

Report to:
*Carpentaria Gold,
Ravenswood,
Queensland*

Cultural heritage reconnaissance: Area 2, Ravenswood

Gordon Grimwade

1998

G o r d o n G r i m w a d e & A s s o c i a t e s

H E R I T A G E C O N S U L T A N T S

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c u l t u r a l h e r i t a g e

Introduction

It is proposed that exploratory deep drilling will be undertaken by MIM exploration on behalf of Carpentaria Gold Pty Ltd a subsidiary of Mount Isa Mines (MIM) Ltd near the town of Ravenswood, north Queensland. Vertical drill holes will be sunk to approximately 400 metres to test deep mineralisation within 'Area 2' or 'Buck Reef' of the Ravenswood Gold Mines.

A reconnaissance survey of the proposed drill sites was undertaken on 26 March 1998. The purpose was to briefly review the drill sites proposed by MIM Exploration and thus minimise the risk of inadvertent damage to any heritage places or artefact deposits within the area. A *systematic survey* was not intended nor required at this stage. The study discussed here was seen as a basis of establishing whether or not there was likely to be a need for more extensive investigations. On this basis a Department of Environment Permit to Survey was not required.

Area 2 is on the western side of the town of Ravenswood (fig 1). It was originally mined during Ravenswood's formative years and re-mined in the mid to late twentieth century (up to about 1988).

Methodology

The field assessment followed a briefing from the Environmental Superintendent, Exploration Manager, and Exploration Geologist. The site visit was in the company of the Environmental Superintendent.

The method adopted in the field was to approach each site as near as practicable by vehicle and to walk to the marked drill position. In practice this meant driving to a position near drill point E and walking north to drill points E - H. The four southerly drill points were approached by parking the vehicle near drill point D, visually locating A and C from the adjacent waste dump (south of D) and then inspecting each on foot. B, obscured from the waste dump by soil from the diversion channel around the waste dump, was located at this time.

Findings

Isolated indications of historic mining activities are to be found among the more recent mine workings. Artefacts include 3 brick chimneys, parts of early loading facilities, shafts and winding gear mountings. Of these the former are of particular importance. The loading facilities are, like the shafts and the winding gear mountings, some distance from the proposed drill holes.

During the inspection access routes for the drill rigs were considered. In the absence of advice to the contrary it was understood that any new approaches would be by way of existing tracks or by cutting new tracks west

of the drill line. This would effectively utilise an area in which there are minimal signs of historic activity.

The findings in respect of the eight proposed drill sites are tabulated at table 1.

2 Implications

The results of this brief assessment suggest that a sensitive approach to the current drilling programme will result in no adverse impacts to the cultural heritage of Ravenswood. Given the initiative taken by MIM Exploration in seeking the prior advice of the Environment Superintendent there is no reason to believe that a sensitive approach will not be maintained.

The implications in respect of further drilling on a more intensive grid are that particular attention will be needed to keep drilling equipment away from the chimneys, shafts and what is left of the winder foundations etc. This may be possible by developing access well to the west and limiting the size of drill pads near the heritage places. Such an approach has been adopted on other mines where proximity to heritage places was an issue.

- Should mining be considered a viable option as a result of the exploratory drilling programmes and the subsequent evaluation of data then heritage issues will be of paramount importance. There are now only six brick chimneys remaining in Ravenswood. They are significant historically, by association with Queensland's history, and are aesthetically important to the town's overall heritage value. While no comparative statewide assessment of relict chimneys has been conducted for this report it is known from personal knowledge that few similar chimneys now remain within Queensland. Most are either circular or square.

One of the chimneys, Sunset No 2, is unusual in that it is hexagonal. In that regard it is one of only three such chimneys in North Queensland (Lennon & Pearce 1996:110). The site has been identified as being significant within the terms of the Heritage Act (Lennon & Pearce 1996:109). Further assessment of significance and management options appropriate to the situation will therefore be necessary if mining is recommended. Open cut mining will present some challenges if the cut includes the chimney sites. Underground mining will have less adverse impacts although care will be needed to ensure the stacks are not at risk through vibration from mining equipment or from underground blasting.

As part of this evaluation process a detailed assessment of the archival and historical documentation is essential as is a detailed recording of the relict physical elements. Management strategies should be determined only after complete data are available and analysed.

Recommendations

Drilling rigs should be kept away from the chimneys in the northern section. There appears to be no heritage constraints on fairly free movement of the rigs in this area. A buffer zone of 2.5 rig lengths should be regarded as a realistic safety margin in the vicinity of the chimneys.

The use of machinery causing subsurface vibration or the continuous operation of heavy vehicles within about 100 metres should be minimised. This recommendation is on the basis that little is readily available on the effects of prolonged vibration on these significant structures.

'Tell tails' - stability monitors - should be fitted to each chimney stack and monitored daily when heavy equipment and drilling rigs are operating nearby.

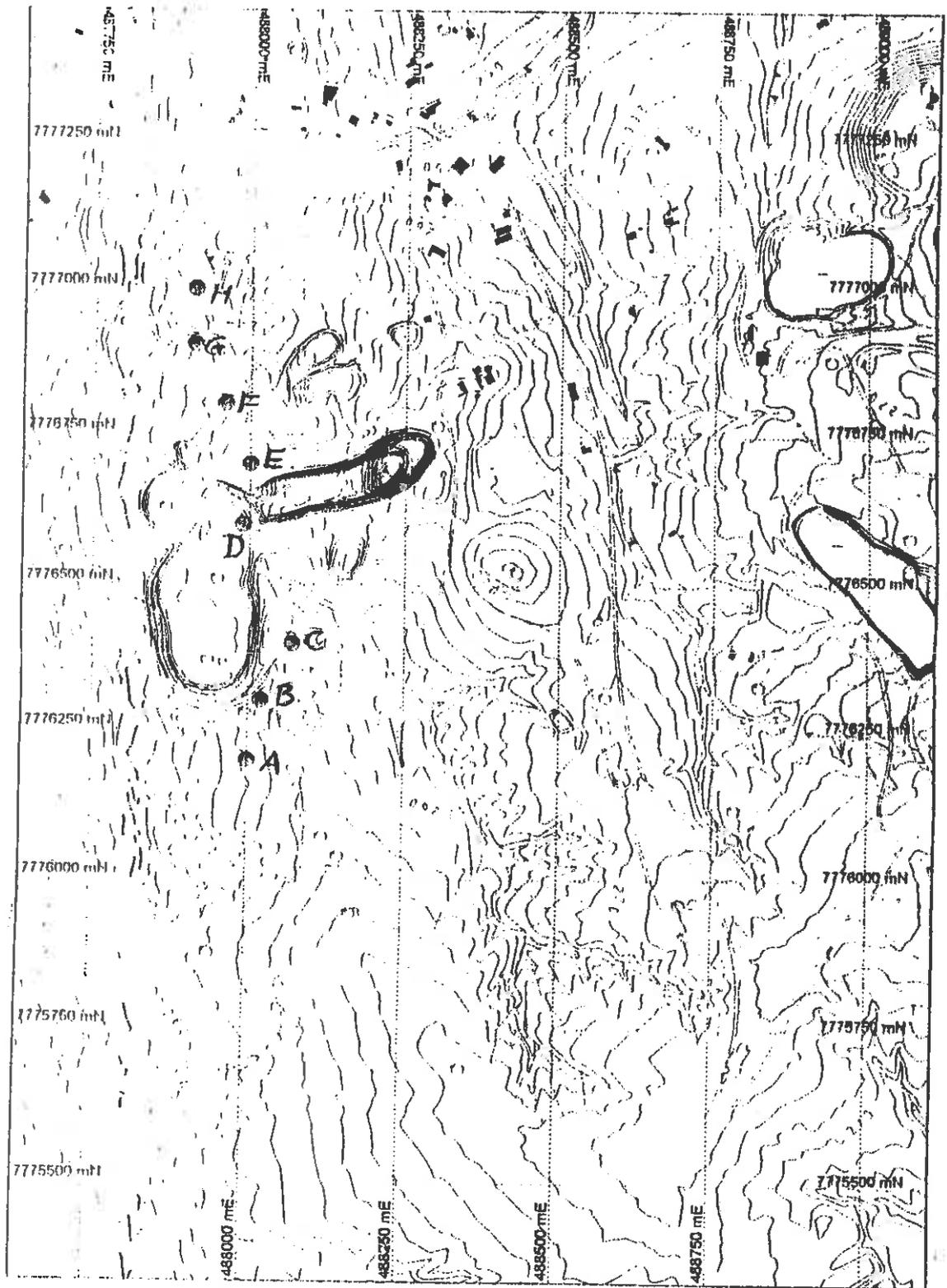
While there appears to be no visible cultural heritage evidence west of the drill line care should be taken at all times to avoid glass and ceramic deposits, timber and brick which has obviously been used in construction work in the past, dray tracks, buildings or other historic mine infrastructure. Despite apparent disturbance, deterioration, or other damage, such sites may still be able to provide useful archaeological or historic information.

Should it be decided to extend the drilling programme or undertake operational mining in this area it is recommended that an archaeological assessment of the old records of the mines in this area should be undertaken. This would include reference to early mine maps and archival material. To minimise delays to further drilling programmes it is further recommended this should be initiated well in advance as research of this material may take sometime.

As a long term aid to exploration teams, mine management and heritage management it is recommended that accurate GIS overlays showing Aboriginal sites, historic sites, and areas subject to archaeological surveys should be further developed. This work should incorporate information on underground workings as well. Mining heritage is as much about what eventuated above ground as below ground.

References

- Lennon J., & H. Pearce, 1996, *Mining Heritage Places Study Northern & Western Queensland, Vol 1 Charters Towers District*, Jane Lennon & Associates (unpub report to Dept of Environment, Brisbane).
- Menghetti D., 1992, *Ravenswood - Five Heritage Trails*, Dept of History & Politics, James Cook University, Townsville.



Proposed Sunset Footwall Drillholes, Ravenswood

1:10,000 Scale

Figure 1.

TABLE 1: ASSESSMENT OF DRILL SITES, AREA 2, RAVENSWOOD

Drill site	Terrain	Cultural heritage constraints	Significant? Yes/No	Proposed management
A	Heavily eroded with light chinee apple and rubber vine. Grass cover adjacent limits visibility to <10%.	None. Light scatter of outwashed ceramics and glass.	No. Scatters probably result from fluvial activity. Light density. No significance attributed.	No constraints but see general recommendations.
B	Heavily eroded with light chinee apple and rubber vine. Grass cover adjacent limits visibility to <10%.	None. A small waste dump and collapsed shaft are relatively close. In the absence of historical information to the contrary they appear to be of no significance.	No. Only cultural activity is associated with a small historic waste pit and what appears to be a collapsed shaft.	Identify the waste dump and collapsed shaft on a map of the area. Avoid it during drilling operations (primarily for obvious safety reasons). Additional research should be considered if further drilling or mining is to proceed in this area.
C	Stream bed. Substantial siltation. Grass cover adjacent and silt limits visibility to <5%.	None.	No	No constraints but see general recommendations.
D	Track side. Grass cover adjacent limits visibility to <10%.	None.	No	No constraints but see general recommendations.

TABLE 1: ASESMENT OF DRILL SITES, AREA 2, RAVENSWOOD

Drill site	Terrain	Cultural heritage constraints	Significant? Yes/No	Proposed management
E	Open area. Visibility 95%. Adjacent to Barrier Open cut	None.	No. There is a large timber tank stand about 20. South. It is considered to have no heritage value due to its recent use (c 1980s).	No constraints but see general recommendations.
F	Grassy knoll with small rubber vines adjacent. Visibility 20% near drill hole increases to 95% about 4 metres to south.	None.	Nearest significant heritage feature is a square red brick chimney about 180 metres away.	No constraints but see general recommendations.
G	On an eroded creek bank. Access will need to be 'dozed'. Visibility 85%.	None provided rig access is from the south or west. Avoid possible impact from use of track which runs through Sunset No 2 site. There are several piles of rock near the drill hole site. It has been suggested these are from ore sorting conducted by the draymen waiting to unload at the nearby mills. Unconfirmed.	No. Nearest significant site is the Sunset No 2 Chimney about 200 metres away.	No constraints but see general recommendations.

TABLE 1: ASSESSMENT OF DRILL SITES, AREA 2, RAVENSWOOD

Drill site	Terrain	Cultural heritage constraints	Significant? Yes/No	Proposed management
H	Fairly level ground about 12 metres from deep dry gully. Surface washed. Visibility 60%.	None provided rig access is from the west or south to avoid possible impact from use of any track from vicinity of Grand Junction site.	No. Nearest significant site are two chimneys. One is about 70 metres across a small open cut. The other is Chimney about 150 metres away.	No constraints but see general recommendations.

Report to:
*Carpentaria Gold,
Ravenswood,
Queensland*

Cultural heritage reconnaissance: Bailey's Prospect, Ravenswood

Gordon Grimwade

1998

cultural heritage

G o r d o n G r i m w a d e & A s s o c i a t e s

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Heritage Reconnaissance: Bailey's Prospect, Ravenswood

Introduction

It is proposed that exploratory deep drilling will be undertaken by MIM exploration on behalf of Carpentaria Gold Pty Ltd a subsidiary of Mount Isa Mines (MIM) Ltd near the towns of Ravenswood and Topley, north Queensland (fig 1). The possible impact on cultural heritage places within and adjacent to the impact area is discussed in this report.

Fourteen drill holes will be sunk to test deep mineralisation within an area known as Bailey's Prospect on One Mile Creek, Ravenswood (fig 2). The drill sites are in three distinct groups. Drill sites A to E are located on open ground north east of property owned by Mr & Mrs Hughes and east of One Mile Creek. Sites F to H are at the northern end of Baileys Prospect and also east of One Mile Creek. The terrain around them is also undulating with dense grass predominating. Chinese Apple is the dominant tree species. West of One Mile Creek and the Hughes' s block are drill sites J to N. They are also located in dense grass interspersed with Chinese Apple. Some localised erosion has occurred along the stream banks, particularly around site L.

A reconnaissance survey of the proposed drill sites was undertaken on 26 June 1998 by Gordon Grimwade, a consultant historic archaeologist. The purpose was to briefly examine the drill sites proposed by MIM Exploration to minimise the risk of inadvertent damage to any heritage places or artefact deposits within the area. A *systematic survey* was neither intended nor required. The study discussed here was seen as a basis of establishing whether or not there was likely to be a need for more extensive investigations. On this basis a Department of Environment Permit to Survey was not required.

Methodology

The site visit was undertaken, in part, in the company of the Environmental Superintendent. During the afternoon of 26 June Mr Grimwade undertook the reconnaissance alone.

Drill sites A to H were approached as near as practicable by vehicle. The area around and adjacent was then inspected to the extent possible given the dense

grass cover which prevailed at the time of the inspection. In the case of drill sites J to N the vehicle was parked on the eastern bank of the creek. Each drill site was then accessed on foot. Time was taken to selectively check some of the more conspicuous river flats for evidence of prior human activity. In view of the dense grass cover the fieldwork was followed by desktop analysis of a range of maps of the area. The purpose was to compare documented land use to better predict where concentrations of habitation and industrial activity might be encountered.

Constraints

The dense grass cover prevailing throughout the study area in late June severely inhibited survey opportunities. Visibility was negligible. Native grasses, growing to about 40 cm high, allowed a maximum visibility of about 2% at best. In such conditions any results must be considered merely indicative.

Determining probable archaeological sites, whether they are Aboriginal, domestic or industrial, is generally the result of analysis of the available documentation. In this regard topographical maps, aerial photographs and - for historical sites - cadastral data are essential. The problem is that turn of the century miners frequently appear to have ignored real property boundaries. They settled in areas which were often not surveyed for habitation sites nor, indeed, for industrial activity. Research at Mungana (Grimwade & Meiklejohn 1994), Mount Cuthbert (Grimwade & Hunter 1995), and Kuridala (Grimwade 1995) has provided significant evidence in this regard. There is little evidence to suggest that the settlers at Ravenswood and Topley would have adopted a different approach. Field conditions were such that this hypothesis could not be easily assessed.

Findings

Extremely isolated indications of historic mining activities are to be found within the study area. Artefacts include low density glass scatters and occasional clay bricks. To the north is the site of the township of Topley (surveyed 1886) the buddles, and Topley mine (1870s - 1891 and c.1948 - 54) (Hooper 1993:35).

During the inspection access routes for the drill rigs were considered. In the absence of advice to the contrary it was understood that any new approaches would be by way of existing tracks. This would effectively utilise an area in which there are minimal signs of historic activity.

The findings in respect of the 14 proposed drill sites are shown at table 1.

Table 1: Potential impact of drill sites on cultural heritage places

Drill site	Description	Management requirements
A	Open area. Dense grass with sparse low shrubs	No visible constraints. Minimise disturbance particularly during accessing site
B	Open area. Dense grass with sparse low shrubs	As above
C	Open area. Dense grass with sparse low shrubs	As above
D	Open area. Dense grass with sparse low shrubs	As above
E	Open area. Dense grass with sparse low shrubs	As above
F	Open dense grassland, lightly timbered	No visible constraints. Minimise disturbance, particularly during accessing site. Avoid northerly access if possible. In any case do not access from a point north of the powerline unless using existing tracks.
G	Open dense grassland, lightly timbered	As above
H	Open dense grassland, lightly timbered	No visible constraints. Minimise disturbance particularly during accessing site
I	Open dense grassland, lightly timbered	As above
J	West of One Mile Creek.	As above
K	West of One Mile Creek.	As above
L	West of One Mile Creek.	As above
M	West of One Mile Creek.	As above
N	West of One Mile Creek.	As above

Implications

The results of this brief assessment suggest that a sensitive approach to the current drilling programme will result in no adverse impacts to the cultural heritage of Ravenswood. Given the initiative taken by MIM Exploration in seeking the prior advice of the Environment Superintendent there is no reason to believe that a sensitive approach will not be maintained.

**Bailey's Prospect,
Ravenswood:**
Proposed drill sites
June 1998

Scale 1:5000
1 km grid (A4)

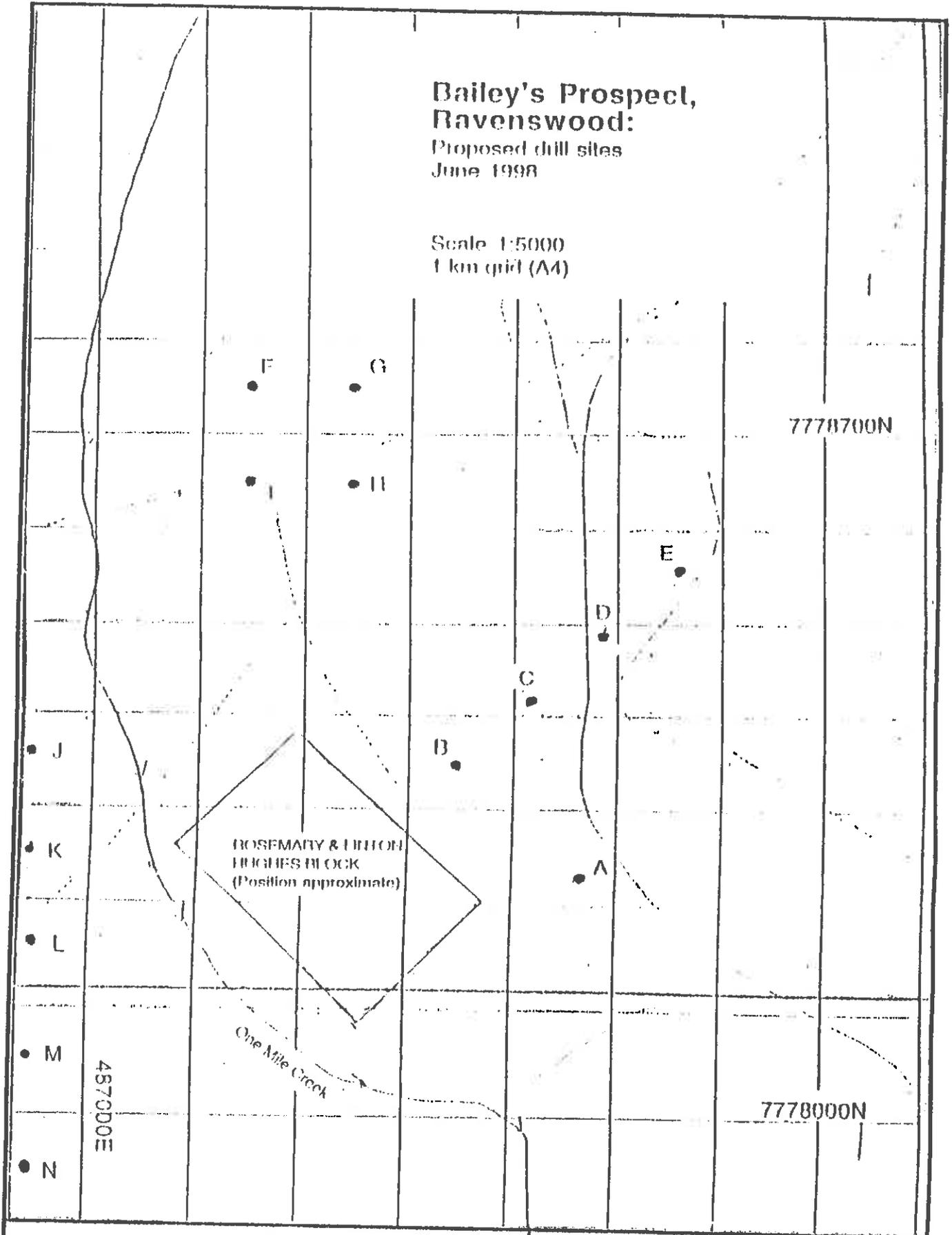


Fig 2



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23 June 2000

SARFIELD PIT: CULTURAL HERITAGE ISSUES

Dear Rob,

Following my recent visits to Ravenswood in respect of the proposed development of the Sarsfield pit I provide the following comments.

My evaluation focused on the area identified on the ground by you adjacent to the proposed bund wall. Dense grass cover was an impediment to detailed examination. At the time of my assessment of 8 June 2000, grasses and vines covered most of the area at about 95% overall. A few small patches, other than that which had been disturbed for realignment of the power-line, provided better visibility. About 2% of the total area had 10% - 20% grass cover.

The dense grass cover at the time of my inspection, understandably, reduces the confidence level that the area is entirely without significant artefacts. However, it is obvious much of it has been disturbed over the past century or more. The issue can be more accurately resolved by inspection after burning or decomposition reduces the grass cover.

Low densities (max density was about 2/m² over about 5m²) of ceramic and glass shards were noted in various disturbed areas. These shards included:

- part of a side of a Chinese 'four seasons' rice bowl;
- a small piece of a white ceramic plate with the blue ribbon pattern, probably produced by Shaw's pottery, U.K. in the late nineteenth century;
- several plain white shards not readily attributable to a particular manufacturer or period;
- numerous fragments of green glass from late nineteenth century beer bottles; and,
- a ceramic head of a child's dolls (N. B. it was normal to integrate a ceramic head and extremities into a fabric body form).

None of the material identified was considered to have sufficient context or quality to justify systematic collection or retention. While visibility was extremely poor there is limited chance that major sites of significance lie concealed beneath the grass. However, if a burn eventuates in the next few months it is recommended that the area is re-examined to confirm the views expressed here.



The development of the Sarsfield pit is probably likely to have greater impact on underground mining heritage. The progressive development of the open cut can be expected to intersect early drives and, less likely, shafts. Opportunity should therefore be taken to put in place contingency measures to ensure such finds are adequately recorded.

Underground mining heritage is virtually neglected in Australia and yet it is an obvious and integral part of our history. The opportunity to record this aspect is, to a large extent, dictated by safety considerations. Open cut methods do provide opportunities, however, to safely record some aspects of tunnelling: drilling techniques, drive size, and timbering.

It is therefore recommended that Ravenswood Gold considers:

1. Undertaking research to locate early mine maps and to relate these to the proposed pit development. In this respect it is assumed Mimex may already hold much of this material at Ravenswood. This material should be referred to an historical archaeologist for detailed evaluation.
2. Facilitating an awareness course of about one half to one days duration for plant operators specifically to increase their awareness of underground mining heritage, its possible form (tools, timber sets, and size), and significance and the provisions of the relevant heritage legislation.
3. Setting up a process to facilitate recording of any features which ensure minimum down-time for the mine and optimal standards of archaeological recording. This may, for example, be achieved by training a staff member in rescue archaeology recording techniques or by arranging a system of pit excavation which enables workers to be redeployed to other locations until archaeologists can complete the necessary recording processes.

The foregoing is submitted for your information and consideration as we discussed.

Yours sincerely



Gordon Grimwade

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23 June 2000

'PENNA RESIDENCE', RAVENSWOOD

Dear Rob,

As part of my work at Ravenswood I was asked to comment on the heritage value of the 'Penna Residence'. The building was inspected in the company of yourself and Dr Peter Bell a mining historian on 7 June 2000.

The building is a simple low set timber and corrugated iron structure. The rear section is at ground level. The garden is overgrown, appears to contain several stone lined paths and flower beds. It is variously bordered by K-wire and timber picket fences.

The building comprises two main rooms, an enclosed front verandah and a kitchen/dining area at the rear. The structure is rudimentary and appears to have been either built from various sources or modified on several occasions. It does not have particularly high heritage values. Within the house there is a 'Beacon Light' wood fired stove and a timber dresser (circa 1950s) which are well worth saving. They should be removed and stored, offered to the Ravenswood museum or simply sold as antiques.

The idea of relocating and restoring the building was mooted. While it would be desirable to maintain as many buildings as possible of this form the practical costs need some consideration. A similar sized building in a remote part of north Queensland has an estimated conservation cost of \$120,000.

