure)



2.40 F3 –burnt remnant squared post beside low mound.

(view NW).



2.41 F1 (probable water wheel site) – large rectangular cutting with vertical sides – view NE across cutting, note upright metal pipe.



2.42 F1 – view S of SE corner – benched headwall with pipe on upper bench.



2.43 F1 – view down of made rock wall along creek (creek flows L to R across top of image) (view NW).



2.44 F1 – view SE up NE edge of cutting showing piled excavated rock on this edge.

3. Barnetts Mine



3.1 General view of Barnetts Mine – view NE across Barnetts Creek and northern (Adit 1 – Shaft 1 area).



3.2 Shaft 1 area – view N to creek junction from near S edge.



3.3 Shaft 1 on mullock platform at creek junction (view SW).



3.4 Shaft 1 – detail of SW corner of shaft.



3.5 T2 – view S to T2 from mullock (T2 grown over).



3.6 T2 – view of undercutting in headwall of trench.



3.7 View S of Adit 1 mullock and Open Cut mullock on slope behind (view from N end finger dump).



3.8 View S to S end of Adit 1 mullock showing mounded mullock in this area,



3.9 Mounded Adit 1 mullock (SW corner) (view NW).



3.10 Adit 1 Mullock – view N from the S end to the N finger dump (creek runs along RHS).



3.11 F1 – hut/shed platform on W edge of Adit 1 mullock (view SW).



3.12 F2 – hut/shed platform on creek edge SE of Adit 1 entrance (view SE).



3.13 Adit 1 – entrance (view W).



3.14 Adit 1 – stacked rock rubble on S edge of adit entrance (view W).



3.15 Adit 1 – portal (note remnant timbers) (view W).



3.16 Adit 1 – internal view from portal (view W).



3.17 Open Cut – upper bench with S2 and stoping into headwall (view N)



3.18 Open Cut – lower bench outer edge (view N).



3.19 Open Cut – view of talus (mullock) from lower bench (view E).



3.20 Open Cut – view up the talus (mullock) to lower bench (view W).



3.21 Open Cut – S2 (shaft/underlay shaft).



3.22 Open Cut – detail of S2.



3.23 Open Cut – view SW across upper bench to open stoping.



3.24 Open Cut – view W into N stoped area.



3.25 Open Cut – view W of S cut/stoped area.



3.26 General view from edge of ridge crest down into area of Adit 2 (view E).



3.27 Adit 2 area – ore bin on mullock platform outside Adit 2.



3.28 Adit 2 – view from portal (view W).



3.29 Adit 2 – detail of interior of Adit from portal.



3.30 Adit 2 area – T3 on E side creek (view E from F5 (race/track)).



3.31 Adit 2 area – T3 on E side creek (view N with F5 (race/track) on LHS).



3.32 F5 in Adit 2 area – view S along creek (upstream).



3.33 F5 in Adit 2 area – view N along creek (downstream).



3.34 F5 in Adit 2 area – view E across creek to stone walling in feature bank.



3.35 Creek in area of F5 and Adit 2 showing straight channelled form in this area.



3.36 Pipe on E edge of F5 in Adit 2 area at T3.



3.37 Detail of pipe on E edge of F5 in Adit 2 area at T3.



3.38 General view of S3 (No 2 Shaft) on ridge crest above Adit 2) (view S along ridge).



3.39 S2 – view S to lower mullock area and washed mullock (foreground).



3.40 S2 – view N from S2 and upper associated mullock to the lower mullock area.



3.41 S2 – view NW to shaft and associated (upper) mullock.



4.42 S2 – view across shaft (view N).



3.43 S2 – view across shaft (view SE).



3.44 S2 – detail of shaft (note remnant timbering).