Given these factors the building is considered to have three possibilities;

- it remains in its present location and is left to deteriorate gradually;
- it is donated to the Ravenswood Preservation Society (if they feel they are willing to undertake appropriate conservation of it); or,
- it is sold off for removal.

In my opinion the cost of relocating the front section and restoring it as a visitor centre would be prohibitive if it was to be done in an appropriate manner. Further research may be in order to verify this assumption of mine.

The foregoing is submitted for your information and consideration as we discussed.

Yours sincerely,



Gordon Grimwade



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23 June 2000

PROPOSED DRILL SITES IN TOWN AREA, RAVENSWOOD

Dear Rob,

As part of my work at Ravenswood I was asked to comment on the possible impacts on cultural heritage values from the proposed drill sites in Ravenswood. Selected sites were inspected, with you, on 7 and 8 June 2000. Drill sites I, O, S, T, and W were inspected. These were sites where there was considered to be a higher probability of adverse impact occurring.

None of the sites concerned appear, however, from a surface appraisal, to present any concerns. Some light scatters of ceramics were noted in the vicinity of several sites. They were of low density and obviously heavily disturbed. Little scientific value could be attributed to them. It is highly likely similar scatters would be found in areas currently covered by grass. This cover reduces visibility in some places. Nonetheless, from previous examination of sites near those now proposed it is considered there is little probability major sites will be encountered.

In my opinion the following general recommendations will adequately cover the drilling programme we discussed.

1. Drill pads should be kept to an absolute minimum size.
2. Access tracks should be as narrow as possible.
3. Minimal soil disturbance should be undertaken.
4. Tracks should be carefully rehabilitated as soon as practical after work is completed.
5. Artefact scatters greater than 10 per square metre and building foundations should be avoided.

The foregoing is submitted for your information and consideration as we discussed.

Yours sincerely,



Gordon Grimwade



Ravenswood Conservation Management Plan

1 Project

The project brief requires the preparation of a Conservation Management Plan for the future management of the township of Ravenswood. The client is the Ravenswood Restoration and Preservation Association Inc, but the report's recommendations also address actions of other organisations such as the Environmental Protection Agency, Dalrymple Shire Council and Carpentaria Gold Pty Ltd. The project brief is attached as an appendix to this report.

2 Project Area

The township of Ravenswood, with a population of about 200, is located in North Queensland at 20°06'S Lat, 136°53'E Long, about 130km by road nearly due south of Townsville, within the Dalrymple Shire. The project also considers historically related sites within about three kilometres radius of the township at Totley and Sandy Creek.

3 Project Team

The consultants who prepared this report are:

- Peter Bell, historian. Peter undertook the historical research, assisted in preparing the statement of significance and the conservation policies and recommendations, and compiled the finished report.
- Gai Copeman, historian. Gai assisted in historical research and fieldwork in Ravenswood, and prepared policy advice for the Court House museum.
- Jane Harrington, archaeologist. Jane assisted in fieldwork and site recording in Ravenswood, and prepared archaeological management policies.

4 Ravenswood Conservation Management Plan: Introduction

Ravenswood is one of the great historic mining towns in Australia, along with Hill End in New South Wales, Zeehan in Tasmania, Beechworth in Victoria, Burra in South Australia and Gwalia in Western Australia. But many visitors find Ravenswood even more fascinating than most other old mining towns because of its intimate juxtaposition of mining, commerce and habitation. Built with a complete disregard for town planning principles - even by pioneer standards - and still remarkably intact, Ravenswood today still has brick chimneys looming over the centre of town, and mine headframes in suburban streets. But it is losing that character very rapidly. The purpose of this project is to make recommendations which will assist in conserving the character of the township of Ravenswood as it is today.

Ravenswood has already been the subject of a number of management plans:

- In 1975, architect Don Roderick did a study for the National Trust of Queensland which provided the first historical overview of Ravenswood, and formulated management advice which is still of value 25 years later,
- In 1979, planner Meredith Walker wrote a management plan for the town and the community, aimed specifically at providing town planning recommendations to assist Dalrymple Shire Council,
- In 1986, Jane Maggs wrote a landscape architecture thesis which focused on Ravenswood's vegetation, but also dealt with broader conservation and tourism management issues,
- In 1989, engineering firm Ullman & Nolan wrote a study which dealt with immediate building issues in the aftermath of Cyclone Aivu, but did not successfully address the longer-term conservation of Ravenswood as a place of cultural heritage value.

Roderick (1975), Walker (1979) and Maggs (1986) between them provided a wealth of detailed insights which are still relevant to the management of Ravenswood today. While this study draws on their findings, it cannot repeat every comment and recommendation. Those reports should still be treated as useful sources of advice.

In addition there have been a number of other studies, which, while not constituting management plans, nevertheless provide a body of relevant research information:

- In 1978-82, Peter Bell undertook a study of domestic architecture on North Queensland mining fields which treated the 35 historic houses then standing in Ravenswood in some detail as a local case study (Bell 1982 & 1984),
- In 1980, a team from the History Department at James Cook University carried out a study of the industrial sites of the Totley silver mining field on Ravenswood's outskirts (Kennedy *et al* 1981),
- In 1984, Joan Neal wrote a thesis on the Dalrymple Shire which put the history of Ravenswood in regional context (Neal 1984 & 1985),

- In 1987, Jennifer Caspani wrote a thesis on the crucial New Ravenswood era which determined much of the physical form of Ravenswood today (Caspani 1987),
- In 1989, Janice Wegner carried out a survey of some historic mine sites as part of an Environmental Impact Study prior to the re-commencement of mining (Wegner 1989),
- In 1992, Ruth Kerr carried out a historical study of mining sites throughout Queensland, which put Ravenswood in State perspective (Kerr 1992),
- In 1992, Diane Menghetti wrote a comprehensive guide book to the town and its mining sites (Menghetti 1992),
- In 1996, Jane Lennon and Howard Pearce carried out a heritage survey of historic mining sites throughout North Queensland, including 9 in Ravenswood (Lennon & Pearce 1996),
- In 1997, Lyndon Megarrity wrote in greater detail on the New Ravenswood company, putting its investors and management in international context (Megarrity 1997),
- In 1998, Sinclair Knight Merz carried out a baseline study providing descriptive detail on the principal historic buildings of Ravenswood (Sinclair Knight Merz 1998).

There have also been a number of other studies of specific buildings and structures, most of them reports on aspects of physical conservation. Ravenswood is fortunate in having this body of information available to draw on. The bibliography lists these and many other similar works that have been identified as relevant to the management of Ravenswood. However, it is not fully comprehensive, as other consulting works that are known to have been written on specific buildings and issues within the town could not be located in the course of this project.

5 Ravenswood Conservation Management Plan: Geographical Setting

Ravenswood is located on Elphinstone Creek, a tributary of the Burdekin River. The much larger gold mining town of Charters Towers is about 50km to the north-west. Both Ravenswood and Charters Towers are located on a low tableland formed by an extensive igneous formation called the Lolworth-Ravenswood Block, which has been dissected by the Burdekin and its numerous tributaries. Ravenswood is only a few kilometres west of the Leichhardt Range, which forms the escarpment between the tableland and the coastal plain. The region has a tropical monsoonal climate, with most rain falling in the summer and autumn months. The natural vegetation of the area was sclerophyll woodland, dominated by hardy eucalypts such as narrow-leaved ironbark (*Eucalyptus crebra*) with grass cover depending on the season. (Hopley 1978)

There has been seismic activity in the Ravenswood district in historical times. On 18 December 1913 the district experienced an earthquake with an intensity of V (Mercalli) and magnitude of 5.7 (Richter), centred close to Ravenswood. Newspaper reports at the time said the quake was felt in Townsville, Charters Towers and Bowen, but oddly there seems to be no record of it in Ravenswood, closest to its centre. (*North Queensland Register* 22 & 29 December 1913) Modern seismologists have called it the Ravenswood Earthquake. (Rynn 1987)

The largest geological unit within the Lolworth-Ravenswood Block is the Ravenswood Granodiorite Complex. The gold-bearing reefs of Ravenswood and Sandy Creek occur within the complex in a zone of tonalite, a form of granite low in silica and dark in colour because of its high iron-magnesium content. About seventy gold-bearing reefs have been discovered within the town of Ravenswood and its immediate surroundings. The largest and oldest of these is the Buck Reef, a low-grade mineralised shear zone which runs east-west across the goldfield. The later intrusive reefs mostly strike generally north-south and are characterised by quartz and mineral sulphides. Some of these reefs had very high gold values close to the surface. (Levingston 1980, pp. 8-9)

Very early in the course of mining in Ravenswood, the field became notorious for the difficulty millers found in extracting gold from the orebodies. These problems are described at some length later, for they constitute a very important theme in Ravenswood's early history, but essentially they arose from two things: the finely divided state of the gold, and the presence of other metals. Nineteenth century processes for separating gold from ore were of two types: mechanical and chemical. Mechanical processes like jigs and buddles all relied on the fact that gold's high density caused it to behave differently from the less dense particles of waste rock, but most gold in Ravenswood occurred as very fine invisible particles, which in the crude processing machinery available, acted just like the light stone surrounding them. Chemical processes like amalgamation and chlorination exploited the very few chemical reactions which relatively inert gold participates in, but Ravenswood gold came surrounded by more active metals, which reacted in preference to the gold.

Ravenswood is roughly equidistant from the two coastal towns of Townsville to the north and Bowen to the east, and when gold was discovered in the 1860s there was active competition between the two newly-established ports for Ravenswood's business. Bowen is located on Port Denison, a superb natural harbour. However, goods coming to Ravenswood from Bowen had to cross the Burdekin River, a serious obstacle during the wet season, and also faced a stiff climb up the escarpment of the Leichhardt Range. Townsville on the other hand had only an adequate harbour, but was on the same side

of the Burdekin as Ravenswood. Crucially, Townsville was blessed by the easiest crossing of the coastal ranges anywhere between Rockhampton and Cooktown, a break known as Reid Gap, where the Haughton River had worn a passage through the escarpment. The construction of a railway inland from Townsville in 1884 resolved the rivalry of the two ports, and Ravenswood has been within Townsville's economic hinterland ever since.

6 Ravenswood Conservation Management Plan: History

Ravenswood is no ordinary town. It is the oldest surviving inland town in North Queensland. It was the first significant goldfield discovered in the northern half of Australia. The house where one of the Ravenswood schoolteachers lives today is the oldest standing house in any town in North Queensland. It had the first railway in Australia built to serve a silver mining field - yes, silver, not gold. Although Ravenswood was a rich mining field, it had some of the most obstinate, frustrating gold ores in Australia, and this put it in the forefront of technological innovation; it was the first place where the chlorination process and Wilfley tables were used in Queensland, and probably the first place where the cyanide process for extracting gold was used in Australia. A hundred years ago its abandoned mineral treatment plants formed one of the world's finest museums of gold processing machinery. Ravenswood experienced its greatest prosperity when most Australian goldfields were already closing down, then it became the first town in Queensland to have its railway closed. It shrank to a population of about seventy people and perhaps a thousand goats, but it has survived to the present day.

To conserve the character of the township of Ravenswood as it is today, it is first necessary to study the historical processes that have caused it to develop into its present form. That is the purpose of this historical account. Ravenswood has been recognised for its heritage value since the 1960s, and as a result has already been the subject of considerable historical research, which has been drawn on in preparing this report. All the sources consulted are listed in the bibliography.

Much of what has been written about the early history of Ravenswood and the surrounding district is unclear and sometimes contradictory, because it comes from a few brief accounts written long afterward, often by people who were not there at the time the events occurred. Where possible, primary source documents have been used in writing this account, and the description of events is based on what contemporary witnesses recorded at the time.

Discovery and Settlement 1864-1870

The first European presence in the Ravenswood district was Ludwig Leichhardt's expedition, which travelled north up the Burdekin River, only a few kilometres west of the town, in April 1845. European settlement of the North Kennedy district commenced with the founding of the government administrative centre of Bowen on Port Denison in 1861, and pastoral settlers spread out through the hinterland. The Burdekin valley and other well-watered land of the region was taken up for sheep and cattle grazing within two or three years, at first remaining dependent on the port of Bowen in the south. Dotted up the valley of the Burdekin west of Bowen were Mount McConnell, Conway, Ravenswood, Carse o'Gowrie, Merri Merriwa, Fanning River and Burdekin Downs stations. In 1864, agents of Robert Towns established the private port of Townsville in Cleveland Bay, and the northern part of the district was more conveniently served by the new centre. (Allingham 1977)

The land where Ravenswood stands was first taken up by the Curr brothers as the Merri Merriwa run, with its homestead near the junction of Elphinstone Creek and the Burdekin River. According to a grandson's recollections sixty years later, the property was taken up by Montague and Marmaduke Curr, and their brothers Walter and Julius only arrived ten or so years later. (Black 1931, p. 26) However, the Treasury Department's Register

of Rent on Pastoral Runs still exists, and it records that it was Walter and Julius Curr who stocked the Merri Merriwa run and commenced paying rent on 25 July 1864. A year later the run was transferred to Walter Curr alone, and he held it for the next five years. (QSA TRE 16)

Within only a few years of European pastoral settlement in the north, the regional economy was diversified by the discovery of gold and other minerals. The first significant gold discovery in North Queensland was on Dotswood station near Keelbottom Creek in 1865, although the find was usually given the name of Star River diggings, or the Cleveland Bay Rush. (*Port Denison Times* 19 May 1866) There was a small rush from Townsville, Bowen and other places to the field in the early months of 1866, but the diggings were inaccessible and waterless, and the later arrivals found very little gold. Some drifted away to prospect elsewhere, creating a restless mobile population alert to rumours of gold. They made a succession of other small finds around the region, one of the most promising being the discovery of the Cape River field in July 1867. (Bolton 1963, pp. 44-45)

These reports of small gold discoveries prompted rural workers throughout the Townsville hinterland to look for more, and in 1868 the business community of Bowen considered offering a reward to the discoverers of a payable goldfield in their hinterland. Coincidentally, the discovery they were seeking was reported in the same issue of the Townsville newspaper, and the very first report even identified the creek that would become the principal focus of the new field:

News reached Townsville during the week to the effect that an important discovery had been made on the Burdekin, in the vicinity of Elphinstone Creek and the Roby Range, situated about one hundred miles from town. It appears that some men who have been working in the neighbourhood for a week or two have got onto payable ground, and have sold gold at the stations in order to pay for their rations. They state that they have prospected the Creek for four miles, and obtained a good prospect wherever they sunk. There is a considerable depth of washdirt, and the sinking is very shallow. From what we can ascertain, there seems to be little doubt that the ground is rich and extensive enough to enable a moderate number of diggers to get wages. We shall doubtless be in a position to furnish more information with reference to this new gold-field in our next issue. (*Cleveland Bay Express* 14 November 1868)

There was no information in the next issue, and it was a year before the name of Elphinstone Creek was mentioned in the press again. Whether in fact there were very early discoveries of gold in Elphinstone Creek, or the journalist had simply chosen that name at random to identify the general district, we do not know. Certainly the next report of alluvial gold placed it on G.E. Forbes' Ravenswood station further down the Burdekin - its homestead was 30km south-east of Merri Merriwa - and that was the name that appeared in the terse reports in newspapers further afield: "Gold is being found at Ravenswood, ninety miles from Bowen." (*Rockhampton Bulletin* 19 November 1868)

An eyewitness account written fifty years after the events names Thomas Aitken, an employee of Ravenswood run, as the original discoverer of gold. A party of prospectors arriving from Townsville to follow up his find were met on the road by Marmaduke Curr - previously experienced as a gold miner in Victoria - who guided them north to other prospects on his family's neighbouring Merri Merriwa run. His motivation is clear;

graziers were keen to encourage prospectors to explore their land, because a successful gold discovery would create a local market for beef. Richer discoveries were made on Merri Merriwa in the following weeks. The best early finds were on two tributaries of Connolly Creek named Trieste Creek (Lower Camp) and Tucker Creek (Middle Camp). The first claim granted was the Perseverance at the Middle Camp, later to be known as Donnybrook. (Hurle 1919)

By early 1869 a group of prospectors were certainly working further west on the tributaries of Sandy Creek and Elphinstone Creek. Before July that year the richest alluvial discoveries on the field were made in three dry creekbeds named Nolan's Gully, Jessop's Gully and Buchanan's Gully after three of the discoverers. The exciting thing about the new finds was that the alluvial gold was not water-worn, but still in jagged shapes, implying that the reefs it had weathered from were not far away upstream. They were not hard to find. The first reef discovered, the General Grant, is said to have stood up from the ground surface like a low stone wall a foot high and 200 feet long. Samples from it assayed six ounces to the ton. (*Charters Towers Mining Journal* 17 May 1884) There were seventy or more reefs scattered for a mile around, but the most promising ones lay in a band that trended north-south, widening out south of the creek: the Shelmalier, Melaneur, London, Grant, Sunset, Duke and Rob Roy. In the forty years that followed, gold worth nearly £3,000,000 would come from the reefs in the little triangle between Buchanan's Gully, Jessop's Gully and Elphinstone Creek.

By October 1869 a tent township - the Upper Camp - had gathered about the reefs. There was not enough water to wash in, let alone cradle for gold. Hundreds of diggers spent their time dollying specimens and waiting impatiently for rain.

The bulk of the miners, both reefing and alluvial, are located at Elphinstone Creek, the camp, containing a population of three or four hundred, being pitched on as arid a looking piece of country as can be met with in this colony. (*Cleveland Bay Express* 8 January 1870)

When the rains finally came in February, they confirmed that the Upper Camp was by far the richest gold discovery in the north so far. It was also the first significant reef mining field discovered in the northern half of Australia. After five years of reports of alluvial gold in creek beds, and ephemeral rushes that were mostly worked out within a few weeks, Elphinstone Creek had finally given North Queensland a mining field which promised years of development and stability. But before it could produce gold it needed a crushing battery to treat the stone. The first entrepreneur to bring machinery to the field was W.O. Hodgkinson, explorer, member of the Burke and Wills expedition, and later mining administrator and politician. His little five stamp battery had actually arrived at Burnt Point on Sandy Creek, between the Middle and Upper Camps, in December 1869, but some of its parts had been broken in a dray capsize, and there was an excruciating four months wait for replacements. Finally North Queensland's first gold battery, the Lady Marion mill, had its first crushing on Easter Monday, 18 April 1870. (*Port Denison Times* 8 January & 7 May 1870)

With the benefit of a few more months knowledge of the reefs, the second stamp mill was strategically sited in the middle of the Upper Camp. Plant and Jackson, later to be prominent on Charters Towers, built their Lady Blanche battery on the bank of Elphinstone Creek right at the mouth of Buchanan's Gully, and had their first crushing on 23 August 1870. They had also chosen a better machine with a bigger engine, because the press compared their mill favourably to "Hodgkinson's slowcoach". (*Port Denison*

Times 10 September 1870) Government Geologist Richard Daintree visited the Upper Camp in August 1870 while the Lady Blanche mill was under construction. He was there to take photographs of northern mining scenes for the Exhibition of Art and Industry to be held in London the following year, and he recorded the half-completed Lady Blanche in one of his scenes. (V&P 1871, p. 663; Sanker 1977, p. 49) Daintree's photographs show a township of bark and slab commercial buildings, not yet organised into streets, with canvas tents in the background in a landscape not yet stripped of its trees.

The Ravenswood Goldfield was gazetted on 3 November 1870, and elderly Commissioner Thomas Hackett was sent to administer it. (Dunstan 1913, p. 851) Although all the significant gold discoveries had actually been made on Merri Merriwa run, the name Ravenswood had stuck. Perhaps it had been assisted by the fact that the name was familiar in Australian gold diggers' folklore, because the sheep station where the Bendigo goldfield had been discovered in March 1851 was also called Ravenswood. (Flett 1970, pp. 217 & 228) But Marmaduke Curr's clever plan to attract miners onto the family cattle station proved more successful than he intended; when the annual lease expired in 1872 the government resumed the run because so much of it had been occupied for mining purposes. (QSA TRE 16)

By 1871 there were 109 prospecting claims granted, and a population of about 900 miners was spread out among four camps - Upper Camp, Middle Camp, Lower Camp and the Eight Mile Rush on the road to Bowen - but more than half of these were at the Upper Camp on Elphinstone Creek, soon to become the town of Ravenswood. Most of the activity was quartz mining, only about fifty people were still working alluvial. (Pring 1871, p. 24)

As confidence in the gold reefs of Elphinstone Creek grew, shopkeepers and hoteliers began to invest in more substantial buildings in the new township. Proudly recording the physical changes in the town was to become a constant preoccupation of Ravenswood's newspaper correspondents. Only three months after the Lady Marion's first crushing, one wrote:

Our town is gradually changing its appearance, and buildings of greater pretensions to architectural beauty than the old sapling shanties are fast springing up. We have already arrived at the stage of weatherboards, and in a very short time shall no doubt sport plate glass and all that kind of thing. (*Port Denison Times* 16 July 1870)

It was only a few weeks later that the same journalist was able to report: "Mr Dippel has the honour and glory of erecting the first comfortable weatherboard cottage with real glass windows." (*Port Denison Times* 3 September 1870) The newspaper intended this as an encouraging indication that Ravenswood was no longer reliant on primitive building techniques, but was demonstrating a new period of prosperity and confidence by building in industrial materials. Mr Dippel, too, was keen to raise building standards in Ravenswood, as he owned the carrying company that would make a lot of money by bringing the imported materials in from the coast.

Early Ravenswood 1870-1883

Government Surveyor John von Stieglitz arrived in the Upper Camp in November 1870 to survey a township, but he was too late to draw up one of the square grid plans that the government liked to impose on the diggings. (von Stieglitz 1994; *Port Denison Times*

24 December 1870) The miners had spent a year making their own arrangements, and the town plan was already established. It straddled Elphinstone Creek, focused on the most convenient crossing place just downstream from the Lady Blanche mill. From that point, tracks radiated out in all directions to the diggings, and there were already buildings beside most of them. All von Stieglitz could do was formalise what existed, rule a few straight lines, and lay out some blocks for future subdivision. To this day, Ravenswood's street plan from the air looks like a wobbly spider's web, and the juxtaposition of mining, habitation and commerce gives the town much of its distinctive character.

More mills kept arriving on the banks of Elphinstone Creek. In the course of 1871, Plant and Jackson expanded their machine to ten head and renamed it the Vulcan, Lord and King built the Enterprise Mill, Robson the Working Miner, and Hodgkinson also moved his operation into town, purchasing a much more powerful second-hand machine called the Valentine from Morinish in central Queensland, and positioning it close to the Grant reef, with the new name Mabel Mill. (*Port Denison Times* 3 December 1870 & 10 June 1871; *Charters Towers Mining Journal* 17 May 1884) Commissioner Hackett began to worry that there were too many mills in Ravenswood: "The foundations are now being laid for 15 additional head of stamps. It is to be hoped that the very attractive business of crushing will not be overdone." (Hackett 1871) For nearly fifty years to come, everyday life in Ravenswood would be accompanied constantly by the roar of the stamp batteries.

The town of Ravenswood was gazetted on 20 May 1871, and a commercial centre had already developed. Long before von Stieglitz's survey, Ravenswood's main thoroughfare was established, and named Macrossan Street after the local political candidate. From the crossing of Elphinstone Creek, it went north to Townsville and Bowen, and south to the diggings at Sandy Creek and Donnybrook. Macrossan Street has always given the town much of its character; the hotels and shops of Ravenswood have almost all been located along this one long winding street, from 1870 to the present day.

A newspaper, the *Ravenswood Miner*, had printed its first issue on 15 October 1870. It would launch the career of its proprietor, James Smith Reid, who went on to become one of Australia's great mining railway builders, financing lines to the Broken Hill, Zeehan and Chillagoe fields. (*Charters Towers Mining Journal* 17 May 1884; Kennedy 1984) Commentators proudly described the physical development of the community, as buildings of imported industrial materials began to appear in the tent town of 1869. "Great improvements have taken place in the township both as regards residences stores & hotels, which would tend to show that there is a general confidence in the future of this gold field which for my own part I believe to be perfectly justified." (Hackett 1871) The Bowen newspaper was eagerly following developments in Ravenswood:

The town of Ravenswood at the Upper Camp has made immense progress. The disreputable shanties composed of sapling walls and calico roofs have almost totally disappeared, and are only to be found in the outskirts of the town. Substantial weatherboard buildings with iron roofs have taken their places, and are now packed as close as possible all along the main street. (*Port Denison Times* 10 June 1871)

Despite these early signs of prosperity, there was trouble developing at the mills. Ravenswood's ores were proving very difficult to treat, a topic which this account will deal with at greater length later. Many people responded to the problem by leaving the

field, for Ravenswood was no longer the only promising goldfield in the north. New gold discoveries were still being made, and some of the others offered easier returns. The gold reefs of the Etheridge were being developed soon after Ravenswood's. Charters Towers was discovered at the end of 1871, and was to become a much bigger goldfield than Ravenswood. It began draining off Ravenswood's population from 1872 onward. In 1873 North Queensland's most famous alluvial goldfield was discovered on the Palmer River, and the exodus of impatient diggers accelerated.

Significantly, all of the prominent entrepreneurs who made their start in early Ravenswood - Hodgkinson, Plant and Jackson, Smith Reid - soon moved on to more prosperous mining fields. Some of the miners who remained formed the Ravenswood Mining Protection Association to promote the field. The association's surviving minutes show that it had about 150 members and was a highly political organisation, intently following the debate on the Gold Fields Bill before parliament, and soliciting pledges from miners to support John Macrossan, "the miners' friend" as their local member. Alas, the association's minutes ended abruptly in February 1874 when the secretary John Napier resigned from the committee, "on account of leaving for the Palmer". (QSA A/12051)

It is often stated that Ravenswood had 42 licensed hotels in 1871, the figure given in the reminiscences of former Warden W.R.O. Hill. (Hill 1907, p. 58) Hill's memory was at fault, for the Register of Publican's Licences, which would have been kept in his office, shows there were 30 hotels licensed at the Upper Camp that year, still an impressive number for a population of less than a thousand people: a ratio of about one hotel for every 30 people in the town. (QSA CPS11C/R1) Probably many of these were eating houses or boarding houses rather than what we would think of as pubs today; places where single men living in tents went to have their meals and to do their washing as well as to relax and gossip.

The names given to Ravenswood's hotels in 1871 give some insights into the mining community's interests and values, as well as a list of places the miners had come from:

Aisbett's Family, Bee Hive, Black Jack, Boomerang, Canton, Coach and Horses, Commercial, Diggers Friend, Emerald Isle, Exchange, Golden Age, Harp of Erin, Jews Harp, Melbourne, Mount Pleasant, New Zealand, North Star, Post Office, Queensland, Ravenswood, Reefers Arms, Rockhampton, Royal, Royal Saxon, Sells, Star and Garter, Suncumlew (?), Tattersalls, Union and Working Miner. (QSA CPS11C/R1)

At least three of these hotels had Chinese licensees. In mid-1871 there was an influx into Ravenswood of Chinese miners who had been forcibly evicted from the Western Creek diggings near Gilberton. (*Port Denison Times* 14 January & 7 October 1871) By that time the attention of European miners was focused almost exclusively on the reefs, and Chinese alluvial miners were tolerated on the Ravenswood field. Two of the hotel licences granted in 1872 were to Chinese publicans, W. Wan Chap and Ah Sin T. Wah, who advertised in the newspaper as Yet Wah, Diggers Friend Hotel. (QGG 9 March & 1 June 1872; *Ravenswood Miner* 2 March 1872) Another hotel, the Sunkumlew, proprietor Ah Gauk, advertised "First-class table (the best in town), for £1 per week." (*Ravenswood Miner* 28 October 1871) Two years later, the same hotel was run by Tommy Ah Sing. (*Ravenswood Miner* 3 January 1874) Ah Hoon charged the same meal prices at the Canton Hotel, and advertised "first class Grog". (*Ravenswood Miner* 22 March 1873) When Thorval Weitemeyer arrived in Ravenswood about 1872, he described the

settlement, including two Chinese boarding houses. The gazette notices and newspaper advertisements suggest that Weitemeyer's boarding houses were licensed premises:

I will not attempt a long description of this the first gold-field I was ever on. There was an ordinary street composed of hotels, boarding-houses and stores, on both sides of the road. Behind the street were tents in which the diggers principally lived. Everywhere was earth-mounds where someone was or had been busy rooting the ground about. The reefs were each surmounted by an ordinary windlass, where a man would stand hauling up the quartz all day long. Such was the picture presented at a superficial glance at Ravenswood, and I think the description answers for all other Queensland gold-diggings. Nearly all the people boarded in two boarding-houses kept by Chinamen, one on each side of the street. I think there must have been two or three hundred boarders in each. They were both alike, two large bark-houses, no floor, only two immense tables with forms on each side. On these tables were at meal-times every conceivable delicacy in season, and up and down between the tables an army of Chinamen would run round waiting on their guests. (Weitemeyer 1908, pp. 172-173)

Early Ravenswood was a cosmopolitan community, and many of its members were well used to life on earlier goldfields. Baker James Ormiston reminded his customers he was the "Pioneer Baker of the West Coast of New Zealand". Louis Borghero, publican of the Working Miner Hotel, referred to his "numerous friends and acquaintances among the working miners of Victoria, N.S. Wales and Queensland". (*Ravenswood Miner* 9 December 1871)

There were almost nightly meetings in the hotels of early Ravenswood, as road boards, cricket clubs and jockey clubs were formed, as well as committees to raise money for a hospital, a school, and churches. The Catholic church committee raised £330 and called tenders for Ravenswood's first chapel. Father Connolly of Townsville blessed the foundations of St Patricks in August 1871. (*Port Denison Times* 29 July & 19 August 1871) An Anglican church and rectory followed much later, in 1879.

The Queensland government provided a Court House in 1871, Police Station and Barracks in 1872, a public powder magazine and a Post and Telegraph Office in 1873. (QSA A/13141) The first hospital was a community one, funded by private subscriptions, and cryptic newspaper reports suggest that early Ravenswood had difficulty finding a resident doctor who was both qualified and sober. The government called tenders for the construction of a larger hospital in 1878. (*Towers Herald* 20 July 1878)

As the Ravenswood community grew in size and confidence, the number of families with children increased, and by 1872 a local committee was pressing the Department of Public Instruction to provide a school. A government school and teacher's residence were built on the hill near the Grant mine in late 1873, and opened in January 1874. (QSA EDU/Z2309) The residence is still in use; it is not only the oldest building standing in Ravenswood, but the oldest house in any town in North Queensland.

Another rush to the Hodgkinson took more miners away early in 1876, and an indication of the changes these rushes were making to the composition of Ravenswood's population came when Yet Wah sold his Diggers Friend hotel and boarding house, strategically situated beside the bridge, to Mr Aisbett who significantly re-named it the Family Hotel. (*Northern Advocate* 15 April 1876) The Australian Joint Stock Bank arrived on the field very early, building its office in a strategic location overlooking the

bridge before the end of 1870. (*Port Denison Times* 1 October 1870) The Queensland National Bank opened a branch in rented premises in 1878. Local government also came to the goldfield in late 1879 when the Ravenswood Divisional Board was established.

One important cultural institution in early Ravenswood was the School of Arts, which provided both entertainment and education. An early hall was superseded by a larger building late in 1875: "Our School of Arts is in a very flourishing condition at the present time. Instead of the puny, insignificant looking building once calling itself the Ravenswood School of Arts, we have a grand hall now, with a still grander piano in it". (*Northern Advocate* 4 January 1876) This description is rather confusing, as two years later another report said: "Well, our School of Arts is in a flourishing condition. We own a large hall, boasting a large stage, with a piano on it. The reading-room and library is attached to the hall at one side." (*Towers Herald* 2 February 1878) The sequence of events seems to have been: (a) in the early 1870s a "puny, insignificant" School of Arts was built, then (b) in 1875 the Library, "a grand hall" was built beside it, and (c) between 1876 and 1878 an even larger hall with a stage was built to replace the original building. This hall, however, was not the existing building, which was still some years in the future.

All of these new commercial and civic buildings in Ravenswood were constructed of sawn timber frames with corrugated iron roofs. It is worth pausing to consider the implications of this transition to industrially manufactured building materials. The nearest sawmill was a very small one in Bowen, although most building timber was still shipped north from Maryborough or Brisbane. The corrugated iron all came from England, as did the nails, glass, hinges and doorknobs. (Bell 1984) Every component of every building arrived in the north by ship, and then had to be overlanded by dray either up Dippel's track from Bowen, or over Reid Gap from Townsville. Not surprisingly, many miners were unwilling to make such an investment in housing, and continued to build in local primitive materials. Bricks for fireplaces and chimneys were made locally from an early date; in 1871, Robert Smithson was advertising his Golden Bar Brick Company. (*Ravenswood Miner* 9 December 1871)

The landscape around Ravenswood had changed in appearance after a few years of underground mining and milling. The only fuel used in Ravenswood's boiler furnaces was firewood, and by the late 1870s there were no tall trees left within hundreds of metres of the town. Firewood cutting and carting became a subsidiary industry to mining. Grazing by domestic goats kept the eucalyptus regrowth down, and Ravenswood stood in the centre of a large clearing in the woodland, which would go on expanding for the next twenty-five years. The goats were a conspicuous part of life in Ravenswood, and played an important part in shaping the landscape; as early as 1876 there were complaints about the goat nuisance, and ineffective efforts to prosecute their owners. (*Northern Advocate* 12 February 1876)

The *Gold Fields Act* 1874 introduced more effective regulations for Queensland goldfields, and replaced the earlier Commissioners with Wardens, whose annual reports to the Mines Department are a useful source of information on the mining fields. By 1878, the Ravenswood field had 1,300 people, a new newspaper, the *Ravenswood Mining Journal*, and the warden proudly indicated the size of the population by reporting that in that year the butchers had slaughtered 539 bullocks, 1,250 sheep and 60 pigs. (*AR* 1878, p. 17) This was a common and fairly accurate means of estimating the population, as vegetarians were rare on the goldfields. However, when in 1880 the

exodus to other fields brought a decline in gold production. Warden Hill put a brave face on it by describing the field as “more settled and steady”:

The town has much improved in appearance and the miners seem more inclined to settle permanently, and one sees very few eyesores in the shape of tumble-down humpies and calico domiciles. (AR 1880, p. 230)

We can test the accuracy of Hill's description by looking at the Divisional Board's Valuation Registers, which recorded the materials of buildings in the town. These show that, while the commercial buildings lining Macrossan Street were mostly of sawn timber and iron, more than half of the outlying miners' huts were still decidedly makeshift. As late as 1882, 45% of buildings in the division were partly of bark, 3% of slab and 1% of grass. Six percent were tents. Nearly all the miners lived on Residence Areas under the *Gold Fields Act*, which caused problems for the Divisional Board, as it was forced to levy rates on the value of property improvements. An attempt at a blanket valuation of all bark huts and tents at £5 caused uproar, because it was effectively a poll tax on all residents. These problems simmered until the *Valuation Act 1887* based council rates on unimproved land value. (QSA COL/O 63; Bell 1982, p. 468)

By 1883 the population of the goldfield was 2,000, and the town probably about 1,400. These figures included 300 Chinese, who worked alluvial claims, were employed as wage labour in some European-owned mines, and operated 24 licensed gardens, which “provide a good supply of vegetables to the town and suburbs.” (AR 1883, p. 29) In later years, Chinese would also be employed by Hugh Barton as skilled roasters and chlorinators at his Mabel Mill. Throughout the nineteenth century, Ravenswood had a significant Chinese minority who were not only prominent in commerce, but also tolerated to an unusual extent within the mining industry.

The Mundic Problem

The early enthusiasm created by the rich outcropping reefs of Ravenswood was dampened as the ore bodies below were exposed. Not far below the surface the nature of the ore changed, and base metals such as lead, arsenic, copper and zinc were found with the gold, all bound in a chemically complex matrix of sulphides. Only a small proportion of the gold in the stone could be extracted by conventional milling processes. One journalist's colourful account said, “A lull then came on the field - the metallic ore was then known by the name of mundic, the presence of which struck terror into the hearts of the miners - and the field began to lose its former glory.” (*Charters Towers Mining Journal* 17 May 1884) Probably few Ravenswood miners were ever actually struck with terror, but certainly many experienced great disappointment at their milling returns. Mundic was a Cornish dialect name for pyrite or sulphide ore (in general use, the three words meant exactly the same thing) and sulphides are usually difficult to process metallurgically. Those of Ravenswood were particularly intractable, and would defy successful treatment for many years.

The problem was recognised very early. Only a year after the first crushing of Ravenswood stone, Commissioner Thomas Hackett reported:

Machinery is being erected for concentrating the pyrites and other heavy minerals in the tailings for the purpose of extracting therefrom the remainder of the gold which cannot be saved by the ordinary machinery. Numerous experiments have shown that the gold chemically combined with the minerals in the tailings is greater

in quantity than that now obtained by crushing. It remains however to be proved whether the whole of it can be extracted by practicable means on a large scale. (Hackett 1871)

Nearly three decades later the millers were still grappling with the same problem, and a government geologist would gloomily sum up the first thirty years of mining in Ravenswood as a "history of metallurgical failures." (Maclaren 1900, p.1) There were two persistent problems confronting the Ravenswood millers. One was that while it was scientifically possible to find ways of extracting gold from the ore - assayers did it in their laboratories every day, using concentrated acids and high temperature furnaces to find out how much gold was in a few ounces of stone - it was commercially impossible to do it at a profit. The assayers' acids and furnace fuel cost too much to use on thousands of tons of ore. The other problem in Ravenswood was that even if experimentation devised a successful extraction process for the ore from one gold-bearing reef, there was no guarantee it would work on the next reef alongside.

A good description of the technical problem that mundic presented to the miners is given by Diane Menghetti:

The problem of how to extract gold from what the miners called the 'mundic' ore was to haunt Ravenswood Goldfield for the rest of its life. Above the water table the 'red stone', quartz which had been oxidised by surface water, was easy to treat. Below the water table most of the gold existed as minute specks throughout the sulphide ore (mainly iron di-sulphide or 'pyrites') Releasing these specks from the sulphides was a problem on any mundic field. In Ravenswood there were several circumstances which made it particularly difficult.

The first of these was that the gold specks were very small. This meant that the ore had to be very finely crushed - a process which tended to result in gold loss through sliming, as the finely crushed ore simply carried off the gold. Further, after their release, these tiny gold particles were likely to be coated with sulphide and therefore could not be collected by mercury which only amalgamates with a clean surface.

The second problem was the variety of sulphides present in the ore, and the unpredictability of their distribution. As well as pyrites, the ore contained galena, chalcopyrite, sphalerite, arsenopyrite and stibnite (minerals containing lead, copper, zinc, arsenic and antimony respectively). Bismuth was also present. Many of these interfere with ore treatment. Thus, while all methods of gold retrieval tried on the field over the next three decades - smelting, chlorination and cyaniding - worked for some ore, none of them worked for all of it - not, at least, at an economical level. (Menghetti 1992, p. 6)

If Ravenswood had been the only goldfield in the north, the industry would have persevered with the partial gold yields, but there were other fields such as Charters Towers and the Palmer where gold extraction was much simpler, and many miners simply moved on. The decline of the Ravenswood field was only partial - mining persisted, and the field remained a significant gold producer - but for the decade from 1872 to 1882 the mundic problem cast a pall over the goldfield, and it was difficult to attract investment capital to Ravenswood.

As the orthodox blankets and amalgamating tables proved unsuccessful, the miners who stayed began to experiment with new technology. Throughout the 1870s and 1880s there were a variety of experiments with fine grinding, amalgamation, chemical treatment and smelting, most of them completely unsuccessful. As most of the proponents were highly secretive about their processes, it is difficult today to tell which ones were serious scientific experiments, which were brave amateur attempts, and which were cynical schemes intended to defraud gullible shareholders. All three were certainly practised on the Ravenswood goldfield. (*Charters Towers Mining Journal* 14 June 1884)

Some of the ores were found to be more responsive to treatment after roasting, or heating them in a furnace to oxidise them, burning off the sulphides in the process. This was not an attractive industry for those living downwind; in addition to the roar of the stampers, Ravenswood residents also had to endure the eye-watering stench of sulphur dioxide. Plant and Jackson were the first of many to go a step further by smelting the gold concentrate, building a reverberatory furnace at the Vulcan Mill. Smelting worked with small ore parcels, but was impractical on a large scale because of the high melting point of gold and the cost of the fuel required; even the local firewood was expensive, but sophisticated smelting required coke as fuel, and the nearest coke ovens were nearly a thousand miles away on the Ipswich coalfield.

The arrival of the railway in Ravenswood brought a more ambitious round of metallurgical experiments. In 1884 Warden John Archibald reported another technical innovation, “the alleged discovery of a method by which it is claimed our complex ores can be successfully treated”:

A company recently formed, called “The Ravenswood Smelting Company”, claims to have discovered a method by which they can extract all gold from the mundic by producing in the first instance, by the aid of fire, a copper bullion (owing to the superabundance of copper) and thereafter, by the aid of an electric-dynamo machine, the separation of the gold from the copper and the zinc takes place. (*AR* 1884, p. 26)

The warden hoped their success would open up the reefs for development, “thereby settling a large and prosperous mining population.” Nineteenth century goldfield wardens often wrote things like that. They saw their job as considerably more than providing a balanced and objective record of events on the goldfield; their reports were intended to promote mining investment and development. For this reason, their reports must always be treated with caution as historical sources, but are usually interesting to read.

The “electric-dynamo machine” is difficult to explain. Either this was an extremely early attempt at electrolytic refining - with no explanation of how the powerful electric current necessary was to be generated in Ravenswood - or the warden had simply been dazzled by a scientific-sounding explanation. Not surprisingly, the following year he reported that the smelting process had encountered “various unforeseen difficulties”, and sensibly queried whether smelting in Ravenswood with its high labour costs and absence of any suitable fuel was economically effective, or whether it would be cheaper simply to concentrate the ore and sent it to a smelter in England or Germany. (*AR* 1885, p. 32) Two years later Warden Frederick Vaughan reported that the same company was building a completely new plant to treat their ores by the Newbery-Vautin chlorination process: “Should this process prove successful a splendid future will be before this field.” (*AR* 1887, p. 33)

In November 1888 William George Kelly Cusack was appointed Warden on the Ravenswood field; he was an old hand, having been a miner and journalist there and in Charters Towers since the first rush. In his first report he summed up the various plants and processes at work on the field. Hugh Barton's Ravenswood Gold Company had taken over the newly-installed chlorination plant at the Mabel Mill. The Queensland Smelting Company on One Mile Creek had been smelting both gold and copper ores, but was now closed. Also at work on One Mile Creek was another new company formed by Duncan and Peter Macintyre, who had taken over an abandoned Cassell's patent plant and adapted it, "substituting a secret process of their own which, if it proves successful (as they aver it is), will revolutionize our mundic workings and prove the philosopher's stone to Ravenswood." The Macintyre brothers' secret process was described as a "simple acid bath", but there was "some difficulty" about their application for Queensland patent rights. (AR 1888, p. 35)

In 1890 there was yet another Scottish syndicate, the Australasian Gold Extracting Company Limited, commencing to build the New England chlorinating plant using Pollock's patent, while the Wild Irish Girl mine nearby began sending concentrated ore for treatment at the Aldershot smelters at Maryborough, and even some to Swansea in Wales. "There are certainly processes here," explained the warden, "such as Barton's Chlorinating Works and Cassell's Works, which act satisfactorily on certain *classes* of ores, but are not suited to *all* ores." (AR 1890, p. 57)

An independent description of the Ravenswood ore treatment plants came from South Australian Mines Inspector James Parkes, who made a detour to inspect the Ravenswood and Charters Towers mines in October 1891 while returning from a visit to the Northern Territory goldfields. He spent two days in Ravenswood and wrote a detailed account of the three principal works: the Macintyre's mysterious process, Barton's chlorinating plant and Pollock's plant at the New England mine. (Parkes 1892, pp. 30-32)

His description of the Macintyre brothers' experiment is particularly interesting. Diane Menghetti has identified their secret as the cyanide process, and believes their plant was the first attempt at cyaniding on a commercial scale in Australia, and perhaps the world. (Menghetti 1992, p. 7) Although a successful extraction process had been patented by MacArthur and the Forrest brothers in Britain only in 1888 - the same year as Cusack first reported the Macintyres' experiments - cyaniding had been the subject of experimentation and earlier patents for some years. The ability of a solution of cyanide salts to dissolve gold from crushed ore had been known for decades; the difficulty was getting the gold back out of the solution. The most important innovations MacArthur and Forrest patented were: first in 1887 the discovery that a dilute solution of potassium cyanide worked better than a strong solution, and second in 1888 the use of finely divided zinc to precipitate the gold. This was the big breakthrough, for it provided an economical method of extracting the gold from solution. Most of the world's gold mines waited years to adopt cyaniding because of the aggressive royalties the inventors charged for use of the process while it was protected. It is generally accepted that the first licensed commercial use of the cyanide process was at the Crown mine at Karangahake in New Zealand in 1889. (Julian *et al* 1921, pp. 1-6; Dorr 1936, pp. 1-4)

When Parkes visited Ravenswood in October 1891 there was no longer any secrecy, for he was permitted to inspect the Macintyres' plant, and specifically described it as the MacArthur-Forrest process, using potassium cyanide solution and zinc shavings.

(Parkes 1892, p. 30) One puzzling aspect of Cusack's 1888 report is that he said the Macintyres were trying to patent their process. If the Macintyres were attempting to pirate the MacArthur-Forrest cyanide process while it was still protected by patent, they would have kept quiet about it, not courted certain exposure by attempting to patent it themselves. The Macintyres seem to have been working on some variation on the process in 1888, but whatever their experiment was, it was apparently not very successful, for they did not figure in the warden's reports in later years. There was a report that a Cassell plant - presumably the Macintyres' - was moved to Charters Towers in 1892. Parkes had noted that copper in the Ravenswood ore interfered with the process and wasted cyanide. Most likely the main problem - as always in Ravenswood - was not the technological development of a treatment process, but the cost of applying it on a commercial scale. (Diane Menghetti has suggested that in reporting the patent problem, Cusack may have heard something about the patent holders in Scotland being engaged in litigation, and thought it was a local issue; in fact, most of the mysteries surrounding the Macintyre brothers' process arise from Cusack's reports, and it may be that he simply did not understand what was going on.)

The frustration of the mundic problem, the mad proliferation of treatment methods, and the competition between companies, kept the Ravenswood field in chaos and disorder for ten years. Many mining companies simply abandoned the field as too difficult. Partial solutions would later be found by combining resources and taking the problem one step at a time. In the meantime, Ravenswood found an alternative industry for a few critical years.

The Topley Silver Mines 1878-1891

The early prospectors realised that the Ravenswood granite hosted many minerals other than gold, and silver-lead ore had been discovered at Sandy Creek in late 1870 and in some of the Ravenswood reefs as early as August 1871. (*Port Denison Times* 24 December 1870; Hackett 1871) The short-lived township of Galena was surveyed on Sandy Creek in 1872. (Hooper 1993, pp. 26-27) However, the price of gold was so much higher than that of any other minerals found locally that silver was a relatively unattractive prospect.

This changed in the late 1870s, when powerful silver mining interests in the USA successfully lobbied for legislation requiring the Treasury to buy most of the enormous national silver output, effectively fixing the silver price and making it a bullion metal like gold. As a result, the silver price was artificially high during the early 1880s, and there was a world-wide boom in silver mining. The metal had never been of much interest to North Queensland miners, but now economic discoveries of silver began to be reported. The first significant find was only a mile north of the town of Ravenswood at the foot of One Mile Hill, a place soon to be known as Topley. In addition to being the first important gold find, Ravenswood was also the scene of the first important discovery of silver in northern Australia.

As usual in early Ravenswood, there is some mystery about the discovery of the Topley silver deposits. Some reports say a Patrick Mangan made the find, but sold it on, unaware of its value. (*Towers Herald* 25 August 1880; *Charters Towers Mining Journal* 12 July 1884) Certainly in 1878, a syndicate headed by Richard King began testing the deposit. (*Towers Herald* 5 October 1878) After four years of exploration, King was encouraged by the high silver price to float the Ravenswood Silver Mining Company Ltd in Sydney in 1882, and took up a large Mineral Freehold, a new form of mining tenure

created by the *Mineral Lands Act*. The promising developments on the new silver field influenced the Queensland government's decision in late 1882 to build a branch railway to Ravenswood. (Kerr 1990, p. 65)

Silver mining was a new industry in the north, and there was no consensus about the most economical way to process the ore. Other new silver fields opened at Argentine on Dotswood run in 1881, and at Montalbion near Herberton in 1883, made the brave decision to smelt their ores on site. (Bell 1996, pp. 50-55) King took the more conservative approach of simply concentrating the ore and shipping it for smelting in England.

By 1883 the company had equipped King's mine with steam winding and pumping plant, and an ore-dressing mill. The township of Topley was established beside One Mile Creek with its own survey plan, a hotel, store and post office. The hotel was at first called the Argentine, then the Silver King, and one of its publicans, Archibald Wilson, would later become very famous in Ravenswood. Two rival mining companies, the Great Extended Ravenswood Mining Company and the Great Queensland Silver Mining Company, were sinking shafts on adjoining leases. King's mine was extremely successful for its first four years, producing about £140,000 worth of silver. During the mid-1880s the Topley silver mines were the most conspicuous mining operations in the district, and the economic boost they gave Ravenswood undoubtedly helped the goldfield survive the depression brought on by the mundic problem and the attractions of other fields.

Rich as the mine was, King's treatment plant was relatively inefficient, and a large amount of silver was known to remain in the tailings. In 1887, responding to a boom in silver share prices, King sold the company to a Melbourne syndicate who floated it in Liverpool, raising money to re-treat the tailings. The new company built a sophisticated treatment plant in a large brick building beside One Mile Creek, connected to the tailings dump by a light tramway. Simultaneously, the Great Extended Company also built a state-of-the-art treatment plant 200m further down the creek, with two impressive German-designed concrete buddles. A published description of the mill called it "the most perfect arrangement of continuous ore-dressing machinery in the colony." (Warnford Lock 1890, p. 400) Both mills were finished by 1889, and Topley seemed poised on the brink of an even more triumphant era.

Abruptly, both companies collapsed in 1890. The Ravenswood Silver Mining mill only produced a few hundred tons of concentrate, the Great Extended mill never reached production. Expenditure on the two mills had plunged both companies into debt on the security of their share capital, and with silver prices and share prices both falling, they could not finance their loans. King was probably aware that the richest part of his lode had already been worked out; significantly, the new mill tramway did not run anywhere near the mine, only to the tailings dump. The Great Extended had been a purely speculative venture, whose productivity never warranted expenditure on such an elaborate treatment plant. Tributary miners worked King's mine for a while - they were free-lance miners who agreed to pay a percentage of their earnings (tribute) to the mine owner - but all mining activity at the Topley silver mines ended in 1891. (Kennedy *et al* 1981) The Great Extended mill was dismantled and taken to the Montalbion smelter. (Lennon & Pearce 1996, p. 54) The final collapse of the American silver price in 1892 ended any hope of the mines' recovery, and put a stop to silver mining throughout the north. Topley township survived as a northern suburb of Ravenswood for many years, with a few people still living there until the 1920s.

The Barton Years 1884-1899

Ravenswood's economy began to pick up from the early 1880s, boosted in part by the Trolley silver mining activity. More important in the longer term was the construction of a railway from Townsville to Charters Towers, then to Ravenswood itself. The close proximity of Charters Towers, which had seemed to threaten Ravenswood in its early years, undoubtedly helped it to survive by attracting mining infrastructure, skills and investment into the region. By itself, Ravenswood would never have attracted a government railway from the coast.

By the late 1870s it had become obvious that Charters Towers was developing into a major reefing field, unhampered by Ravenswood's metallurgical problems. The Queensland government responded to local pleas by commencing the Great Northern Railway from Townsville in 1880, which was opened to Cunningham's Waterhole at the top of the range - only 25 miles from Ravenswood - by November 1881. This immediately reduced cartage costs in Ravenswood, and put an end to any competition from Bowen to be the port for the goldfield. The line had scarcely reached Charters Towers in late 1882 when Cabinet, impressed by the reports from Richard King's silver mines, approved a branch line to Ravenswood to cash in on the world silver boom. (Kerr 1990, p. 65) It was Australia's first railway to a silver mining field, a fact obscured by Ravenswood's much stronger historical association with gold mining. The railway officially opened on 1 December 1884, further reducing local costs and giving Ravenswood an important economic boost. Cunningham's Waterhole was re-named Ravenswood Junction.

Ravenswood also experienced a rise in prosperity because of developments within the local mining industry. Despite the frustration of treating the complex sulphides, it was always possible to extract some gold from the ores. Because many of the Ravenswood reefs were very rich, this meant that the companies could sometimes be pleased with their return, even though they knew that more than half the gold in the ore was still on the tailings heap.

Hugh Hawthorne Barton had arrived on the Ravenswood field very early. He had joined the great Victorian gold rush of 1852, and mined gold continuously on Victorian and Queensland goldfields for nearly twenty years before arriving in Ravenswood. (Pring 1871, p. 26) From the late 1870s he operated the Brothers Mill on Elphinstone Creek, and was prominent in civic affairs, for many years the Chairman of the Ravenswood Divisional Board.

In about 1884 Barton began to expand his mining operations, taking over the Grant, Sunset and Black Jack mines and the Mabel Mill. Other properties were added to the group as time went on. Barton formed the Ravenswood Gold Company, and for the next ten years enjoyed modest success. His company had lean times and for a few years he relinquished control of the Mabel Mill, but for most of the period from 1884 to 1896 his group operated on a larger scale and more productively than any previous mining operation in Ravenswood. There were several reasons for Barton's success. First, he was assisted by factors outside his control, the coming of the railway, and the silver boom at Trolley. Second, his consolidation of operations brought economies of scale, and the flexibility to vary his treatment processes to suit different ores. By sorting the ores into different types, Barton was able to experiment with them individually. He knew there was no single answer to Ravenswood's metallurgical problems, but went along

with any process that worked well. At the Mabel Mill he used chlorination for some ore parcels, but smelted others. Barton employed Chinese workers in the mill, some of whom became highly skilled at roasting and chlorinating techniques. Intractable ores were concentrated and sent away for treatment by experts. Barton's methods were only partly successful, but they would lay the groundwork for later developments, which would culminate in the most prosperous mining era in Ravenswood's history.

While the population of Ravenswood still experienced fluctuations during this time, it remained between 2,000 and 3,000 in the period from 1885 to 1900, and had taken on the economic characteristics of a stable community. The proliferation of hotels and eating houses in early bachelor Ravenswood had gone. With a more stable and balanced population, the town had only six hotels, the Commercial, Criterion, Exchange, Family, Ravenswood and Royal. None of them any longer had a Chinese licensee, but Chinese merchants were prominent among the town's storekeepers; On Wah & Coy, Sun Wing Lee, Sing Chong, Sam Yuen and Tong Chong & Coy all advertised in 1884. (*Pugh's Almanac* 1884, p. 408)

The physical development of the town, which had stagnated since the 1870s, saw a revival in the mid-1880s. After the railway arrived in Ravenswood, industrial building materials came into universal use, and there were probably no new buildings of bark, slab or grass after 1884. The school, which had opened with an enrolment of 147 in 1874, had been enlarged by the addition of several classrooms in the intervening years, and had grown to 390 pupils by 1889, about a sixth of the population of the town. (*Ravenswood Centenary* 1973)

There was an impressive new generation of public buildings, replacing many of those of the early 1870s. The government built a new Court House in 1883, and a new Post and Telegraph Office in 1885. (*Northern Miner* 23 January 1884; V&P 1891, Vol. 4, p. 567; QSA A/13068) The School of Arts built an attractive new concert hall beside the library in 1884 to replace the 1876 hall. (QSA COL/O 63; *Charters Towers Mining Journal* July 1884) In January 1884 there was a "dreadful storm" which blew down brick chimneys throughout the town. The Catholic chapel of 1871 on the hill was "blown down level with the ground". It was replaced the same year by a new St Patricks church and St Agnes convent, opened by Bishop Cani in October. (*Northern Miner* 31 January & 25 October 1884) In 1887 the Wesleyan congregation built a church and manse in Elphinstone Street. (Roderick 1975)

The Queensland National Bank expanded its operations in Ravenswood in 1894, and began an aggressive campaign to attract mining clients. In 1899 it bought the Australian Joint Stock Bank's premises in the centre of town and took over as the major bank in Ravenswood. (Queensland National Bank Premises Register) The QN Bank was to play a crucial role in Ravenswood's remaining years of mining.

The Wilson Years 1899-1917

For the eighteen years beginning in 1899, the largest mining operation on the Ravenswood field was that of the New Ravenswood company. "In the period from 1899 to 1917, the company was to dominate the goldfield, and to a large extent, determine its future." (Megarrity 1997, p. 38) That future was to be something like a roller-coaster ride. In those eighteen years Ravenswood would experience its most productive gold mining episode, giving the community its most exhilarating boom in prosperity, which can

still be seen in the town's surviving buildings today. It would later see the complete collapse of Ravenswood's gold mining industry, and the dispersal of the community.

The key player in the rise and fall of New Ravenswood was its managing director, Archibald Laurence Wilson. Unlike most other northern mine managers, Wilson was professionally qualified, with a diploma in Mining Engineering from Edinburgh, and experience on the New Zealand and Palmer goldfields before he arrived on Ravenswood in 1878. (Caspani 1987, pp. 7-8) He combined two of the most lucrative goldfield occupations, mine manager and hotel licensee; for a time in the 1880s he operated the Silver King Hotel in the township of Topley. Wilson first came to the attention of Warden Cusack in the mid-1890s when, as manager of the John Bull mine at Sandy Creek, he raised capital in London and installed one of the first successful cyanide plants on the field. The warden described the operation as "carried out in every way upon the most approved and economic principles." (AR 1896, p. 87) When he wrote that praise of Wilson's management, Cusack did not know that the John Bull would never pay a dividend, but that was true of most mines on the Ravenswood field.

Within three years, Wilson was in a position to take over the Barton group of mines, which had long been the core of the Ravenswood field. They were declining in profitability as they went deeper, still frustrated by being able to extract gold efficiently from the ore from some mines, but not others. In the aftermath of the financial crisis of 1893, Barton's Ravenswood Gold Company had difficulty financing its loans. By 1896 it was in debt to the Queensland National Bank, which foreclosed, seizing the company's Ravenswood mining properties. In 1897 the bank let the Grant and Black Jack mines and Mabel Mill on tribute, in one of the many bungling interventions in its clients' mining properties for which the QN Bank was notorious. (Bell 1987a) The tributers attempted to operate the chlorinating works, but refused to employ Barton's experienced Chinese workforce. The resulting amateur attempts at chlorination were disastrous, and the Chinese were re-employed, whereupon someone sabotaged the Mabel Mill by breaching its dam wall, draining the water supply. (AR 1897, p. 90) Barton's enterprise was back in the chaos and disorder from which he had rescued the Ravenswood field.

Wilson had been following the declining fortunes of the Ravenswood Gold Company with great interest. He knew that, despite its problems, Barton's consolidated operation was still the best option for successful gold mining in Ravenswood, and reviving it was only a matter of raising sufficient capital. In 1899 he went to London again and floated New Ravenswood Ltd, which bought Barton's Grant, Sunset, Black Jack, Melaneur, Shelmalier and London mines and the Mabel Mill from the Queensland National Bank, and later acquired the Saratoga, Duke of Edinburgh and London North, so that the New Ravenswood leases covered the very heart of the Ravenswood field. Under Wilson's management in the next few years, the company flourished. He concentrated on the promising Sunset mine at first, driving it deeper and redeveloping its underground workings. New timber headframes and more powerful winding engines were built on the major mines, each with a new brick boiler stack. The Grant and Sunset mines were redeveloped with underlie shafts at about 45° running down the dip of the reefs, and squat headframes like timber ramps at the surface. At the same time Wilson rebuilt the Mabel Mill so that it would more efficiently separate the constituent minerals from the ore, and sent the more difficult ones away for smelting. His big-spending approach to adopting new technology repeated the formula that had brought him to prominence at Sandy Creek. For a few years, it was a brilliant success.

New Ravenswood Ltd had an unusual company structure, with all the major shareholders and directors in London, and all the management expertise in Ravenswood. Normal practice was for such companies to have an Australian director on the board in London, and an English manager or secretary in Australia. The shareholders must have had very great faith in Wilson. In setting up New Ravenswood, Wilson sought out London investors associated with the Queensland Smelting Company, which had briefly smelted in Ravenswood in the 1880s, and now operated the large Aldershot smelters at Maryborough in southern Queensland. (Megarrity 1997, p. 35-37) The relationship between the two companies was mutually beneficial; Aldershot gaining a customer with a guaranteed local supply of concentrate, New Ravenswood having privileged access to a friendly smelter.

Wilson's technical ally in the mill was the Wilfley table, only patented as recently as 1896, and never before used in Queensland. While broadly similar in principle to many older jigs, vanners and shaking tables, the Wilfley table was far more effective, and in the hands of a skilful operator could be fine-tuned to separate out multiple mineral products from within one ore. (Richards 1907) It enabled the mill to have several flow paths which dealt individually with the bafflingly complex constituents of the orebodies. Wilson abandoned the chlorination process in the Mabel Mill altogether, and at first only used cyaniding on low grade tailings. Galena and free gold, which responded to amalgamating, were treated within the Mabel Mill. The lighter sulphides, containing the arsenic, copper and zinc, were concentrated and sent to Aldershot for smelting (Cameron 1903, p. 4; Clark 1904, pp. 305-306) Having proved the technique with two Wilfley tables installed in 1900, Wilson had six at work in the mill by 1903, at the same time expanding the crushing capacity of the mill to 30 stamps. The result was the most efficient production which had ever been achieved from the orebodies of the Ravenswood field; from a yield of below an ounce of gold per ton of ore in the 1890s, Wilson's methods raised production in 1902-03 from the same mines to more than two ounces per ton. At its peak, the company was producing over 1,000 ounces of gold every week. It seemed that Ravenswood's long struggle with mundic had been won.

In 1902 Cusack, never noted for the succinctness of his reports, described Wilson's New Ravenswood operation as:

... taking up and casting aside of effete machinery, remodelling in a general way the whole of the mines under his charge, substituting newer and more powerful hauling and milling machinery, new chimney stacks (of gigantic dimensions), elevating wheels and other advanced contrivances, bagging sheds for pyritous tailings and concentrates before bagging for transit to the smelter, and the adding generally of the newest and best designs calculated to advance the industry to save and cheapen labour. (AR 1902, p. 97)

The five years from 1901 to 1905 were the peak of Wilson's achievement, with astonishing dividends being paid to the shareholders in London. Although excellent records have survived from New Ravenswood Ltd, it is difficult to make complete sense of the company's disbursements, with different figures being given in the company's annual reports, the newspapers, the Queensland Mines Department reports and the Warden's share register, all complicated by the fact that some dividends were paid in cash and others in future share issues, and that it was common for dividends to be declared for past or future years. The best estimate is that extracted by Lyndon Megarrity from Nash's usually reliable *Australasian Joint Stock Companies Yearbook*:

New Ravenswood Ltd dividend payments 1900-1908

1900-01	50%	
1901-02	50%	
1902-03	75%	
1903-04	50%	
1904-05	25%	
1905-06	12.5%	
1906-07	25%	
1907-08	37.5%	(Megarrity 1997, p. 42)

The shareholders recouped their entire investment in the first two years, and averaged 50% per annum return for the first five years. New Ravenswood was featured in the mining columns of the London *Times*, attracting worldwide attention, which made it easier for other Ravenswood companies to attract capital. For the first time, Charters Towers agents began to promote Ravenswood companies, and Sydney Thorp opened a mining exchange in Macrossan Street. However, the success of New Ravenswood seemed to inhibit others from mining on the field. The boisterous competition of the 1880s was long gone from Ravenswood, only a few mines operated outside the Wilson group, and all the other mills except the Brothers were closed.

As word spread across the north that Wilson was taking on miners, people flocked to Ravenswood. New arrivals could not find accommodation; six miners from Charters Towers were forced to spend their first month in Ravenswood camped in "a huge iron cylinder, a discarded remnant of a treatment plant near the New Irish Girl lease", which sounds like the Bruckner furnace from the Pollock chlorination plant. (*Queenslander* 3 September 1903) The population peaked at 4,700 in 1903, and this sparked a building boom unlike anything Ravenswood had ever seen before. The town expanded to its greatest physical extent, and an entirely new generation of houses was built.

It is stated that Mr Hans Thomsen, building contractor for Ravenswood has eighty cottages booked for erection at that town on residence areas taken up by miners and others ... (*Queenslander* 3 September 1903)

Over a thousand people arrived in Ravenswood that year. At the normal rate of house occupancy in mining towns at the time, this may have required the construction of as many as 250 new houses. Most were small two-roomed cottages, but a few were large highset houses with encircling verandahs. One of these was Wilson's new house, on the hill beside the Court House.

Unfortunately the school enrolment figures from 1897 to 1910 have been lost, but in proportion to the population of the town, the school must have reached about 700 or 800 pupils in 1903-05. School photographs from the early twentieth century show an enormous line-up of hundreds of children in front of a greatly enlarged row of classrooms. A fourth classroom block was added to the school in 1905. (Roderick 1975; Brumby 1998)

Those fabulous years in Ravenswood transformed the fabric of the town. The number of hotels rose again to nine. The bark-roofed eating houses for bachelor miners were now thirty years in the past, and these were all respectable two storey buildings along Macrossan Street: the Exchange, Imperial, Metropolitan, Miners Arms, New Ravenswood, Railway, Ravenswood, Royal and Tattersalls. (*Pugh's Almanac* 1904, p.

725) The pride of the town was Charles Browne's enormous Ravenswood hotel on the corner of Macrossan and Deighton streets, with its bars and billiard rooms and first class accommodation. At the turn of the twentieth century, all of Ravenswood's hotels were still built of timber, but that was about to change. James Delaney applied for a licence for the Imperial Hotel in 1900, and his new 18 bedroom premises started trading in 1901. (QSA CPS11C/R4) However, that building was not the present hotel; within weeks the new timber hotel burnt down and Delaney replaced it with the present brick building in 1902. (*North Queensland Register* 29 April 1901; Crow 1997) John Moran also rebuilt the Railway Hotel as a fine brick Federation building in 1902. Beside it, A.L. Wilson built his New Ravenswood Hotel of timber.

The two new brick hotels were an innovation for Ravenswood, and the newly fashionable method of construction was carried on by other builders. Browne's Buildings went up beside the Imperial on the site of the 1901 fire. Across the street Thorp's Building, built by Charters Towers mining agent Sydney Thorp, and its adjoining store were both built of brick about 1904, transforming the centre of the town. The new Ambulance building in Deighton Street was also built of brick before 1905; the date 1902 on its facade is the date of inception of the ambulance service. (Roderick 1975) The cost of bricks was lowered by local manufacture to supply Wilson's company, for in the early twentieth century New Ravenswood was also re-building the mining landscape in and around the town, with expansion of the Mabel Mill, and new headframes and winders, magazines, boilers and brick smokestacks going up beside all the principal shafts. There must have been a tremendous market for bricks in Ravenswood in those few years. The only clue to their manufacturer is the letter H on the frog of many of the New Ravenswood company's bricks.

St Patricks church on the hill was also doubled in size in 1905 to accommodate a growing congregation. (*Queenslander* 14 January 1905; *AR* 1905, p. 88) Interestingly, that was the end of the building boom; although New Ravenswood Ltd was apparently still thriving, no significant new buildings went up in Ravenswood after 1905.

Despite the prosperity and physical development of Ravenswood, for many people in the town daily life was far from luxurious. The houses, shops and churches were interspersed with mines and mills, and industrial noise, smoke and sulphur fumes were constantly present. Miners on the field were paid lower wages and worked longer hours than their counterparts in Charters Towers. Early death from mining accidents and occupational diseases were constant hazards of the industry, and they were not confined to the workforce; the legacy of thirty years of mining had left the environs of the town "one mass of old shafts from end to end", and it was not unknown for children to die in falls down abandoned mines. (*AR* 1902, p. 100) But infant deaths from typhoid or scarlet fever were far more common. Domestic water supply in Ravenswood came from rainwater tanks or dams on the gullies, and the only sanitation was backyard earth or pan closets. In these conditions, epidemics of infectious disease were frequent. The folklore about Ravenswood in its boom years boasts of the French champagne that was available in the hotels on Macrossan Street, but says very little about child mortality in the corrugated iron cottages of the workforce.

Buoyed by the success of New Ravenswood, Wilson attempted to repeat his winning formula a third and then a fourth time. The productivity of the Grant and Sunset reefs led him to believe that where they met underground, they would form a bonanza gold deposit. He apparently wanted this deeply hidden gold - not the impressive production already coming from New Ravenswood's mill - to become the pinnacle of his career.

The same erroneous thinking was encouraging mining companies all over the world to sink ever deeper in search of a mythical “mother lode”. (Probably on Ravenswood this belief was strengthened by the fact that the Melaneur and Black Jack reefs had been found to intersect in a particularly rich patch of ore.) With the backing of the same group of London investors, in 1902 Wilson floated the Deep Mines Ltd which was to sink a shaft east of the New Ravenswood leases in an attempt to reach the place where the two reefs met. Then in 1903 he floated the Grand Junction Consols Ltd for the same purpose, this time sinking to the north. (Megarrity 1997, p. 58) Meanwhile, the same theory led another deeps company, the Grant & Sunset Extended, to seek the same reefs to the south of New Ravenswood’s leases. (Cameron 1903) It was evident from a glance at the map that what was happening owed more to wishful thinking than to geology. Even Cusack, who loyally supported most of Wilson’s activities, commented sardonically,

A block on the Deep Mines lease is somewhat like holding valuable interests in the moon; it is very dubious at best, and decidedly a long way off striking payable gold. No matter how sanguine may be our hopes and expectations, I fear a 2,000 feet straight shaft will not trouble any of us for a great number of years to come. (AR 1902, p. 99)

The Deep Mine burrowed vertically downwards at enormous cost for two years, passing through five small mineral formations, each of which yielded a few ounces of gold. In 1905, when the shaft had reached a depth of 1,536 feet, it intersected an orebody which Wilson was convinced must be the Sunset reef, but the ore was so rich in zinc that even the Aldershot smelters could not treat it satisfactorily. Underground exploration continued for some years, but nothing of value ever came up from the Deep Mine. The company’s total losses were at least £65,000. (Megarrity 1997, p. 74)

After 22 years as Warden in Ravenswood, Cusack died in May 1910. He had faithfully recorded the rise of New Ravenswood in his official reports, and was spared the pain of reporting its fall. Folklore says that New Ravenswood’s decline began with the great strike of 1912, but this is a nostalgic simplification of complex events - it is probably what Wilson told his business colleagues for years afterward - because the strike was a symptom of the problems that had already developed within New Ravenswood, not the cause of them. The strike certainly accelerated the company’s decline, and drew public attention to it, but in fact Wilson’s enterprise was already in trouble several years before the strike began. 1908 was the last really good year, and then gold production began to dip downwards in every year.

The reasons for the decline of New Ravenswood were in part those that face every underground gold mining company: as the mines become older and deeper, costs always rise, and yields always decline. One indication of the financial pressures acting on New Ravenswood can still be seen today. In 1900 firewood cost £1 per ton in Ravenswood (Maclaren 1901, p. 7), but as it had to be carried increasing distances to the mine boilers, the cost of carting steadily raised its price. About 1905 the company found it was cheaper to establish wood-cutting camps along the railway to Ravenswood Junction, and bring its firewood in by train. The resulting clearings in the woodland can still be seen along the railway at Grass Hut, Kirk River and other places.

Other more specific reasons for New Ravenswood's problems were its waste of money on deep mining adventures, and the board’s generosity to shareholders; there can be no doubt that the early dividend payments were ridiculously high, and as a result there were

no reserves of working capital in the later critical years. Characteristically, Wilson tried to fight adversity with new technology. In 1906 he bought tube mills for fine grinding, then in 1907 installed an Elmore Vacuum Concentrator - a variation on the flotation process - but it proved a failure. Its tanks were later converted to a cyanide plant. But the thirty-year-old mines of the group gradually began to close: the Shelmalier first in 1904, the Black Jack in 1909, the Melaneur in 1910. As each mine closed and its pumps stopped, the water level rose faster in all the other mines in the vicinity, and their pumping costs increased.

As the mines closed and the workforce shrank, so the population of Ravenswood began to edge downward in step with the gold production figures. The building boom ceased; in fact the earliest warnings of decline may have been sounded by the fact that so few new buildings were constructed in Ravenswood after 1905. The hospital closed in 1908, and the warden reported that the "sick and maimed" would in future be sent by train to Charters Towers. (AR 1908, p. 103) By 1910 the Grant, Sunset, Duke of Edinburgh and London North were the only producing mines left in New Ravenswood's empire, and the population of the town was down to 3,500.

Perhaps Wilson's management skills had been over-rated in the past. He had cleverly found a way around some of Ravenswood's metallurgical difficulties, but he was still faced with every early twentieth century Australian gold mine manager's graph of increasing costs and declining yield. He could find ways to hold costs down for a while, but he was defeated in every attempt to produce more gold, which was what the London shareholders most wanted. Probably the closure of the Aldershot smelters in 1906 also meant the end of that advantageous relationship, so that concentrates had to be shipped to the less friendly smelters at Cockle Creek and Port Kembla, or at very great cost to Britain.

Dividend payments to London shareholders were shrinking year by year.

New Ravenswood Ltd dividend payments 1908-1912

1907-08	37.5%	
1908-09	31.25%	
1909-10	12.5%	
1910-11	6.25%	
1911-12	18.75%	(Megarrity 1997, p. 42)

There were no dividends paid after 1912. Wilson had begun quietly selling his own shares in New Ravenswood Ltd from 1907 onward. (Caspani 1987, p. 24)

In 1912, there was a fall-off in ore grade from the rich Sunset mine, which had been the mainstay of New Ravenswood all along. Wilson's first response to this new emergency was to install a larger cyanide treatment plant at the Mabel Mill, using the tanks left over from the Elmore process, in an attempt to extract more gold locally before selling concentrates to the smelters. It was apparently only marginally successful. With the benefit of historical perspective, we can see that general adoption in Australia of two of the greatest innovations in mineral processing - flotation and cyaniding - coincided with New Ravenswood's heyday. With some experimentation, either of them had the potential to revolutionise the treatment of Ravenswood's ores. Wilson was certainly not afraid of innovation - his early adoption of Wilfley tables and ball mills showed his responsiveness to new technology - but he failed to grasp the potential of both the

flotation and cyanide processes, experimenting with them only as remedial techniques when his company was in difficulty, and after apparently being disappointed with the results, did not persist in developing them.

Wilson's second response to the falling grade from the Sunset was to lay off 32 miners to cut costs. This brought the company into confrontation with the newly-formed local branch of the Amalgamated Workers Association, which was already negotiating to have Ravenswood miners receive the higher wages and better conditions that Charters Towers miners enjoyed. The union saw the dismissals as a flagrant breach of faith, and now demanded reinstatement, a 44 hour week, and a 9/- pay rise. Wilson flatly refused all three demands.

The resulting strike dragged on for eight months. The mines never closed completely, as Wilson brought in non-union labour to keep production going, although at a greatly reduced rate. This split the Ravenswood community into union versus non-union camps, a bitter division which never entirely healed. On New Years Eve 1912 the bitterness boiled over during a rowdy street celebration when insults were shouted, then stones were thrown, and a revolver shot was fired, wounding a miner, Michael Gorman, in the leg. (Hunt, 1984; Caspani 1987; Megarrity 1997)

Wilson's many engineering and financial skills did not extend to industrial relations. Arrogant and paranoid, he was bewildered by the strike, could not see any justice in the miners' demands, and believed the union was a subversive political organisation bent on revolution. The miners on the other hand had patiently tolerated poor conditions and low pay for years, believing they were helping the company and supporting the community, and now found themselves being sacked and replaced by outsiders; they felt very strongly that Wilson had betrayed them. The strike ended when the Industrial Court ordered New Ravenswood to observe the hours and wages the union had demanded, but it was a pyrrhic victory for the miners, for the severely wounded company could only afford to re-employ a few of the men. A year later the First World War further raised the company's labour and material costs, and disrupted shipping to the smelters, and bullion sales in London. The company's operations spiralled steadily down over the next three years, as operating costs continued to rise and production continued to decline.

Wilson appealed to the London board for more working capital to keep the company's operations going, but even after years of receiving huge dividends from Ravenswood, they were not interested in further investment in the declining mines. Understandably, many shareholders who had invested in the Deep Mine and Grand Junction companies had lost faith in Wilson's judgment. In the final years, Wilson was reduced to selling off New Ravenswood's unused buildings and other assets to maintain some cash flow, and the miners in the Grant and Sunset mines were doing no development, simply working out patches of ore in the old workings. The London North mine was forced to close in 1915. (AR 1937, p. 111) The New Ravenswood gloom spread to the few other mines still operating. The Deep Mine and all the other deep shafts had been abandoned as a hopeless waste of money. Tributaries picked away at the upper levels of the Grant and Sunset Extended, and a little trial shaft was put down on Golden Hill, but closed when its government subsidy ran out. (AR 1917, p. 123) With revenue from the Ravenswood line dwindling, in 1916 Queensland Government Railways cut the daily train service to two trains a week. (Kerr 1990, p. 65)

On 24 March 1917 New Ravenswood Limited ceased operations altogether. "This action was rendered necessary by the diminution in size and depreciation in value of the

ore lenses on the properties of the company, the increased costs of all labour and mining material, and the want of capital for further development,” explained the warden, writing New Ravenswood’s epitaph. (AR 1917, p. 123) It was the end of large-scale mining in Ravenswood for 70 years.

The ancient Greeks would have recognised Wilson instantly as a victim of what they called *hubris*: excessive pride in a mortal which taunts the gods and leads inevitably to catastrophe. Just as his personal vision and technological abilities created the New Ravenswood era, so Wilson’s fanciful ideas about geology and his failure to understand the changing times hastened its destruction. Wilson died in Townsville in 1935. He is buried in the Ravenswood cemetery, but his grave is unmarked.

Ravenswood Sleeps 1917-1987

When Wilson’s company finally collapsed in 1917, Ravenswood had produced about 850,000 ounces of gold - over 28 tons - worth about £3,500,000, as well as a million ounces of silver. The Sunset mine had produced nearly a quarter of the field’s gold. Ravenswood was the fifth largest gold producer in Queensland, well behind the biggest fields, Charters Towers, Mount Morgan, Gympie and the Palmer, but ahead of Croydon, the Etheridge and the Hodgkinson. (Dunstan 1913)

Ravenswood was not alone in its decline; during the First World War all the other old goldfields of Queensland were closing down, for the same reasons. By 1918 New Ravenswood Ltd was in liquidation, and the Mabel Mill’s plant was already being dismantled and sold off. A few tributers continued to pick at the mines, and in 1919 a company called Ravenswood Gold Mines Ltd took over some of Wilson’s leases and renovated the Deep Mine’s mill, but its operations were on a pathetic scale, producing in each of its first few years of operations the same amounts of gold that New Ravenswood at its peak had produced in a few days. (AR 1919, p. 103; 1921, p. 89)

With the major mines closed, there were no jobs to be had in Ravenswood, and there was no longer any reason for people to remain. Families left by the trainload, some of them headed for the copper mines of the Cloncurry field, which were booming under artificial wartime prices, but had only a few more years to run. The town’s businesses closed down one by one; in 1918 there were only five hotels left trading, the Imperial, Metropolitan, Miners Arms, Railway and Ravenswood. (*Pugh’s Almanac* 1918, p. 767) The Queensland National Bank closed its Ravenswood branch in 1921, and in that year Ravenswood’s population fell below 1,000, and continued to decline. The school that same year once more had 147 pupils, exactly its enrolment when it first opened at the beginning of 1874. (*Ravenswood Centenary* 1973) Out in the deserted firewood clearing around the town, feral plants such as Chinee apple and rubber vine began to appear for the first time. The railway service was reduced again in 1923, when one of the two weekly steam services was replaced by a light Napier rail car. (Kerr 1990, p. 138) It had few passengers; by that year, six years after the New Ravenswood mines closed, the town’s population was down to 530, including eight Chinese. (AR 1923, p. 93)

During the 1920s, the town’s principal export was buildings. Timber-framed houses were pulled apart and sent by train for re-erection in the grazing towns of western Queensland, the suburbs of Townsville, or the growing sugar towns of the Burdekin delta. Considering the size of Ravenswood at its peak about 1905, perhaps as many as a thousand houses may have been railed away. Where are they all today? Hans Thomsen, Ravenswood’s most prominent builder, is said to have subdivided a block of

land at Railway Estate in Townsville and removed a number of Ravenswood houses there as a speculative development. (Crow 1997) Wilson's timber New Ravenswood Hotel was dismantled and railed to the newly-important western railway town of Winton, where it traded for many years as Scott's Hotel. The long-distance exodus of buildings slowed after the railway closed in 1930, but did not stop; in about 1948 the Catholic school was removed to the sugar town of Giru by road, and in 1954 the Ravenswood Masonic Lodge was also taken there. (Roderick 1975; "Foundation Stone" 1955, p. 11) In the 1950s the government also sold off the Court House and Police Station, and they were taken south to Mount Graham station on the Burdekin and used as stockmen's quarters. Only the brick buildings of the early New Ravenswood years were anchored in position, and remained the nucleus of the town.

In December 1929 the Ravenswood Shire was abolished, and absorbed within the Dalrymple Shire, with its office in Charters Towers. (Neal 1984, p. 207) A year later, Ravenswood's reduced railway service closed altogether on 7 November 1930. (Kerr 1990, p. 65) Queensland Government Railways kept its options open for a few years, but in the face of deepening depression pulled the rails up within the next two years, leaving Ravenswood once more accessible only by a rough dirt road as it had been in the years before 1884. Ravenswood Junction was no longer the junction to anywhere, and was re-named Mingela. Ravenswood was the first town in Queensland to lose its railway line. (Kerr 1990, p. 65)

In September 1934, Chief Government Geologist Lionel Ball flew over Ravenswood in the course of a geological survey and took the first aerial photographs of the town. In that year, Ravenswood had a population of 357 people. Ball's photographs show the town looking very much as it does today; although there were large gaps visible in the streets, the great exodus of buildings was over. More than half of the buildings that he photographed in 1934 are still standing today.

Like most gold mining centres in Australia, Ravenswood saw an upturn in mining in the 1930s because, perversely, gold mining becomes more profitable during times of economic depression. The price of gold had been fixed at just over £4 per troy ounce for many decades, but in 1931 it was floated, and immediately began to rise steadily, doubling in value to £8 by 1934, and quadrupling to £16 by 1949. In addition, the Commonwealth offered a bounty on all new gold production, and the Queensland Department of Mines also offered more generous subsidies to new mines in the hope of encouraging the State's moribund mining industry.

The result was a flurry of activity in Ravenswood. In 1933 the North Queensland Gold Mining Development Company Pty Ltd took up leases along the Buck Reef and re-opened the Golden Hill mine above St Patricks church. The following year, their operations were taken over by the much larger company Gold Mines of Australia Ltd, which took out an Authority to Prospect - a new form of tenure specifically designed to encourage large-scale prospecting - covering the whole town. The Sunset Extended Gold Mining Company Ltd pumped out the Sunset and Duke of Edinburgh mines, which had been the last significant producers, and retimbered their shafts for production. The most conspicuous development was in Macrossan Street, where in 1934 James Judge revived the old Eureka mine which had not been worked since the 1870s, and sank a new shaft more than a hundred feet deep on the vacant allotment right beside the Imperial Hotel. Another syndicate was re-treating the Grant mullock heaps in the few stampers that were left of the Mabel Mill. The London North mine was re-opened in 1937, and a group of Basque miners formed the Biscay Mining Syndicate to work the

Sunset No. 2 shaft. They used a petrol engine down the shaft for pumping, and the warden was worried about the safety of the practice. He was proved right in February 1937 when Jose Guerricabeitea was killed by an explosion of petrol fumes as he climbed down the shaft holding an acetylene lamp. (*AR* 1933, p. 113; 1934, p. 107; 1935, p. 109; 1936, p. 100; 1937, pp. 111 & 150) At least 29 miners had died in mining accidents in Ravenswood between 1879 and 1937.

Most of these 1930s ventures were simply small scale revivals of mines known to have some accessible gold left at shallow depth. Except for the Eureka and Golden Hill, they were doing no development, just gouging out rich patches of ore. The most systematic efforts to cash in on the high gold price were made by people who went back to the tailings dumps accumulated during nearly fifty years of milling, and treated them again using the cyanide process, which had increased in effectiveness over the years. In 1938 Partridge and Ralston had the Mabel Mill's tailings tested, and found they assayed 5 to 7dwt of gold - between a quarter and a third of an ounce of gold in every ton - a higher grade than many profitable gold mines had in their orebodies. They installed a new plant beside Elphinstone Creek, with cyanide tanks and a ball mill for fine grinding. Later they added flotation tanks to extract silver and base metals. For the next few years, their mill was probably the most profitable operation in Ravenswood.

There were two new plants built to treat mullock dumps the same year. Archibald and Heuier invested in a large Empire edge-running mill and Wilfley table, both powered by a diesel engine, and set up a mill on the bank of One Mile Creek. James Judge formed the Ravenswood Gold Mining Syndicate to treat some rich ore in the mullock dumps at the Sunset mine. The syndicate bought a ten-head battery of old steam-powered stampers from Mount Wright and installed it on the Sunset lease. Their mill simply crushed and concentrated the ore; the concentrate was sent to the Chillagoe State Smelters for treatment. (*AR* 1938, pp. 105-6 & 144; 1939, pp. 106-7 & 142) The results must have been satisfactory, for the following year Judge decided to expand the operation. He bought a huge Stirling boiler and 250 hp engine from the Burdekin Meatworks, and enlarged the mill to 30 head of stamps, using a motley collection of old machinery from mines around the district. It was too much, too fast. The mill was over-powered for its job, and as concrete was unobtainable because of the war, its machinery was based on poorly built brick foundations, which soon began to break up under the pounding of the stamps. The new mill never worked satisfactorily, and closed in 1942. (Menghetti 1992; Lennon & Pearce 1996, pp. 59-61)

This mining activity during the depression breathed some life back into Ravenswood, but all these operations were on a small scale, and employed very few people. Their aim was survival, not prosperity, and Ravenswood remained a quiet town. The Chinese apple and rubber vine had moved in from the firewood clearing and were growing on vacant allotments in the township.

The Second World War once again brought labour and material shortages, fuel of any kind became almost impossible to obtain, and gold mining wound down again. By the end of 1942 both Partridge and Judge had closed their re-treatment plants. A new kind of life came to the township at the height of the war, when civilians were evacuated from the coast for fear of Japanese bombing, and two Townsville schools sent their pupils to Ravenswood from 1942 to 1945. The girls of St Patricks College on the Strand were housed in St Agnes convent at Ravenswood, and the girls of the Anglican school of St Anne at Aitkenvale were billeted in Wilson's house. Lines of uniformed schoolgirls escorted by black-clad nuns became part of the wartime townscape.

The last episode of the old mining industry began shortly after the war ended. The Duke of Edinburgh mine was briefly re-opened in 1947, but that came to nothing. (Menghetti 1992, p. 25) After Percy Kean was discharged from the RAAF, he came to Ravenswood in 1947 to investigate a mining property his father had bought in 1924, Richard King's old Mineral Freehold at Totley. Kean commissioned a geological report from Archibald Woodville Wilson, the son of Archibald Laurence, and on its advice decided his best prospect was to re-open the nearby Great Extended mine, which had been silent since 1890. To do this he embarked on an extraordinary odyssey. New mining machinery was still unobtainable so soon after the war, but all over North Queensland there were abandoned mining fields equipped with every sort of machinery imaginable, all of it legally the property of the Queensland Department of Mines, and available for purchase at cheap prices.

Kean bought the machinery from the Louisa mine on the Palmer goldfield. It was an unusual plant, a very large 220 hp MAN diesel engine coupled to a Vickers generator - which had originally been used to power a treatment plant at Wolfram, west of Cairns, by a French company in 1912 before being taken to the Palmer - and a steel headframe with electrically-driven winding and pumping gear that had been installed at the Louisa gold mine in 1915. It had all been sitting unused since 1924, and then had a brief revival in 1939-41. The cantankerous MAN diesel had defeated every attempt by several owners to start it since 1916. To shift it all, Kean bought a war surplus US Army truck, dismantled the machinery and made a series of about twenty trips through the bush to deliver it to the nearest railhead, Chillagoe, from where it was railed to Mingela and then trucked to Totley to be re-erected at the Great Extended mine. Kean also built a timber headframe over King's mine and re-opened it. It was 1951 before the mines began producing, and Kean bought Partridge's abandoned mill beside Elphinstone Creek and re-equipped it to treat his silver-lead ore. After all that effort, the results were very disappointing, and Kean closed the Totley mines in 1953. Another company, Silver Horizons NL, briefly sub-leased the Great Extended in 1964, with no better results. (Kennedy *et al* 1981) That was the end of underground mining at the Totley silver mines, and the end of the old mining industry in Ravenswood.

There was another pause in mining activity in Ravenswood for some years, during which nothing happened except for Kean and a few others continuing to investigate small prospects around the district. Precious metals were of little interest, and instead prospectors were looking for newly-glamorous commodities such as uranium, bismuth or nickel. During the 1960s and 70s, Ravenswood shrank to its lowest ebb, an inward-looking community of about 70 people, mostly elderly, with two hotels and one store. It was literally a dead end, reached by a narrow dirt road that went nowhere else. All the churches except St Patricks were gone. The police station and most other government services were closed. School enrolments fell to only nine in 1972, and Ravenswood was on the brink of having even its school closed. (Brumby 1998, p. 12) The Chinee apple and rubber vine had grown from shrubs into trees dominating the landscape.

During the dark years there were always optimists who said the mines would "come again", although even they knew it would take the arrival of a new era in extraction and treatment technology to re-open the Ravenswood gold mines. But in the meantime, the town found a new industry in tourism, and people began to realise there were economic benefits in encouraging outsiders to visit Ravenswood. For the first time, Ravenswood's physical heritage was seen as an asset, and people began to think seriously about preserving it for future generations.

The Modern Era

Tourism became a new force in the northern economy after the Second World War. There had always been some demand for leisure and recreation, but the nature and scale of the tourism industry changed in the 1950s. The population of North Queensland increased dramatically through a combination of immigration and a rising birthrate; it was a time of prosperity with virtually full employment, higher wages in nearly all sectors of the economy, and shorter working hours. Australians were becoming more affluent than they had ever been before, and had longer holidays and weekends to spend on leisure activities. For the first time, motor cars were within the reach of families, and the provision of new roads and other wartime infrastructure contributed to the ease of travel. People also began to develop a nostalgic interest in historic places. With the steady increase in population, rising income and greater leisure time, historic towns such as Ravenswood became increasingly popular destinations for tourists.

As early as 1961, romantic stories were appearing in the press about "the once great mining town":

Broken chimney stacks, fallen poppetheads, and weathered dumps peeped up out of a jungle of smothering bush, silent monuments to the ghosts of forgotten pioneers. ("Ravenswood" 1961, p. 11)

At first, there was no suggestion of conserving these "silent monuments", simply an acceptance that their continuing decay was inevitable, although the process was picturesque and interesting to look at. But this renewed interest in Ravenswood was soon followed by a realisation on the part of some local people that the tourism resource depended on the town's historic buildings and mining structures, and that many of these were in poor condition and could be lost just as their significance was being realised. A severe storm early in 1974 damaged a number of buildings, providing a catalyst for action. Townsville architect Don Roderick was commissioned to prepare a plan for the conservation of Ravenswood, and on 30 June 1974, representatives of the National Trust of Queensland met in Ravenswood with local residents to see what could be done to conserve the town's historic buildings. (*North Queensland Register* 3 August 1974) Arising from this campaign, the Dalrymple Shire Council received a grant of \$33,000 from the first round of National Estate Grant funding in 1975 to carry out conservation work on St Patricks church and the School of Arts theatre and library. (*Townsville Daily Bulletin* 5 April 1975) This was the commencement of efforts to conserve Ravenswood's heritage.

During the 1970s and early 1980s, the entire town sites of both Ravenswood and Trolley were placed on the National Trust of Queensland Register and the Register of the National Estate. In 1979, another study was undertaken for Dalrymple Shire Council, this time specifically advising on town planning issues. (Walker 1979) However, even while all this was happening, timber mining structures continued to succumb to the effects of decades without maintenance. The headframes of the Sunset mine and the Eureka mine in Macrossan Street both collapsed in about 1977. St Agnes Convent and the manager's house at the Duke of Edinburgh mine were also both in poor condition, and were demolished at about the same time. The Golden Hill headframe was demolished during prospecting activity on the Buck Reef in 1980.

Ravenswood began to stir in the 1980s. The Burdekin River is one of northern Australia's great watercourses, and represents a huge water resource. Proposals to dam the Burdekin for agriculture had been made as early as the 1940s. In 1950, a small dam was built lower down the river to irrigate tobacco, rice and sugar growing areas around Millaroo on the lower Burdekin. However, a much larger water catchment was proposed for the Burdekin Falls, about 80km south of Ravenswood. Government funding for the Burdekin Dam was made available in 1980, and surveys and planning began to increase activity in the Ravenswood district. The first impacts of the dam were the construction of a new section of road bypassing Ravenswood on the western side - previously all traffic going south to the Burdekin Falls had to drive down Macrossan Street - and then building a sealed road to the dam site, which gave Ravenswood all-weather road access for the first time.

Convenient road access brought Ravenswood an immediate increase in tourism. Construction of the dam wall itself commenced in 1984 and was finished by 1986, and during that period there was a modest economic revival in the town from traffic and building activity. A motel was built at the turnoff to Ravenswood from the dam road. Since the dam was completed it has had no significant impact on agriculture in the Ravenswood district, but fishing, boating and other recreational uses of the artificial lake created on the Burdekin have further increased tourist traffic in the town. For the first time, Ravenswood is on the road to somewhere else.

Completion of the Burdekin Dam had another unexpected benefit for Ravenswood. As the dam filled in 1987, its waters backed up over the site of Mount Graham station, where the Ravenswood Court House and Police Station had been taken thirty years earlier. With the cooperation of Dalrymple Shire Council and volunteer labour, the buildings, still in generally good condition, were taken back to town and reinstated on the allotment where they had originally been built over a hundred years before. Their return filled the yawning gap in the centre of the town's buildings, and sent an important psychological message to Ravenswood residents and visitors alike that things were changing for the better. They certainly were, for 1987 was also the year in which the first gold bar was poured in Ravenswood since Wilson's company went into liquidation seventy years earlier. Gold mining had recommenced on the Ravenswood field.

In the 1980s, the Australian gold mining industry was transformed by two things: a dramatic rise in the price of gold, and greatly improved new technology for the extraction and treatment of gold ores. The gold price, which had been on a plateau since the 1950s, shot up dramatically in 1979, briefly reaching \$800 an ounce early in 1980; the highest price gold had ever reached. This anomalous price fell by half within two years, but gold then sat in a price range between \$300 and \$500 per ounce for the next fifteen years. The 1980s saw the twentieth century's biggest gold mining boom throughout Australia, and for the first time since 1917, economic conditions were right for mining investment in Ravenswood.

Methods of mining had changed just as dramatically. Revolutionary developments in earth-moving had made it possible to opencut ore deposits on a vast scale, so that where miners had once worked underground because of the sheer cost of removing overburden, now machinery was used to expose the whole orebody to the sky. A century ago, a team of two miners excavating underground in hard rock like granite, boring holes with a pneumatic drill to lay small dynamite charges, would remove about one ton of rock in a working day. To shift a thousand tons of rock, they would have to work fulltime for about three years. If they survived the risks of sudden death on the job

from a rock fall or a blasting accident, they were likely to die by their early forties of phthisis, coughing miserably in their final months as their lungs succumbed to the effects of years of inhaling powdered silica particles and burnt nitroglycerine fumes.

Today, a single blast of explosives in an opencut mine breaks up many thousands of tons of ore in seconds, while there is no-one within hundreds of metres. Removing a mere thousand tons of that ore with a ninety-ton oretruck takes about twelve round trips. Today's team of two miners - one driving an excavator and the other a truck - can have the job done before their morning tea break, with negligible risk to their safety or health.

The treatment process used in the modern Australian gold industry is extremely standardised. Enormous rotary mills are used for fine grinding the ore, which is then treated in a sodium cyanide solution. Gold is extracted from the solution by granulated activated carbon. The processes happen in a closed circuit, and the carbon, cyanide and water are all re-used repeatedly. Finely powdered tailings with some remaining water are stockpiled because they contain other minerals, but extraction of gold is about 95% effective, even from such notoriously difficult ore as Ravenswood's. The Macintyre brothers and all the other nineteenth century millers would weep.

In response to the rising price and new technology, Mount Isa Mines subsidiary MIM Exploration began investigating extensive areas around Ravenswood from 1978 onward; this exploration work was later taken over by the MIM group's gold-mining subsidiary Carpentaria Gold Pty Ltd. However, the first people to go into production were the Northern Queensland Company Ltd, who in 1982 tested the gold and silver dumps of the Ravenswood district, and prepared two sites at Tolley and near Nolan's Gully for agglomeration heap leaching. This was even cheaper and more efficient than opencut extraction, for it used material that was already mined. A large area of ground surface was prepared and covered with impervious plastic membrane, then old mullock and tailings were heaped on the surface and sprayed with sodium cyanide solution. Gold and silver were then recovered from solution by carbon just as in the case of ore treatment. Treatment continued at Tolley from 1983 to 1986. There was a price to pay for the new gold and silver in terms of the historic landscape, for in the process the company removed several major landmarks: the enormous silver tailings dump from Kings mine, and the mullock heaps from the Grant and Sunset mines, on the ridge overlooking Ravenswood. The Tolley treatment site itself was positioned squarely on the long-abandoned site of the 1880s township. (Bell 1987b)

Modern large scale gold mining and treatment is so cheap that the 1980s mining boom opened up many low grade ore deposits which were known in the nineteenth century, but could not be mined profitably by the methods of the time. Ravenswood had a classic large low grade ore deposit that had waited over a century for the new mining era: the Buck Reef. In the early 1980s the Northern Queensland Company (whose assets were later acquired by Burdekin Resources Ltd), the Golden Hill Mining Company and Eastern Copper NL all held interests along the reef. But it was Carpentaria Gold Pty Ltd which in 1987 commenced opencut mining the Buck Reef near the old Grant and Sunset mines, in the traditional heart of underground mining in Ravenswood, a few hundred metres south of the town centre. This was to be the first of three pits along the line of the reef, and opencut gold mining has continued in Ravenswood to the present. By the late 1980s, Carpentaria Gold had taken over nearly all the leases in the vicinity of Ravenswood, and has dominated mining activity in the district since.

There have been three principal areas of mining activity since 1985. The first operations were along the Buck Reef running through the southern end of the town, from west of the school to Golden Hill, with underground operations extending into the Grant - Sunset - Duke reef complex until 1993. The underground operations pumped out the Grant and Sunset mines and broke into the old workings, where the miners found intact stonework and timbering dating from the New Ravenswood era. (*Advocate* 27 August 1993) Openings into the levels of the old mines can be seen in the walls of the opencut today. There were some historical losses in the new mining period. The surface workings of the Grant mine were seriously disturbed, and the Grant and Sunset Extended headframe was demolished because of fears about its safety. (*Northern Miner* 22 April 1988)

The second area of operations was the entire Melaneur - Shelmaliel - Black Jack - Overlander reef complex northeast of the town, which was mined as one large opencut in 1990-91, and subsequently backfilled and developed as a golf course. The largest operation is the Nolan's Gully opencut south of the town, which commenced in 1993 and is still in production. The Nolan's Gully leases were held by Haoma NL, and Nolan's is mined under a joint venture arrangement with Carpentaria managing the project. In future there are plans to extend operations further north to the vicinity of the General Sarsfield reef. Carpentaria is also mining at Mount Wright, about 8km north of Ravenswood, and is actively exploring other prospects in the district.

The new gold mining era has revived Ravenswood's economy, but modern mining booms do not affect towns as the ones a century ago did. No-one is planting vegetable gardens along Elphinstone Creek, or rushing to build new hotels in Macrossan Street. The mine workforce of about 120 live in unobtrusive new housing on the outskirts, or in single quarters northeast of the town. The mining operation is economically self-contained to a great extent, and has surprisingly little visible impact on the town centre. Even traffic is deliberately routed to avoid Macrossan Street as much as possible. Carpentaria Gold, like most modern mining companies, is a good corporate citizen, conscious of its potential social and environmental impacts on Ravenswood, and has sensitive management practices in place. The company has provided community facilities such as the golf course, swimming pool and school oval, and has made a major contribution to the conservation of Ravenswood's heritage over the past ten years. In 1993 a Management Committee was established to coordinate heritage activities in Ravenswood, with representation from the Dalrymple Shire Council, Carpentaria Gold and the Restoration and Preservation Association. (*Advocate* 27 August 1992)

Just when good management seemed to have many of Ravenswood's heritage problems under control, tropical cyclone Aivu struck Ravenswood on 4 April 1989, doing damage to many buildings and structures. Butler cottage was blown into scattered sheets of iron, but later rebuilt. The School of Arts complex and nearby group of timber shops in Macrossan Street were particularly badly hit. The School of Arts library - the "grand hall" of 1875 - was blown down. Sadly, resources could not be found to do the work necessary to rebuild it, and in 1992 it and Sidley and Trenfield's butcher shop across the street were finally demolished. (*Advocate* 30 September 1992) The pie shop was reconstructed with a grant from the State Department of Environment. The School of Arts theatre was in better shape, as it had undergone conservation only eleven years before, and while it was being repaired the opportunity was taken to restore its 1884 facade, which had been covered by unsightly cladding for many years. The work was funded by Carpentaria Gold, and completed by early 1990. (*Courier Mail* 28 February 1990)

The School of Arts library and theatre sum up the state of modern Ravenswood's heritage. Much of value has been lost, but a great deal remains, and its cultural and economic value is now clearly recognised. When the community, the council, the government and the mining industry work together, they have the power to achieve excellent conservation results.

7 Ravenswood Conservation Management Plan: Industrial Processes

An important theme in the history of Ravenswood is the metallurgical challenge presented by the complex gold ores, and the reader without a knowledge of historical mining technology may be left bewildered by some of the terms used in describing the miners' battle. These notes briefly describe the major gold extraction processes that were reported to have been used in Ravenswood.

(See Appendix 1 for contemporary descriptions of the Great Extended Mill, Macintyres' process, Pollock process and Mabel Mill.)

Buddles

A buddle is a Cornish name for any mineral **separating** device, either circular or rectangular in plan, that relies on gravity to settle out heavy particles from a liquid flowing down an inclined surface. Two concrete buddles are prominent features of the ruins of the Great Extended Company's silver mill on One Mile Creek at Topley, built in 1888-89. Their details are sufficiently well preserved to identify them as **Linkenbach Round Tables**, invented at Ems in Germany in 1878. When they were in operation, an overhead pipe delivered the slurry of crushed ore to the centre of the buddle, where it ran outwards in all directions down the inclined surface. Gravity caused the particles of different densities to settle out from the flowing stream in a series of concentric bands: heavy galena first near the top of the buddle, then middlings, then lighter waste rock near the bottom. Over the buddle was a rotating framework (which looked a bit like a large Hills hoist) carrying an ingenious set of travelling water sprays, which washed each of the concentric bands in turn down to the bottom of the slope. As it poured off the lip it was caught by a rotating launder which funnelled it into one of the four concentric channels cast into the base of the table. The process was continuous, with ore particles constantly running down, settling out, then a few seconds later being washed off by a rotating spray into a launder. ((Warnford Lock 1890, pp. 400-403; Richards 1909, pp. 368-375; Simons 1914, pp. 352-355) Unfortunately the company collapsed financially while the mill was still under construction, and the Topley buddles were probably never used.

Cassell Process

In the Ravenswood warden's reports, the Cassell process was sometimes linked with the experiments of the Macintyre brothers between 1888 and 1891. Henry Cassell was an American metallurgical inventor with a number of processes associated with the name of his Cassell Gold Extraction Company, so it is not certain which ones were used in Ravenswood. One was a version of the **chlorination** process in which crushed gold ore was agitated in a saline solution, through which an electric current was passed; this is probably the type of plant that the Macintyres took over. The current was supposed to liberate free chlorine which would dissolve the gold. (Schnabel & Louis 1896, vol. 1, p. 841) Another process involved the use of bromine as a solvent. (Eissler 1902, pp. 176-178) After Cassell's resignation in the late 1880s, his company also began promoting the MacArthur-Forrest **cyanide** process. (Dorr 1936, p. 1-2) In 1891 the Macintyres' plant was described as a Cassell process, but was using conventional cyaniding. (Parkes 1892, p. 30) No surviving evidence of the Cassell process can be identified in Ravenswood today.

Chlorinating

There were a number of processes which used chlorine to extract gold from its ore, all relying on the fact that gold, normally inert, would form a chloride at high temperature or pressure. (Schnabel & Louis 1896, vol. 1, pp. 815-19) Variations of the chlorination technique used in Ravenswood included the **Pollock** process at the New England mine and the **Newbery-Vautin** process used at Barton's Mabel Mill from 1885 to 1897. (Parkes 1892, pp. 30-31) In general terms, both these processes involved crushing and concentrating the ore, roasting it to oxidise the sulphides, then exposing the hot concentrate to chlorine gas generated by the reaction of calcium chloride with sulphuric acid. This was done while the reagents were rotating in a large lead-lined iron cylinder. Gold was precipitated from the chloride solution by the addition of ferrous sulphate, and the resulting sludge was smelted. The only surviving evidence of the chlorination process that can be identified with certainty in Ravenswood today is the brick and concrete foundations of the Newbery-Vautin plant at the Mabel Mill.

Crushing

Any process to extract gold from ore has to begin with **comminution**, or breaking the ore into small particles to expose the gold. In Ravenswood, the ore had first to be reduced to fist-sized chunks, a process called primary crushing, which was done manually by hefty workers with large hammers at first, until **stonebreakers** came into general use at the mills in the 1890s.

Next the ore went to secondary crushing. For this task a few of the mills used **rolls**, large rotating steel cylinders, but the majority of treatment plants in Ravenswood from 1870 to 1942 used **gravity stamps**. Crude but relatively fool-proof, these noisy machines worked like a giant mortar and pestle, using steam power to raise a number of heavy iron stamps in turn by means of rotating cams, then letting the stamps fall back onto the ore to crush it. When ore particles were crushed to the required diameter - about the size of fine sand grains - they splashed out of the mortar box through holes in a screen. For six days a week from 1870 until 1917, the metallic roar of iron stampers slowly crushing granite into powder was a constant accompaniment to life in Ravenswood.

After crushing, much Ravenswood ore went on to fine grinding to further reduce the stone particles to the consistency of flour. In the early decades this was usually done by **Berdan pans**, **Wheeler pans** or **Huntington mills**, until **ball mills** were adopted in the early twentieth century. The best surviving evidence of the crushing process in Ravenswood today is on the sites of the Mabel Mill (1871-1917), Judge's Mill (1938-1942) and Archibald and Heuier's Mill (1938-52).

Cyanide Process

From about 1890 onward, the cyanide process began to revolutionise the gold industry all over the world, as it offered a cheap and effective method of extracting gold from ore. Cyanide is a simple combination of the common elements carbon and nitrogen, which occurs naturally as HCN, hydrocyanic or prussic acid, found in almonds and stone fruits and used to make pigments, including the blue in blueprints. When metallic cyanide compounds are dissolved in water, the solution has the unusual property of being able to dissolve fine gold particles. Many people had been experimenting with cyanide solutions for decades; dissolving the gold was easy, but the difficulty was finding an economical way to recover the gold from solution.

Between 1887 and 1889 the Scottish chemist John MacArthur and the brothers Robert and William Forrest patented a number of processes to do with dissolving gold in a dilute potassium cyanide solution and then precipitating the gold out of solution on finely divided zinc. Although legal wrangling over their patents delayed the commercial adoption of the process, by 1900 cyaniding was in general use on goldfields throughout the world. (Julian *et al*/1921, pp. 1-6; Dorr 1936, pp. 1-8)

In Ravenswood, the Macintyre brothers began experimenting with cyanide at some time between 1888 and 1891. It is uncertain to what extent they were following the MacArthur & Forrest discoveries, and how much was original experimentation. They seem to have had limited success, probably because of the high copper and zinc content of the Ravenswood ores, and cyaniding never became very important in Ravenswood before gold mining collapsed in 1917. In the early decades of the twentieth century the cyanide process became more efficient as other researchers discovered the importance of agitation and oxygenation, and found sodium cyanide was a more effective solvent. The staple gold treatment process throughout the world today involves fine ore grinding, an oxygenated dilute alkaline solution of sodium cyanide, and precipitation with activated carbon. The best surviving evidence of the old cyanide process in Ravenswood today are the steel tanks at Partridge's mill, installed in 1938, and the concrete tanks at Heuier's mill, installed in 1950.

Electrolytic Refining

In 1884 Warden Archibald reported that the Ravenswood Smelting Company intended to extract gold from copper bullion by means of "an electric-dynamo machine", but the process never went ahead. We could dismiss this as fast-talking promoters fooling a gullible warden, but it possible that what Archibald was describing was an early and over-optimistic proposal to separate gold from smelted matte by electrolysis. Ever since the experiments of Faraday and Volta in the early nineteenth century, it had been known that an electric current could deposit metals from a charged solution onto an electrode. Electrolytic refining of metals, as it began to be practised many decades later in the early twentieth century, generally involves casting the impure metal as an anode, immersing it into an acid or salt solution and passing an electric current. The metal is deposited in nearly pure form at the cathode.

Although the theory was already understood in principle in 1884, attempting to use this technique commercially in Ravenswood was hopelessly premature. The practical details still needed to be worked out, and the costs of smelting the anode and generating an electric current would have defeated the venture. The commercial treatment of gold ore by electrolysis was still on an experimental basis in the USA and Europe ten years later in the 1890s. (Schnabel & Louis 1896, vol. 2, pp. 873-876) The earliest proposal for electrolytic refining in Queensland was put forward by the Chillagoe company, who planned to build a hydro-electric plant at the Barron Falls in 1899, but it was stopped by public and political opposition. No surviving evidence of the electrolytic process can be identified in Ravenswood today.

Elmore Process

The Elmore process, patented in 1904, was a variation of **flotation** which used a partial vacuum over the ore slurry so that dissolved air formed bubbles which rose with the mineral particles attached. (Richards & Locke 1940, p. 234) In 1907, Warden Cusack

reported that the New Ravenswood company had installed an "Elmore Vacuum Concentrator" at the Mabel Mill, but it was apparently unsuccessful. No surviving evidence of the Elmore process can be identified in Ravenswood today.

Flotation

Another of the great breakthroughs in ore treatment a century ago was flotation, developed in Broken Hill among other places, and coming into commercial use by about 1905. (Richards & Locke 1940, pp. 232-287; Blainey 1969, pp. 259-271) The process works by the rather unlikely-sounding principle that if crushed ore with some oil added is agitated vigorously in water while air bubbles are blown through it, fine mineral particles will attach themselves to an oil film coating the bubbles and rise to the top of the tank, where they can be skimmed off. While flotation could potentially have been very useful for treating the Ravenswood sulphides, it came too late, and was still being pioneered when the New Ravenswood company was in terminal decline. Wilson experimented briefly with the **Elmore process** in 1907, without much success. Flotation was also used on a small scale by Partridge from 1939 to about 1942, and later by Kean. The only surviving evidence of the process in Ravenswood today is a battery of small flotation tanks at Partridge's mill.

Newbery-Vautin Process

This was a variation of the **chlorination process** developed in Victoria and first used in Queensland at Barton's Mabel Mill from about 1885 to 1897. It used chlorine gas to extract gold from its ore, relying on the fact that gold would form a chloride at high temperature or pressure. (Schnabel & Louis 1896, vol. 1, pp. 815-19) The only surviving evidence of the Newbery-Vautin process that can be identified in Ravenswood today is the brick and concrete foundations of the plant at the Mabel Mill.

Pollock Process

This was a variation of the **chlorination process** used at the New England mine in the late 1880s. It used chlorine gas to extract gold from its ore, relying on the fact that gold would form a chloride at high temperature or pressure. (Schnabel & Louis 1896, vol. 1, pp. 815-19) No surviving evidence of the Pollock process can be identified with certainty in Ravenswood today, but there are brick foundations in the vicinity of the Wild Irish Girl mine which may have been associated with the 1880s plant.

Roasting

Roasting or **calcining** was a technique for dealing with sulphide ores by heating them to oxidise the sulphides, which burned off as sulphur dioxide. People in nineteenth century Ravenswood must have become used to breathing the noxious and toxic fumes of burning sulphur. Roasting could be done in a number of ways; simply in a heap on the ground, by heating the ore in a brick oven, or by tumbling it in a heated rotating metal cylinder. Because fuel was expensive, it was only practical to roast small quantities of concentrate, not all the ore that came from the mine. Roasting was used at the Mabel Mill and some other plants as an essential preliminary step in the **chlorination** process. No surviving evidence of the roasting process can be identified in Ravenswood today.

Separation

Separation is the general name for all the processes that were used to extract gold from ore. Gold ores were crushed, and then subjected to a variety of treatment methods. Some of the mechanical methods of **ore dressing** that were tried on the Ravenswood field involved simple **blankets** or riffle plates to capture gold particles as they flowed from the stamp mill, then more complex **buddles**, **concentrators** and **jigs**, culminating in the adoption of the **Wilfley table** at the Mabel Mill in 1900. All of these processes exploited the higher density of gold to separate it from the lighter waste rock. Unfortunately, much of Ravenswood's gold was in the form of extremely fine particles chemically bound to the rock, and most of these methods achieved only partial success.

Amalgamation - forming an amalgam or alloy of gold with liquid mercury - was a mainstay of many other early Australian goldfields, but the copper and zinc in the Ravenswood ores made it almost useless. Chemical processes such as **chlorinating** achieved success with some ores, but even **cyaniding**, almost universally used on Australian goldfields from about 1900 on, was only partially successful in Ravenswood. **Flotation** came too late to have any impact, and **smelting** was prohibitively expensive on a large scale, although it was used to treat small parcels of concentrate. Much Ravenswood ore was simply concentrated locally and shipped to Aldershot or elsewhere for treatment.

“simple acid bath”

In 1888 Warden Cusack reported that the Macintyre brothers were experimenting with a secret gold extraction technique which he described as "a simple acid bath". Three years later a visitor clearly described their plant as using the MacArthur-Forrest cyanide process. (Parkes 1892, p. 30) It is difficult to reconcile these two descriptions - a potassium cyanide solution could hardly be described as an "acid bath" - but it is possible either that Cusack simply misunderstood their process, which he only knew from second-hand descriptions, or alternatively the Macintyres may have been experimenting with something else altogether in 1888, perhaps some form of hydrochloric acid leach process, which proved unsuccessful. No surviving evidence of the process can be identified in Ravenswood today.

Smelting

Smelting is the process of using heat to separate metals from ore. There is more to it than simply making the metal hot enough to run as a liquid; it also involves chemical reactions to free the metal from its chemical bonds. Smelting is commonly used to treat base metals which make up a high proportion of the ore, such as lead and copper, but is not usually applied to rare metals such as gold because it is very expensive. The melting point of gold is about 1060°C, and a large amount of fuel is required to heat ore or concentrate to that temperature.

Even so, some Ravenswood mills used smelting, starting with Plant & Jackson's Vulcan in 1872. Hugh Barton also smelted selected ores at the Mabel Mill from about 1884 to 1896. Both mills used **reverberatory furnaces**, which were essentially a large brick hearth with a vaulted roof over it, a firebox at one end and a flue leading to a smokestack at the other. The charge of ore was spread on the floor, and a very hot fire was lit in the firebox, the flame passing over the charge, heating it directly and also reflecting (or "reverberating" in nineteenth century language) heat from the curved roof. After a few hours when the temperature had reached well over 1000°C, the gold was chemically freed from the sulphide compounds, and flowed as liquid into a mould. Most

likely the resulting gold bar would still be alloyed with copper and zinc, and would have to be sent away to a more sophisticated smelter for refining. However, the principal product of the smelting process was not gold bars, but **slag**, or the molten waste rock, which solidified into a black mass.

The best evidence of smelting in Ravenswood today is the base of a small reverberatory furnace at the Mabel Mill, and an adjacent slag deposit, mostly consisting of cones moulded in iron slag pots. Small slag deposits can be seen at several other places around Ravenswood.

Wilfley Table

Much of the success of A.L. Wilson's New Ravenswood company can be attributed to the skilful use of Wilfley tables in the Mabel Mill. These employed one of the many ways in which minerals can be **separated** from crushed ore, by shaking or jerking the mixture so that particles of different densities behave in different ways. The principle can be demonstrated easily; sprinkle salt and pepper together on a piece of paper. Now tilt the paper slightly and tap its edge repeatedly with a fingernail, and the salt and pepper particles will move apart so they can be separated. During the nineteenth century, there were a great variety of jigs, vanners and concentrators which worked in essentially the same way.

In 1896, Arthur Wilfley of Colorado patented his very effective new shaking table which within a few years was in use by the thousands all over the world. The advantage of the Wilfley table in Ravenswood was that it did more than simply separate heavy minerals from light ore; it could simultaneously separate out a whole range of products of slightly different densities, so that gold, galena, sulphides and waste rock all left the table in parallel streams. Wilson installed two Wilfley tables at the Mabel Mill in 1900 - the first in Queensland - and increased the number to six in 1903. (Cameron 1903; Clark 1904, p. 306; Richards 1907; Richards & Locke 1940, pp. 212-222) The Deep Mill also used Wilfley tables. In Ravenswood today, there are two Wilfley tables at Kean's mill at Toley, which he first installed at Partridge's Mill in 1951.

8 Ravenswood Conservation Management Plan: Individual Site Records

On the following pages, 59 buildings, structures and sites within the Ravenswood area are listed individually, with brief details of their history, description, condition, heritage value and contribution to the historic character of the township of Ravenswood.

The buildings and structures included here have been divided loosely into several categories:

- RW 1-12 the best-known sites with a high rate of tourist visitation, including the prominent public and commercial buildings in the centre of town, and the cemetery;
- RW 13-29 a selection of the more prominent private houses on the major streets in the town area;
- RW 30-48 mining and milling sites, and less well known structures and sites in the town area;
- RW 49-50 two empty sites of demolished buildings which are of particular historical significance; and
- RW 51-59 outlying mining and milling sites outside the town area at One Mile Creek, Tolley and Sandy Creek.

Name	Railway Hotel
Other Names	-
Location	Barton Street
Description	Symmetrical two storey hotel with a U-shaped plan, set on an irregular wedge-shaped allotment. Constructed of exposed red brick in Federation style, with traditional red and cream colouring and name "Railway Hotel" in raised lettering on parapet. Concealed pitched corrugated steel roof with raised rendered brick parapet at front. The street facade has a verandah with paired posts, timber brackets and dowel balustrades on the first floor, wrought iron valencing with arched openings on the ground floor. Coloured leadlight in front entrance door, two-storey verandah on west side. The cornice and row of openings on the parapet are very similar to those on Thorps Building.

Date	1902
History	<p>Built in 1902 by John Moran to replace an earlier timber hotel of the same name which had stood on the site since 1889, the hotel expresses the prosperity and exuberance of the New Ravenswood boom. It seems likely that it was designed by the same architect as the Imperial Hotel, built the same year. One of the nine hotels that traded in the town's heyday, the Railway Hotel stood beside the Mabel Mill and just across the street from the railway station, in a strategic position to catch arriving travellers, except that alongside it stood A.L. Wilson's New Ravenswood hotel, and commercial visitors doing business with the mining company knew it was wiser to stay there.</p> <p>As one of the substantial brick buildings of the 1902-05 boom period, the hotel has played an important part in keeping the town's economic core intact during its decades of decline. The Railway Hotel has been very little changed physically since it was built, and was operated by John Moran's family until the 1950s.</p>
References	Roderick 1975; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the hotel is generally good.
Integrity	The integrity of the hotel is very good.
Heritage Value	The hotel is a valuable historic building in its own right as an attractive and distinctive Federation building, and one of the five major brick buildings surviving from the early twentieth century building boom. It also makes an important contribution to Ravenswood, as the first notable building that visitors see on arrival. The Railway Hotel is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the hotel in its present form and condition. It is important that the hotel maintain its visual prominence from the north (front elevation) and west (the approach from Townsville).

Name	Court House
Other Names	Museum
Location	Macrossan Street
Description	<p>Complex of four buildings in a commanding position in the centre of town, on a large grassy allotment with a picket fence facing Macrossan Street and a brick retaining wall on Raven Street. The complex originally consisted of a court house, police station, police quarters and cell block, now used as a museum, offices and meeting rooms. The buildings are all single storey and symmetrical, built to standard late nineteenth century Queensland Works Department designs. They are all timber framed and elevated on low stumps, have open verandahs with timber balustrades and weatherboard cladding, and gabled corrugated steel roofs. The court house has minimal ornament in the form of timber verandah brackets and consoles under the eaves.</p>

Date	1884
History	Built in 1884 by the Department of Works to replace an earlier timber court house and police station on the same site dating from the early 1870s. This was Ravenswood's goldfield and legal administrative centre, occupied by the Warden and Police Magistrate until the 1920s, and remained the town police station until the 1950s. When the police station closed, the buildings were sold and taken to Mount Graham station on the Burdekin, where they were used as stockmen's quarters. When the Mount Graham site was flooded as the Burdekin Dam filled in 1987, the buildings were returned to their original allotment in town. Subsequently they have been restored and converted to a museum and cultural centre.
References	<i>Northern Miner</i> 23 January 1884; V&P 1891, Vol. 4, p. 567; QSA A/13068; Roderick 1975; Bell 1982; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the court house is very good.
Integrity	The integrity of the court house complex is very good. However, that does not mean it is in original condition: the buildings have been removed from this site and subsequently returned, in the process locating them in slightly different positions and necessarily carrying out some reconstruction. Some elements such as the picket fence are entirely reconstructed.
Heritage Value	The court house building complex is of great historic value in its own right as Ravenswood's administrative centre from the 1870s to the 1950s, and of architectural value as an attractive and unified group. It also makes an important contribution to Ravenswood, as the most prominent building complex in the centre of town. The Court House Group is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the court house in its present form and condition. It is important that the group maintain its visual prominence in the town.

Name Post Office

Other Names Store

Location Macrossan Street

Description The Post Office is a single storey symmetrical building in a prominent location right on the street frontage beside the Elphinstone Creek bridge. It is an exposed timber stud frame construction with open verandahs, raised on low stumps, with hipped corrugated steel roof. The verandah has diagonal timber balustrading and cast iron valencing. Its most distinctive feature is an imposing classical pediment in timber centrally positioned over the entrance stairs.

The Residence is a single storey timber framed house at the rear of the Post Office, facing Raven Street.

Date	1885
History	Built in 1885 by the Department of Works to replace an earlier timber post office and telegraph station on the same site dating from 1873. The post office and residence have been in use continuously since. There has been relatively little alteration to the post office since it was built; the most conspicuous changes were the addition of petrol pumps in front of the building, and enclosure of the verandahs in the 1960s. Subsequently the verandahs have been restored to their original appearance and the building still functions as the town's post office and general store.
References	V&P 1891, Vol. 4, p. 567; QSA A/13068 & 13141; Roderick 1975; Bell 1982; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the post office is fairly good.
Integrity	The integrity of the Post Office complex is very good. It is one of relatively few buildings in Ravenswood that still performs its original function, and is still in very nearly in its original form.
Heritage Value	The Post Office complex is of great historic value in its own right as an important government building in Ravenswood from the 1880s to the present, and of architectural value as a well-designed and distinctive government building from the 1880s. It makes an important contribution to Ravenswood as a conspicuous and attractive building in the centre of town. The Post Office with its Residence is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the Post Office in its present form and condition. Further restoration of verandah details and minor repairs and maintenance to the Post Office are a high priority for conservation work. It is important that the building maintain its visual prominence in the town.

Name	Thorp's Building and Adjoining Store
Other Names	-
Location	Macrossan Street
Description	<p>Two attached buildings, treated together here because they form a group both historically and visually. Thorp's Building is a symmetrical two storey commercial building with two ground floor stores and a central entrance and stairway leading to professional offices above. Constructed of rendered brick with a raised parapet at front, with the name "Thorp's Buildings" in raised lettering. The cornice and row of openings on the parapet are very similar to those on the Railway Hotel. Concealed pitched corrugated steel roof. The street facade has a two storey verandah with paired timber posts, cast iron brackets and valencing, and cast iron balustrade panels on the first floor. The ground floor shop fronts have recessed timber doors and timber-framed plate glass display windows with most details intact. The building had its own gas producer, and still has gas piping and fittings.</p>

The Adjoining Store is a symmetrical single storey commercial building housing two stores. Constructed of rendered brick with a raised parapet at front, concealing a pitched corrugated steel roof. The street verandah has been restored with simple timber posts and sawn timber valancing. The ground floor shop fronts have recessed timber doors and timber-framed plate glass display windows with most details intact. The building's most remarkable feature is its rendered parapet, with two flanking urns (one missing) and a central urn within a hollow arch. The central arch motif was repeated on the Imperial Hotel and Browne's Building opposite.

Date	c.1904
History	Built about 1904 at the height of the New Ravenswood boom by Charters Towers mining agent Sydney Thorp, this building stood opposite Browne's Buildings, Delaney's Imperial and Browne's Ravenswood Hotel in the heart of the town. The smaller store alongside was built at the same time or shortly afterward. The buildings played a prominent part in Ravenswood's business life, housing many commercial and professional tenants. Both buildings have undergone superficial refurbishment in recent decades, but are now empty. A mural has been painted on the north wall of the shop in recent years.
References	Roderick 1975; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the buildings is only fair, and some maintenance is required.
Integrity	The integrity of the buildings is very good.
Heritage Value	The building group is of historic value in its own right, two of the most attractive buildings of the New Ravenswood era, and a distinctive landmark in the town. They also make an important contribution to the town as two of the five major brick buildings surviving from the early twentieth century building boom. With the Imperial Hotel opposite, the group forms a gateway of prominent historic buildings in southern Macrossan Street. Thorp's Building and the Adjoining Store are two of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the group in its present form. It is important that the buildings maintain their visual prominence seen down Macrossan Street from both the north-west and the south-east. Finding a viable and sympathetic use for these buildings and carrying out necessary maintenance are among the high conservation priorities for Ravenswood.

Name	Imperial Hotel
Other Names	-
Location	Macrossan Street
Description	Symmetrical two storey hotel with a U-shaped plan. Constructed of exposed red brick in Federation style with pronounced red and cream horizontal bands and a raised brick parapet at front, ornamented with a remarkable central arched pediment and six flanking spires. Concealed pitched corrugated steel roof. The street facade has a verandah with paired posts, timber brackets and cast iron balustrade panels on the first floor, timber valencing with arched openings on the ground floor, two-storey verandah on south-east side. It seems likely that it was designed by the same architect as the Railway Hotel which was built the same year. The interior of the bar has its original fittings, included an elaborately decorated timber and leadlight dividing screen.

Date	1902
History	<p>Built in 1902 by James Delaney to replace an earlier timber hotel of the same name which he had built the previous year, only to see it burn down a few weeks later. Probably the town's first commercial brick building, the exuberant styling of the new hotel made a remarkable contribution to Ravenswood, expressing the prosperity and confidence of the New Ravenswood boom. One of the nine hotels that traded in the town's heyday, the Imperial Hotel stood beside Browne's Buildings and the Ravenswood Hotel and opposite Thorp's Building in the heart of the town.</p> <p>In 1934-37, during the depression-era mining revival, the Eureka mine was opened immediately alongside the Imperial Hotel, sinking a 30m deep shaft in what is now the hotel's car parking space. The mine's timber headframe stood beside the hotel as a picturesque landmark until it collapsed in 1977. As one of the substantial brick buildings of the 1902-05 boom period, the Imperial Hotel has played an important part in keeping the town's economic core intact during its decades of decline. The Imperial Hotel has been very little changed physically since it was built, and was still operated by James Delaney's daughters until recent years.</p>
References	Roderick 1975; Menghetti 1992; Fraser Osborn 1992; Sinclair Knight Merz 1998
Condition	The condition of the hotel is generally good.
Integrity	The integrity of the hotel is very good.
Heritage Value	The hotel is a valuable historic building in its own right, one of the most attractive buildings in Ravenswood, and a distinctive landmark of Federation architecture in Queensland. It also makes an important contribution to the town as one of the five major brick commercial buildings surviving from the early twentieth century building boom, the centrepiece of the group of historic buildings in southern Macrossan Street, and the first notable building that visitors see on arrival from the south. The bar is one of the finest historic hotel interiors in Australia. The Imperial Hotel is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the hotel in its present form and condition. It is important that the hotel maintain its visual prominence seen down Church Street from the south-west (front elevation) and from the south-east (the approach to Ravenswood from the south). The insensitively-sited electricity pole erected in front of the building about 1998 should be relocated.

Name	Pie Shop
Other Names	Cake Shop; Shop adjacent to School of Arts Library
Location	Macrossan Street
Description	Symmetrical single storey shop set close to street frontage, rectangular in plan with long axis at right angles to the street. Sawn timber framed walls clad with chamferboards and left unlined internally. Gabled corrugated steel roof, clad with sheet metal in the front gable. The street facade has a verandah with plain timber posts and a straight corrugated steel roof. The building has no ornamentation. The building has undergone severe damage, partial demolition, repair and extensive reconstruction in recent years.

Date	1880s
History	The date of construction of the shop is not known, but it probably dates from the rebuilding of the town's commercial centre that followed the construction of the railway in the mid-1880s. It has had a number of functions - at various times a pie shop, cordial factory, residence and fodder store - and is now an antique shop. The building, already weakened by termites and fungal decay, was severely damaged by Cyclone Aivu in 1989. The rear of the shop and an attached residence were demolished about 1993, and the front of the store was reconstructed in its original form with new framing. The adjacent School of Arts Library and former Sidley and Trenfield butcher shop were both demolished about the same time.
References	Roderick 1975; Allom Lovell Marquis-Kyle 1990; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the shop is good.
Integrity	The integrity of the shop is fair. It retains its street frontage and its contribution to the townscape, but much of the building has been demolished and the remainder reconstructed.
Heritage Value	The shop is the only small timber commercial building left standing in Ravenswood out of a great many that are now gone, and one of only about six buildings known to survive from the 1880s. It once made an important contribution to the town as one of the group of historic buildings in southern Macrossan Street, although it and the School of Arts Theatre are now the only survivors of that group. The Pie Shop is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the shop in its present form and condition. It is important that the shop survive to demonstrate both the former physical extent of the commercial core of Ravenswood, and the range of building types that once stood there.

Name	School of Arts Theatre
Other Names	School of Arts Concert Hall
Location	Macrossan Street
Description	Symmetrical single storey rectangular hall with main axis at right angles to street. Timber framed, weatherboard clad, gabled corrugated steel roof with raised timber parapet at front. The street facade has classical arched openings and parapet, and is divided into three bays by pilasters. The painted stage curtain is a notable feature of the interior.

Date	1884
History	<p>For nearly 120 years, the School of Arts complex consisted of two buildings. The first School of Arts building was a hall built in about 1872. Next came the Library, a delightful little timber building with an ornate classical entrance porch, built immediately west of this building in 1875. It was the first building in Ravenswood with any architectural pretensions, and when it opened a newspaper correspondent enthused, “we have a grand hall now”. The Library fell into disrepair by the 1970s, was damaged by Cyclone Aivu in 1989, and was demolished in 1992.</p> <p>This theatre was built nine years after the library. A newspaper account in July 1884 said the School of Arts and the Catholic church were “now in course of erection” and will be “most imposing structures.” Since that time, the hall has been the principal theatre, cinema, meeting and social venue of Ravenswood. It underwent extensive conservation work in 1978, and after cyclone damage in 1989 it was again repaired and the facade was restored to its original classical timber form.</p>
References	<i>Northern Advocate</i> 1 January 1876; QSA COL/O 63; <i>Charters Towers Mining Journal</i> July 1884; Roderick 1975; Bell 1982; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the hall is good.
Integrity	The integrity of the hall itself is good. The character of its surroundings has been altered by the loss of adjacent buildings and the construction of a brick toilet block.
Heritage Value	The hall is a valuable historic building in its own right, and makes an important contribution to the Macrossan Street streetscape. It is one of only about six buildings known to survive from the 1880s. The School of Arts Hall is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the hall in its present form and condition. New structures in its vicinity should be designed with great sensitivity to the hall’s form and materials.

**Ravenswood Conservation Management Plan: Site Record
RW 08**

Name	School Residence
Other Names	-
Location	School Street
Description	Symmetrical single storey rectangular house, raised on low timber stumps, with main axis at right angles to street. Timber framed, weatherboard clad, open verandahs with horizontal balustrades. Steeply pitched complex multi-gabled corrugated steel roof. Historically a prominent building on the ridge overlooking the town, but now screened by trees. The house has an unusual form as a result of repeated extensions.

Date	1873, extended in stages up to 1897
History	The School Residence was built by the Department of Public Instruction in late 1873 and occupied in early 1874 when the adjacent school opened. The original part of the house, at the rear, consisted of four rooms under a gabled roof, with a brick fireplace in the living room. The house was repeatedly extended over the next 24 years, first by the addition of verandahs in 1874, a detached kitchen in 1877, ceiling and lining in 1887, addition of a sitting room to the front in 1889, and a side extension to the whole house in 1897. The house has had only minor modifications since, and is still in use as a teacher's residence.
References	QSA EDU Z/2309; Roderick 1975; Bell 1982, pp. 399-403; Bell 1984, pp. 188-192; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the house is good.
Integrity	The integrity of the house is very good.
Heritage Value	The house is of great heritage value. It is the oldest building standing in Ravenswood, and the oldest house in any North Queensland town. It is of particular interest historically because its plan, roof form and construction details pre-date the standardised forms of later North Queensland houses. The School and Residence are jointly one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the house in its present form and condition. New structures in its vicinity should be designed with great sensitivity to the house's historical significance.

Name	School
Other Names	-
Location	John Street
Description	Symmetrical single storey rectangular classroom block, raised on high concrete stumps, with main axis parallel to street. Timber framed, weatherboard clad, with an enclosed verandah, and eaves over windows. Steeply pitched gabled corrugated steel roof. A prominent building on the ridge overlooking the town, although somewhat screened by trees. There is a particularly notable large fig tree in the school grounds. The school building is the product of repeated extensions and subsequent removals.

Date	1873, extended and then reduced in several stages
History	The School was built by the Department of Public Instruction in late 1873 and opened in early 1874. The original double classroom block was repeatedly extended over the next 30 years, reaching a size of eight classrooms and a gymnasium by about 1905. The existing early building was an 1880s addition to the original school. The school was then reduced progressively in size as the town's population dwindled in the twentieth century, shrinking back to one classroom by the 1970s. The school has since been increased in size again by the construction of a modern classroom block and other facilities.
References	QSA EDU Z/2309; Roderick 1975; Menghetti 1992; Brumby 1998; Sinclair Knight Merz 1998
Condition	The condition of the school is very good.
Integrity	The integrity of the school is very good.
Heritage Value	The school is of considerable heritage value. It is one of only about six buildings in Ravenswood known to survive from the 1880s, and is a visually prominent building in the town. Architecturally, the building is a standard late nineteenth century country school design. The School and Residence are jointly one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the school in its present form and condition. New structures in its vicinity should be designed with great sensitivity to the building's historical significance and visual prominence.

Name	Community Church
Other Names	St Patricks Church
Location	Chapel Street
Description	Single storey long rectangular church prominently sited overlooking the town, with main axis roughly at right angles to street, and asymmetrical extension at rear. Timber framed, raised on low concrete stumps, weatherboard clad at northern end (1884), exposed frame at southern end (1905). Steeply pitched gabled corrugated steel roof. Entrance porch at the northern end, arched gothic openings, polygonal apse, pyramid roofed belfry over crossing. The 1884 church has casement windows, and the 1905 extension has patent hopper windows. A large ornate fretwork timber ceiling panel probably dating from 1884 is a notable feature of the interior.

Date	1884, extended 1905
History	<p>Since 1871, the Catholic Church of St Patrick has overlooked the town. The first church, funded by public subscription, was opened in August 1871. During a violent storm in January 1884 it was “blown down level with the ground”, but was replaced within months. A newspaper account in July 1884 said the new Catholic church was “now in course of erection”, and it was opened by Bishop Cani in October. The church was built by Rooney Brothers of Townsville. During the New Ravenswood boom in 1905, the church was nearly doubled in size by the addition of a nave extension, vestry, apse and belfry to the southern end. Interestingly, the new addition had its frame left exposed externally, unlike the 1884 building which was externally clad with weatherboards, showing the changed architectural fashion in the north. The church complex consisted of a presbytery, St Patricks church, St Agnes convent and St Johns school. The presbytery burned down in about 1926, the school was removed to Giru in about 1948, and the convent was demolished in 1977. The church however underwent extensive conservation work in 1978, and after cyclone damage in 1989 the church was again repaired and the belfry and other details were restored to their original form. The building is no longer a Catholic church, but is now the Ravenswood Community Church.</p>
References	<p><i>Port Denison Times</i> 29 July & 19 August 1871; <i>Northern Miner</i> 23 January & 25 October 1884; <i>Charters Towers Mining Journal</i> July 1884; <i>Queenslander</i> 14 January 1905; AR 1905, p. 88; Roderick 1975; Walker 1979; Bell 1982; Maguire 1990; Menghetti 1992; Sinclair Knight Merz 1998</p>
Condition	The condition of the church is very good.
Integrity	The integrity of the church itself is very good. The character of its surroundings has been altered by the loss of the three adjacent buildings of the complex and their associated trees and surrounding fence.
Heritage Value	The church is a valuable historic building in its own right, and in its prominent position makes an important contribution to the Ravenswood landscape. It is one of only about six buildings known to survive from the 1880s. The Community Church is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the church in its present form and condition. New structures in its vicinity should be designed with great sensitivity to the church’s form and materials.

Name	Cemetery
Other Names	-
Location	Cemetery Road
Description	Fenced rectangular cemetery reserve about 500m south of the nearest buildings of the town. The old cemetery, characterised by tall white marble and some cast iron monuments, is at the south end of the reserve, and the new cemetery, with low granite monuments, is at the north end. A distinctive feature of the cemetery is the two sets of cast iron gates made by Francis Morton's foundry in Liverpool. The cemetery has been protected from grazing, and has some remnant native eucalypt and Burdekin plum trees, and an exotic horseradish tree. The cemetery also has an area of Chinese graves with nineteen stone mounds arranged in three rows. Until the 1970s, some of the Chinese graves also had marble markers and inscribed bricks, but except for one broken stone, all these monuments have been stolen.

Date	1875
History	This is Ravenswood's second cemetery. An 1872 lease map shows an earlier cemetery reserve presumably surveyed in 1870 north-east of this site, at the intersection of Macrossan Street and Cemetery Road. That site would have been unsuitable because it was very close to houses, mining claims and the watercourse of Buchanan's Gully. According to the sign on the cemetery gate, this site was established on 14 January 1875, although it has marked graves dating from 1872. In recent decades the cemetery has been damaged by neglect, vandalism and theft of monuments. There have been several projects to clean up the cemetery - one by the Army in the 1980s - and to record monumental inscriptions. In 1999 a shelter shed was constructed in the cemetery.
References	Roderick 1975; Walker 1979; Maggs 1986; Menghetti 1992
Condition	The condition of the cemetery is fair.
Integrity	The integrity of the cemetery is fair. It has been damaged by vandalism, neglect and the unfortunate new shelter.
Heritage Value	The cemetery is of great historic value in documenting the Ravenswood community. It contains the marked graves of members of many prominent Ravenswood families such as the Podokys and the Morans, and those of miners who died in accidents, such as John Bracewell, killed by a fall of rock in King's mine in 1887. The monuments make a variety of social statements, ranging from Warden Cusack's tall granite Celtic cross, to the nineteen anonymous piles of stones in the Chinese section, and Werner Heyden's heart-wrenching monument to his three daughters who died of disease within one week in October 1876.
Policy	The cemetery is an important heritage asset, and a program for repair and maintenance work is a high conservation priority. New structures should be designed with great sensitivity to the cemetery's heritage value.

Name	Ambulance Building
Other Names	-
Location	Deighton Street
Description	Single storey building, rectangular in plan, built right on the street frontage with its long axis at right angles to the street. Brick construction, rendered and painted. Asymmetrical facade with arched vehicle entrance, pedestrian doorway and window, gabled parapet. Rendered ornamentation of stripped classical pilasters, finials, Maltese crosses in relief, and raised lettering: "Ambulance" and "1902". Steep corrugated steel roof, hipped at rear, concealed by parapet gable at front, sheetmetal ventilator on ridge. Lamp over doorway. Although a small building on a side street, the ambulance is prominent across the open space of Elphinstone Creek to people approaching the bridge along Macrossan Street from the north-east.

Date	c.1904
History	The ambulance building was built during the New Ravenswood boom years about 1904. The date 1902 on the facade refers to the inception of the ambulance service in an older building in Macrossan Street. After the mines closed the building was intermittently used as a storeroom and a residence. For several decades it has housed the weekly visiting Royal Flying Doctor Service clinic. In recent years the building has been refurbished and now also houses a part-time children's play group.
References	Roderick 1975; Walker 1979; Menghetti 1992; Sinclair Knight Merz 1998
Condition	The condition of the ambulance building is good.
Integrity	The integrity of the ambulance building is good.
Heritage Value	The ambulance building is of historic value in its own right, an attractive building of the New Ravenswood era, and a distinctive landmark in the town. It also makes an important contribution to the town as one of the five major brick buildings surviving from the early twentieth century building boom, and as one of the prominent historic buildings of the central core of Macrossan Street. The Ambulance Building is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Generally maintain the ambulance building as a community facility in its present form and condition.

Name	House
Other Names	-
Location	Elphinstone Street
Description	Two-roomed cottage with rearward extension and detached kitchen. Sawn timber framed walls clad with corrugated steel. Gabled corrugated steel roof, clad with weatherboards in the gable ends. The street facade has a verandah with plain timber posts and a straight corrugated steel roof. The building has no ornamentation. The building has undergone severe wind damage and neglect in recent years.

Date	c.1903
History	The date of construction of the house is not known, but it dates from the New Ravenswood era. It stands immediately alongside the London North mine, and according to tradition was the mine manager's residence, so it probably dates from 1903 when the mine opened. The building was occupied as a family home until the 1960s, and was still intact in 1980, although neglected. Weakened by termites and fungal decay, the house was damaged by Cyclone Aivu in 1989 and has not been repaired.
References	Roderick 1975; Bell 1985; Roderick 1993
Condition	The condition of the house is very poor. It is mostly unroofed and in nearly ruinous condition. The allotment is overgrown with vegetation.
Integrity	The integrity of the house is fair. Despite its condition, it retains most of its fabric on site and makes a notable contribution to the townscape.
Heritage Value	The sight of housing and mining relics side by side was one of the qualities which gave Ravenswood much of its character. With the loss of both mining structures and buildings, that visual juxtaposition is now quite rare. For that reason, this house, adjacent to the only timber headframe left standing within the town of Ravenswood, still makes an important contribution to the town.
Policy	Stabilise the frame of this house urgently, re-attach its roof and wall cladding, and clear vegetation from the allotment. It is important that the house beside the headframe remain standing, even in ruined condition, to demonstrate both the former character of the streets of Ravenswood, and the range of buildings and structures that once stood there.

Name	House
Other Names	-
Location	Elphinstone Street
Description	Two-roomed cottage with detached kitchen at rear. Sawn timber framed walls lined with chamferboards, kitchen clad with weatherboards. Low-pitched hipped corrugated steel roof, verandahs on three sides with plain timber posts and straight corrugated steel roofs. The house has no ornamentation. The building is suffering severely from neglect in recent years.

Date	unknown, brought to this site after 1934
History	The date of construction of the house is not known, but it was not on this site in 1934. Aerial photographs of Ravenswood in 1934 show this as a vacant allotment. It may be an older house brought from somewhere else, but it was only built on this site between 1934 and 1962, when it does appear in an aerial photograph. The house was occupied until about the 1970s, and was still intact in 1980, although neglected. It has deteriorated steadily since.
References	Roderick 1975; Bell 1982; Bell 1985
Condition	The condition of the house is very poor. It is partly unroofed and falling into ruinous condition. The house and surrounding allotment are overgrown with vegetation.
Integrity	The integrity of the house is fair. Despite its condition, it retains most of its fabric on site and makes a notable contribution to the townscape.
Heritage Value	The sight of housing and mining relics side by side was one of the qualities which gave Ravenswood much of its character. This house, one of two beside the only timber headframe left standing within the town, still makes an important contribution to the town.
Policy	Stabilise the condition of this house urgently and clear vegetation from the allotment. An effort should be made to keep this house standing, even in ruined condition.

Name	House
Other Names	-
Location	Elphinstone Street
Description	Two-roomed cottage with detached kitchen at rear. Sawn timber framed walls clad with chamferboards, kitchen clad with corrugated steel. Gabled corrugated steel roof, front verandah with plain timber posts and straight corrugated steel roof. The house has no ornamentation. Its most distinctive feature is a frame of round bush poles wired together, laid on top of the roof to prevent it lifting in high winds. There is a large tamarind tree growing at the rear of the allotment. The building is suffering severely from neglect in recent years.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house was occupied until about the 1960s, and was still intact in 1980, although neglected. It has deteriorated slowly since.
References	Roderick 1975; Bell 1982; Bell 1985
Condition	The condition of the house is poor. The rear extensions have partly collapsed and the house is deteriorating in condition.
Integrity	The integrity of the house is good. Despite its condition, it is still substantially intact and makes a notable contribution to the townscape.
Heritage Value	This house, within sight of the timber headframe of the London North mine, makes an important visual contribution to the town. Its external roof frame is of great architectural interest.
Policy	Stabilise the condition of this house. An effort should be made to keep this house standing, even in ruined condition.

Name	House
Other Names	-
Location	Raven Street
Description	Two-roomed cottage with rear extension and detached kitchen in a prominent position on the hill beside the site of A.L. Wilson's house. Sawn timber framed walls lined with chamferboards on verandahs, kitchen and exposed walls clad with weatherboards. Gabled corrugated steel roof, front verandah has timber posts, fretwork timber brackets and straight corrugated steel roof. The front of the house is partly screened by shrubs.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is still occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good. It has been restored and renovated since 1980.
Integrity	The integrity of the house is good.
Heritage Value	This house, close to the Court House and Post Office, makes an important visual contribution to the character of Ravenswood. Because of its hilltop site, it is a prominent house in the townscape.
Policy	Generally maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Raven Street
Description	Four-roomed house with rear extension and detached outbuilding partly hidden by trees on the bank of Elphinstone Creek. Sawn timber framed walls clad with corrugated steel, front verandah wall lined with chamferboards. Hipped corrugated steel roof, front verandah has timber posts, dowel balustrade and straight corrugated steel roof continuing plane of core roof. There is a large mango tree behind the house, and the front of the house is partly screened by shrubs.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house was occupied until recent years.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is fair.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Stabilise the house in its present form and condition.

Name	House
Other Names	-
Location	Aisbett Street
Description	Large four-roomed house with detached kitchen wing in a prominent position on the hill behind the church. Sawn timber construction with casements enclosing verandahs, kitchen and exposed walls clad with asbestos cement. Pyramid corrugated steel roof, kitchen verandah has timber posts with fretwork timber brackets. The house is partly screened by shrubs.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is still occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good.
Integrity	The integrity of the house is good.
Heritage Value	This house, close to the Community Church, makes an important visual contribution to the character of Ravenswood. Because of its hilltop site, it is a prominent house in the townscape.
Policy	Generally maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Elliott Street
Description	Four-roomed house with modern rear extension in a prominent position on the hill overlooking Buchanan's Gully. Pyramid corrugated steel roof, front verandah has enclosed balustrade, glass louvres and straight corrugated steel roof. Sheetmetal ventilator on roof apex. The front of the house is raised on low steel posts.

Date	unknown, brought to this site 1979
History	The house has only been on this site since 1979, when it was relocated from a site on Cemetery Road a few hundred metres away on the southern outskirts of town. The original date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good.
Integrity	The integrity of the house is good.
Heritage Value	This house, close to the Imperial Hotel and School of Arts, makes an important visual contribution to the character of Ravenswood. It also makes a statement about the traditional practice of moving timber framed houses. Because of its hillside site, it is a prominent house in the townscape.
Policy	Generally maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Elliott Street
Description	Four-roomed house framed by two large mango trees in a prominent position on the hill overlooking Buchanan's Gully. Sawn timber framed construction lined with chamferboards on side walls. Pyramid corrugated steel roof, sheetmetal eaves over side windows. Front verandah has dowel balustrade, wooden roller blinds, timber fretwork brackets and straight corrugated steel roof. The house is raised on low stumps.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house was occupied until recent years.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is fair.
Integrity	The integrity of the house is very good.
Heritage Value	This house, close to the Imperial Hotel and School of Arts, makes an important visual contribution to the character of Ravenswood. Because of its hillside site, it is a prominent house in the townscape.
Policy	Stabilise the house in its present form and condition.

Name	House
Other Names	-
Location	John Street
Description	Four-roomed house in a prominent position on the hill overlooking Buchanan's Gully. Sawn timber framed construction clad with corrugated steel on all walls. Pyramid corrugated steel roof, sheetmetal eaves over side windows. Front verandah enclosed in corrugated steel with glass louvre windows and straight corrugated steel roof. The house is raised on low stumps.

Date	unknown, brought to this site c.1930
History	The house has only been on this site since about 1930, when it was relocated from the Burdekin Meatworks at Sellheim after they closed in 1929. The original date of construction of the house is not known, but it probably dates from the establishment of the meatworks the 1890s. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good. Window eaves have been added and the front verandah has been enclosed since 1980.
Integrity	The integrity of the house is good.
Heritage Value	This house, close to the Imperial Hotel and School of Arts, makes an important visual contribution to the character of Ravenswood. It also makes a statement about the traditional practice of moving timber framed houses. Because of its hillside site, it is a prominent house in the townscape.
Policy	Generally maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Macrossan Street
Description	Four-roomed house concealed by large trees beside the southern approaches to Ravenswood. Sawn timber framed construction clad with weatherboards on side walls. Hipped corrugated steel roof, sheetmetal eaves over side windows. Front verandah has recent cast iron balustrade and straight corrugated steel roof. The house is raised on low stumps and has a concrete block extension at the rear.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house was unoccupied and derelict in the 1970s. It was re-occupied and restored in the 1980s.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good.
Integrity	The integrity of the house is good.
Heritage Value	This house, when in derelict condition on the southern approach to the town, once made an important visual contribution to the character of Ravenswood, but because of its surrounding vegetation, it is now an inconspicuous house in the townscape.
Policy	Generally maintain the house in its present form and condition.

Name	House
Other Names	Butler Cottage
Location	Railway Street
Description	Extended cottage of irregular form in a prominent position beside the entrance road to Ravenswood from Townsville. Sawn and round timber framed construction with corrugated steel clad walls. Gabled corrugated steel roof with a number of skillion extensions to the rear and side, push-out steel sheet windows. The house is set on the ground with an earth floor. A date palm is growing beside the house.

Date	unknown
History	The date of the cottage is not known, but the original construction probably dates from the New Ravenswood era of the early twentieth century. The house began as a two-roomed cottage, and was then repeatedly enlarged by skillion extensions, resulting in its rambling and eccentric form. The house was occupied until the 1980s. It was severely damaged in Cyclone Aivu in 1989, but rebuilt and is now operated as a folk museum.
References	Roderick 1975; Bell 1982; Mather & Cox 1990; Menghetti 1992; Crow 1997
Condition	The condition of the house is fair.
Integrity	The integrity of the house is good.
Heritage Value	This picturesque cottage is an excellent example of the bush practice of making vernacular extensions to a relatively conventional building core. It is one of the first buildings that greet the visitor approaching Ravenswood from Townsville, and because of its gateway site and bare surroundings, it is a prominent house in the townscape. The cottage makes an important visual contribution to the character of Ravenswood.
Policy	Stabilise the house in its present form and condition.

Name	House
Other Names	-
Location	Railway Street
Description	Two-roomed cottage with rear extension, raised on low stumps. Sawn timber framed walls clad with corrugated steel. Gabled corrugated steel roof, front verandah has asbestos cement sheeting, casement windows and straight corrugated steel roof. The front of the house is partly screened by shrubs.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is fair.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Railway Street
Description	Two-roomed cottage with rear extension, set on the ground. Sawn timber framed walls clad with corrugated steel. Gabled corrugated steel roof, front verandah has steel sheeting, wooden louvre windows and straight corrugated steel roof. The front of the house is close to the street frontage.

Date	unknown, brought to this site after 1934
History	The date of construction of the house is not known, but it was not on this site in 1934. Aerial photographs of Ravenswood in 1934 show this as a vacant allotment. It may be an older house brought from somewhere else, but it was only built on this site between 1934 and 1962, when it does appear in an aerial photograph. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is fair.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Maintain the house in its present form and condition.

Name	House
Other Names	-
Location	Railway Street
Description	Four-roomed house with rear and side extensions, raised on low stumps. Sawn timber framed walls clad with asbestos cement sheeting and glass louvre windows. Hipped corrugated steel roof, open front verandah with straight corrugated steel roof. Large mango tree at the rear of the house.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is occupied and has been extended in recent years.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is very good.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Maintain the house in its present form and condition.

Name	House
Other Names	-
Location	James Street
Description	Two-roomed cottage with rear extension, raised on low stumps. Sawn timber framed walls clad with corrugated steel. Gabled corrugated steel roof, open front verandah with straight corrugated steel roof.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is unoccupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is poor. It is in neglected condition and the front verandah roof has partly collapsed.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Stabilise the house in its present form and condition.

Name	House
Other Names	-
Location	James Street
Description	Two-roomed cottage, raised on low stumps. Sawn timber framed walls clad with corrugated steel. Gabled corrugated steel roof, front verandah partly enclosed with sheet steel and glass windows, straight corrugated steel roof.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is poor. It is in neglected condition and some front verandah windows are broken.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Stabilise the house in its present form and condition.

Name	House
Other Names	-
Location	James Street
Description	Four-roomed house with rear extension, raised on low stumps. Sawn timber framed walls clad with corrugated steel. Sheetmetal eaves over side windows. Pyramid corrugated steel roof, front verandah enclosed with asbestos cement, wooden louvres and casements, straight corrugated steel roof. House is in neatly kept yard with brick and cyclone wire fence.

Date	unknown
History	The date of construction of the house is not known, but it probably dates from the New Ravenswood era of the early twentieth century. The house is occupied.
References	Roderick 1975; Bell 1982
Condition	The condition of the house is good.
Integrity	The integrity of the house is good.
Heritage Value	Although not visually prominent, the house makes a contribution to the historic character of Ravenswood.
Policy	Generally maintain the house in its present form and condition.

Name	Bridge
Other Names	-
Location	Chapel Street
Description	Small semi-circular arched road bridge crossing Slaughter Yard Creek. It is built of red brick, with four courses of brick on edge forming an arch of about 3m span, above which are brick sides and coping and a concrete roadway. Three threaded iron ties rods connect the sides of the bridge. There are brick abutments on the south side of the bridge, and stone abutments on the north side.

Date	unknown
History	The date of construction of the bridge is not known, but it probably dates from the early years of the Ravenswood Divisional Board, which was carrying out road improvements in the 1880s. It is not clear why, of the many creek crossings in Ravenswood, only this one was chosen to have an arched bridge. Perhaps this was once the road to Bowen, which would imply that the bridge dates from before 1884 when the railway to Townsville opened. The bridge is still in use: a half-hearted effort has been made to block Chapel Street with a row of posts in recent years, but the bridge is still used by traffic.
References	Ullman & Nolan 1989
Condition	The condition of the bridge is fair. The arch structure appears sound, but the western stone abutment has collapsed, and there is salt attack to both stone and brick surfaces. Concrete mortar has been used to repoint some of the brickwork; this is a mistake, as it will accelerate decay.
Integrity	The integrity of the bridge is good.
Heritage Value	Arched masonry bridges of this kind are rare in Queensland. Although not visually prominent, the bridge makes an important contribution to the historic character of Ravenswood.
Policy	The bridge is an important historic structure and action should be taken to ensure its conservation. Expert advice is required on the best way of achieving this. In the short term, if the bridge is believed to be unsafe then it should be securely blocked against traffic, or at least a load limit should be posted.

Name	Hospital Site
Other Names	-
Location	Hospital Street
Description	Ruin of a red brick structure, consisting of four cavity brick walls forming a single room, unroofed, with doors and windows missing. Beside the ruin is a very fine large tamarind tree. The surrounding site has a scatter of metal building fasteners and glass and ceramic fragments.

Date	1878
History	This is the site of Ravenswood's second hospital, built by the Queensland government in 1878. It closed in 1908. Local tradition says the brick room was the operating theatre.
References	<i>Towers Herald</i> 20 July 1878; <i>AR</i> 1908, p. 103; Roderick 1975
Condition	The hospital site consists of a single fragmentary building ruin and a surface scatter. The brick structure is in surprisingly good condition if it has been exposed to the weather for over ninety years.
Integrity	The integrity of the site is poor, although enough remains to provide some understanding of the building.
Heritage Value	Although isolated on the outskirts of town, the hospital site is highly evocative and makes a contribution to the historic character of Ravenswood.
Policy	Stabilise the site in its present condition.

Name	Mabel Mill Site
Other Names	New Ravenswood Company's Mill
Location	Barton Street
Description	<p>Extensive ruins of a large gold treatment plant spread over about 3ha on both sides of Elphinstone Creek. Major surviving elements of the site include: the assay office; five head of gravity stamps and the partial foundations and frames of another 25 head; engine and boiler foundations and a brick boiler stack; raff wheel supports; brick and concrete machinery foundations and large tailings dumps. Other elements of the site such as the New Ravenswood company's office and Hugh Barton's house have left no surface evidence, but have potential for archaeological investigation. There is a recent collection of mining and other machinery and relics from other places on the site of the company office, facing Barton Street.</p> <p>The nearby sites of Partridge's Mill and the Chinese Temple and Oven (RW 33 & 34) are closely associated with this site.</p>

Date	1871, rebuilt 1885 and 1899
History	<p>The Mabel Mill was one of the early mills in Ravenswood, built by Hodgkinson in 1871. From about 1885 under Barton's ownership it began to dominate the field, and was greatly expanded by the addition of roasters, reverberatory furnaces and a chlorinating plant. In 1899 it was taken over by Wilson and again expanded and revolutionised, experimenting with Wilfley tables, flotation and cyaniding, becoming a showcase for the Queensland mining industry, and attracting much attention in mining industry publications. The success of the Mabel Mill accounted for much of the New Ravenswood company's prosperity in the next few years. The mill closed when the company collapsed in 1917, and was mostly demolished soon after. Some parts of the mill plant remained in use for small-scale ore treatment in the next twenty years, but it was completely abandoned during the Second World War. Tailings from the site were re-treated in the 1930s and the 1980s. Conservation work was carried out on the brick boiler stack in the early 1990s.</p>
References	Parkes 1892; Cameron 1903; Clark 1904; Roderick 1975; Menghetti 1992; Roderick 1993; Lennon & Pearce 1996; Megarrity 1997
Condition	<p>The condition of the site is poor. It consists for the most part of fragmentary ruins, and is subject to continuing deterioration. The stamper frames have been damaged by fire in recent years.</p>
Integrity	<p>The integrity of the site is very good. Despite its poor condition, it can be readily interpreted, evidence of several different industrial processes can be seen, and it still demonstrates the phases of its historical growth and decline.</p>
Heritage Value	<p>The Mabel Mill site is the largest and most significant ore treatment site in Ravenswood, retains evidence of most aspects of its long and complex career from 1871 to 1942, and is of great technological value as the first mill in Queensland to use two innovations: chlorination and Wilfley tables. The site is a prominent landmark and conveniently accessible. The Mabel Mill is one of the 13 places in Ravenswood on the Queensland Heritage Register.</p>
Policy	<p>Stabilise the site in its present form and condition. Emphasize this site in planning a tourism strategy. Interpretation can be improved, and the machinery collection from other sites should be rationalised. The Mabel Mill should have a high priority for conservation and interpretation work.</p>

Name	Partridge's Mill Site
Other Names	-
Location	Deighton Street
Description	<p>Ruins of a small gold treatment plant adjacent to the Mabel Mill tailings on the south side of Elphinstone Creek. Major surviving elements of the site include: two steel cyanide tanks; small ball mill; Oliver filter; Akins classifier made from half a boiler shell; Crossley two-cylinder oil engine; Kraut flotation unit; a broken Langlands grinding pan and brick and concrete settling tanks.</p> <p>The nearby site of the Mabel Mill (RW 32) is closely associated with this site.</p>

Date	1938
History	This mill was built by Partridge and Ralston to re-treat the Mabel Mill's tailings during the gold price rise of the Depression. They installed a ball mill and cyanide plant with engines and pumps in 1938 and added flotation cells and other machinery in the next few years. The mill was sufficiently notable to have photographs of it published in the <i>Annual Report of the Under-Secretary for Mines</i> in 1938. The operation was defeated by fuel and labour shortages during the Second World War, and closed about 1942. In 1951, Kean acquired the plant to treat silver-lead ore from Totley, adding a stonebreaker, Wilfley tables and classifier. Since 1980, some plant items from the mill have been removed to Kean's treatment plant at Copper Knob (RW 57).
References	AR 1938, pp. 105-6 & 144; 1939, pp. 106-7 & 142; 1951, pp. 68 & 87; Kennedy <i>et al</i> 1981; Menghetti 1992; Lennon & Pearce 1996
Condition	The condition of the site is poor. A roof over the mill has collapsed since 1980. The site consists for the most part of fragmentary ruined structures and machinery exposed to the weather, and is subject to continuing deterioration.
Integrity	The integrity of the site is good. Despite its poor condition, it can be readily interpreted, and it shows evidence of several unusual mineral treatment processes.
Heritage Value	Partridges Mill site is the remains of two small and short-lived mineral treatment operations relatively late in Ravenswood's history. It is of value principally because (a) it demonstrates the continuity of the mining industry over time and its responsiveness to economic forces, and (b) it is one of the three most complete collections of <i>in situ</i> mining plant in Ravenswood, and lends itself to interpreting the technology of the industry.
Policy	Stabilise the site in its present form and condition. Interpretation should be provided.

Name	Chinese Temple and Oven Site
Other Names	Ravenswood Chinatown
Location	Deighton Street
Description	The site contains the concrete floor of the temple, and a stone and brick pig roasting oven. There is some scattered sheetmetal, glass and ceramic artefactual material visible in the surrounding area, but during fieldwork for this project the site was too heavily overgrown to inspect closely. There may be remains of Chinese gardens extending along the creekbank, and there appears to have been a grove of trees in the vicinity of the oven; all that remains at present is a single mango tree growing nearby, a dead tamarind tree and the trunks of two other dead mango trees.

Date	probably 1870s to 1890s
History	No documentary evidence relating directly to this site has been found. However, it is known (a) that Chinese alluvial miners, hotel licensees and eating house keepers formed a significant minority of Ravenswood's population from 1871 onward, and that there were two Chinese eating houses close to the bridge 300m east of this site in the 1870s, (b) that there were a number of Chinese market gardens along Elphinstone Creek, including one immediately west of this site, and (c) that Chinese were employed as roasters and chlorinators at the Mabel Mill - 100m north of this site - from the 1880s to 1897. This site seems a logical place to have been the focus for Ravenswood's Chinese community in the nineteenth century. The juxtaposition of temple and oven is well known on other Australian mining fields, and this site has some similarities with the Chinese precincts of Atherton and Croydon.
References	Roderick 1975; Menghetti 1992; Bell 1995; Grimwade 2000
Condition	The condition of the site is very poor. It consists of only a concrete floor and a stone and brick oven, and is subject to continuing deterioration.
Integrity	The integrity of the site is fair. Despite its poor condition, enough remains to be interpreted, and it provides the only surviving physical evidence of the Ravenswood Chinese community.
Heritage Value	The Chinese Temple and Oven Site is extremely important as rare and fragile evidence of the Chinese who constituted an important but little-known part of Ravenswood's history. That it is in the centre of town, but virtually unknown, tells us something about the role of the Chinese in Australian mining history. This site has significant potential for archaeological investigation.
Policy	Stabilise the site in its present condition. Interpretation should be provided.

Name	London Mine
Other Names	-
Location	Barton Street
Description	The site is in a conspicuous position at the entrance to the town, close to the Railway Hotel. It contains the tall irregularly-shaped mullock heap of the London Mine, a caved underlie shaft, and 15m to the west the concrete foundations of the engine and winder. The mullock heap is a tempting vantage point which visitors often climb.

Date	1870 to 1913
History	The London was never a very significant producer, although it operated intermittently for over forty years. It was part of Barton's group until its collapse in 1896. The mine was taken over by a local syndicate and re-equipped with new winding gear after 1902. It was acquired by Wilson late in its life, but was virtually worked out, and closed in 1913.
References	Roderick 1975; Menghetti 1992
Condition	The condition of the site is fair. It consists of only concrete foundations and a mullock heap, which is subject to some erosion by pedestrian traffic.
Integrity	The integrity of the site is fair. Despite its poor condition, enough remains for its operation to be interpreted.
Heritage Value	The site is of no particular historical or technological value, but is of interest to visitors because of its prominent location and usefulness as a lookout.
Policy	Maintain the site in its present condition.

Name	Windmill
Other Names	-
Location	Barton Street
Description	A timber windmill standing in a triangle of open space between Barton and Elphinstone streets, with a stone trough and several mango trees.

Date	unknown
History	The date of construction of the windmill is not known, but it was probably early in the twentieth century, as light steel framed windmills made by Cyclone and other firms became readily available from the 1920s onward. The windmill stood on an area of common ground near the entrance to town and the railway station, and was a community facility for watering stock. It has been restored and painted white in recent years, but has since lost its vanes, which are lying on blocks beside the windmill base.
References	Menghetti 1992
Condition	The condition of the windmill is fair.
Integrity	The integrity of the site is good.
Heritage Value	The site is of some historical and technological value, because timber windmills are now very rare.
Policy	Maintain the windmill in its present condition.

Name	London North Mine
Other Names	-
Location	Elphinstone Street
Description	The site is in a conspicuous position near the entrance to the town, opposite the Railway Hotel. Within a very small area it has a vertical timber headframe - the only one still standing in Ravenswood - a caved shaft, and two tall mullock heaps retained by pigsty timbering. The mullock heaps offer a tempting vantage point which visitors often climb.

Date	1903
History	The London North was a small mine which operated late in Ravenswood's history. It was opened in 1903 to work an extension of the underlying London reef at greater depth. At that late date it was forced to operate on a surveyed allotment in a built-up street, so was cramped for space, and had to build tall mullock heaps with timber retaining walls on both sides of the shaft. Production was disappointing, and it was let on tribute in 1907. It was acquired by the New Ravenswood company in 1910, but closed in 1915. The mine was re-opened in 1937 but closed again a few months later.
References	Roderick 1975; Menghetti 1992; Roderick 1993
Condition	The condition of the site is very poor. The headframe, affected by termites and fungal decay, is in a state of near-collapse, and the sheave wheels fell out of their timber framing in about 1995. The pigsty timbering has collapsed in recent years, and the mullock heaps are subject to erosion by pedestrian traffic.
Integrity	The integrity of the site is good. Despite its poor condition, more remains on this site than on most other mine sites in Ravenswood, making it a good candidate for interpretation.
Heritage Value	The site is of not of great historical value, but is of high technological value as the only vertical timber headframe still standing in Ravenswood and also as a relatively intact site which lends itself to interpretation. It is of particular interest to visitors because of its prominent location and close proximity to houses and commercial buildings (RW 01, 13 & 14). The London North Mine is one of the 13 places in Ravenswood on the Queensland Heritage Register.
Policy	Stabilise the site in its present condition. It is worth making an effort to preserve the headframe, which can still be saved by re-connecting the rotted ends of its eight upper braces to the four headframe legs. If the headframe is allowed to collapse, it will be lost. Emphasize this site in planning a tourism strategy.

Name	Grand Junction Mine
Other Names	-
Location	Sunset Street
Description	The site is beside a track which runs south from Deighton Street near the Mabel Mill. The most conspicuous element of the site is a squat red brick boiler stack, built with a square cross-section. There is a caved shaft with three headframe footings, concrete winding engine foundations and remains of a mullock heap.

Date	1903
History	The Grand Junction Consols was one of the deep mines which were sunk in the early twentieth century in an attempt to exploit a supposed intersection of the Grant and Sunset reefs at depth. The company was floated in 1903 by Wilson and London investors, many of them New Ravenswood shareholders. Production was disappointing, and the mine was closed by about 1910. The mine was re-opened by Judge in 1939 but closed by 1942. Conservation work was carried out on the brick stack in the early 1990s.
References	Roderick 1975; Menghetti 1992; Megarrity 1997; Lennon & Pearce 1996
Condition	The condition of the site is fair. The most substantial structure, the stack, is in sound condition. The other elements of the site have stabilised.
Integrity	The integrity of the site is fair.
Heritage Value	The site makes a significant contribution to Ravenswood's mining landscape.
Policy	Maintain the site in its present condition. Monitor the condition of the stack. .

Name	Sunset No.2 Mine
Other Names	-
Location	Sunset Street
Description	The site is beside a track which runs south from Deighton Street near the Mabel Mill. The most conspicuous element of the site is the tall red brick boiler stack, built with an unusual octagonal cross-section. There is a caved shaft, headframe timbers, some concrete foundations and a small quantity of mullock.

Date	1900
History	This was a second vertical shaft into the deeper levels of the extensive Sunset workings, established by Wilson when he re-organised the mine in 1900. The Sunset was the largest producing mine in Ravenswood, and it was worked until the New Ravenswood company collapsed in 1917. The shaft was re-opened in 1937 but closed again a year later. The headframe collapsed in the 1970s. Conservation work was carried out on the brick stack in the early 1990s.
References	Roderick 1975; Menghetti 1992; Megarrity 1997; <i>AR</i> 1937
Condition	The condition of the site is fair. The most substantial structure, the stack, is in sound condition. The other elements of the site have stabilised.
Integrity	The integrity of the site is fair.
Heritage Value	The site makes a significant contribution to Ravenswood's mining landscape.
Policy	Maintain the site in its present condition. Monitor the condition of the stack. .

Name	Judge's Mill Site
Other Names	Ravenswood Gold Mining Syndicate's battery
Location	Deighton Street
Description	Ruins of a large gold treatment plant adjacent to a small tributary of Elphinstone Creek, near the Sunset mine. Major surviving elements of the site include: five head of stamps and the foundations of 25 more; .the water tubes of a Stirling boiler; belt drive pulleys and shafts; standing timber posts and extensive brick and concrete foundations. The mortar box of the intact stamps reads: "Union Ironworks San Francisco 1903".

Date	1938
History	This mill was built by Judge to treat a rich patch of ore in the Sunset mine's mullock heaps during the gold price rise of the Depression. In 1938 he installed ten head of stamps (the San Francisco ones) from the Mount Wright gold mine, powered by a diesel engine. The mill was housed in a large corrugated steel shed, and was sufficiently notable to have photographs of it published in the <i>Annual Report of the Under-Secretary for Mines</i> and the <i>Queensland Government Mining Journal</i> in 1938. Early results were promising, and in 1939 Judge expanded the operation to 30 head of stamps scrounged from abandoned sites, powered by a 250hp steam engine with a Stirling boiler from the Burdekin Meatworks. The expanded mill was never a success. Badly built and with inappropriate machinery, it was defeated by poor returns from the mullock heaps and wartime fuel shortage, and closed in 1942.
References	AR 1938, pp. 105-6 & 144; 1939, pp. 106-7 & 142; QGMJ 15 April 1940, p. 117; Menghetti 1992; Lennon & Pearce 1996
Condition	The condition of the site is poor. It consists for the most part of fragmentary ruined structures and machinery exposed to the weather, and is subject to continuing deterioration.
Integrity	The integrity of the site is good. Despite its poor condition, it can be readily interpreted.
Heritage Value	Judges Mill site is the remains of a small and short-lived mineral treatment operation relatively late in Ravenswood's history. It is of value principally because (a) it demonstrates the continuity of the mining industry over time and its responsiveness to economic forces, (b) it is one of the three most complete collections of <i>in situ</i> mining plant in Ravenswood, and (c) some of its elements - the San Francisco stamps and the Stirling boiler - are very rare and of particular interest.
Policy	Stabilise the site in its present form and condition. Interpretation should be improved.

Name	Deep Mine
Other Names	-
Location	School Street
Description	The site is prominently located on the ridge overlooking the town, near the school. The most conspicuous element of the site is a tall red brick boiler stack, built with a circular cross-section. There is a high mullock heap, a caved shaft, and some concrete machinery foundations. There are two vaulted brick and concrete explosives magazines on the site.

Date	1902
History	<p>The Deep Mine was the first and most ambitious of the shafts which were sunk in the early twentieth century in an attempt to exploit a supposed intersection of the Grant and Sunset reefs at depth. Deep Mines Ltd, with capital of £100,000, was floated in London in 1902 by Wilson and a group of New Ravenswood shareholders, and a state-of-the-art mine with its own mill was set up on the old Saratoga lease. The mine was a spectacular failure; in three years it was sunk to over 1,500 feet below ground, but only produced a little more than 200 ounces of gold, worth about £1,000. Underground exploration continued for a few years, but the project was abandoned by about 1910. The mine lost London shareholders at least £65,000, and undoubtedly contributed to a loss of investors' faith in Wilson and in Ravenswood. The Deep Mine never worked again, although there was later exploration on the surface. Conservation work was carried out on the brick stack in the early 1990s.</p>
References	<i>AR</i> 1902, p. 99; Roderick 1975; Menghetti 1992; Megarrity 1997
Condition	The condition of the site is fair. The most substantial structure, the stack, is in sound condition. The other elements of the site have stabilised.
Integrity	The integrity of the site is good. Enough remains on site to enable the site's history to be interpreted very effectively.
Heritage Value	The site is of great historic value in telling the story of one of the saddest episodes of mis-directed investment in Queensland mining history. With its impressive and prominent remains it makes a very significant contribution to Ravenswood's mining landscape. The two explosives magazines are particularly interesting and attractive elements of the site.
Policy	Maintain the site in its present condition. Monitor the condition of the stack. Emphasize this site in planning a tourism strategy.

Name	Deep Mine Mill Site
Other Names	-
Location	School Street
Description	The site is an area of bare ground with some indefinite machinery foundations down the slope north of the Deep Mine. The most conspicuous element of the site are large brick settling tanks and a quantity of tailings.

Date	1902
History	The mill was set up to process ore from the Deep Mine, but had very little work to do in that role. It was like a smaller version of the Mabel Mill, with gravity stamps, Wilfley tables and a cyanide plant. The plant worked as a custom mill, treating ore for independent mine owners, and its milling charges were the Deep Mine company's only source of income. The mill probably operated intermittently until New Ravenswood collapsed in 1917. Two years later a company called Ravenswood Gold Mines Ltd renovated the mill and worked it sporadically to treat ore from some of the Wilson group's mines. It closed at some time in the 1920s. In the early 1950s about 900 tons of tailings were taken from the site for re-treatment at Heuier's cyanide plant.
References	<i>AR</i> 1902, p. 99; Roderick 1975; Menghetti 1992; Megarrity 1997
Condition	The condition of the site is poor. It is on an unstable bare slope, and the most substantial surviving structures, the brick settling tanks, are deteriorating.
Integrity	The integrity of the site is poor. Very little remains of the mill, and it is difficult to interpret the site's history effectively.
Heritage Value	The site is of some historic value for its associations with the Deep Mine, but the mine site itself does a better job of telling that story. The mill is not a prominent site and makes a modest contribution to Ravenswood's mining landscape.
Policy	Leave the site in its present condition. Monitor the condition of the tanks. The site does not have high priority for conservation or interpretation.

Name	Sunset Underlie Headframe
Other Names	Sunset No. 1 Shaft
Location	Within fenced Carpentaria Gold lease, off School Street
Description	The site is in a prominent position on the ridge overlooking the town. The main elements of the site are the collapsed underlie headframe, a caved shaft and a brick and concrete explosives magazine.

Date	1900
History	<p>The Sunset was the most productive mine in Ravenswood, operating continuously from 1871 until the New Ravenswood company was wound up in 1917, and producing nearly a quarter of the field's gold. In 1900 the mine was reorganised by Wilson as a key part of his strategy, and the underlie headframe was built to haul from a shaft driven down the dip of the reef. The Sunset mine was the focus of repeated attempts at reviving the field; it was worked again on a small scale from 1919 to 1921, and was re-opened in 1934 but closed again a year later. Ore from its mullock heaps was treated at Judge's mill from 1938 to 1942. The large Sunset mullock heap, which had been a landmark overlooking Ravenswood for eighty years, was taken to Totley for heap leaching in 1983. In 1991-93 the Sunset reef was mined from underground workings extending from the Buck Reef open-cut. The headframe was still reasonably intact in the 1970s but has collapsed since.</p>
References	<p>Cameron 1903; AR 1921 p. 89 & 1934 p. 107; Roderick 1975; Fraser Osborn 1990; Menghetti 1992; Megarrity 1997</p>
Condition	<p>The condition of the site is poor. The only standing structure, the underlie headframe, is in very bad condition and rapidly deteriorating. The other elements of the site have stabilised.</p>
Integrity	<p>The integrity of the site is fair.</p>
Heritage Value	<p>The site is of very great historic and technological value as the remains of (a) the most important mine of the Ravenswood goldfield, and (b) the only underlie headframe known to survive in Queensland. The site makes a significant contribution to Ravenswood's mining landscape.</p>
Policy	<p>Stabilise the site in its present condition. It is worth making an effort to preserve the headframe, which can still be saved by re-instating the collapsed uprights and getting the fallen timbers up off the ground. If the headframe is allowed to collapse further, it will be lost.</p>

Name	General Grant Mine
Other Names	Grant Mine
Location	Within fenced Carpentaria Gold lease, off School Street
Description	The site is in a prominent position on the ridge overlooking the town. The most conspicuous element of the site is the tall red brick boiler stack, built with a square cross-section. There is a caved shaft, headframe timbers, and a large quantity of mullock. A large surrounding area has been disturbed by earthmoving, and brick and concrete machinery foundations have been overturned.

Date	1900
History	<p>The General Grant was the first reef discovered in Ravenswood in 1869, and was named after the Union hero of the American Civil War, who had taken office as President of the USA a few months earlier. It developed into one of the most productive mines on the field, operating until the New Ravenswood company was wound up in 1917. In 1900 the mine was reorganised by Wilson, and equipped with powerful new haulage machinery. The Grant mine played little part in revival attempts, although it was worked again on a small scale from 1919 to 1921. Some of the mullock heap was taken to Totley for heap leaching in 1983. In 1991-93 the Grant reef was mined from underground workings extending from the Buck Reef opencut. The headframe had collapsed by the 1970s. Conservation work was carried out on the brick stack in the early 1990s.</p>
References	<i>AR</i> 1921 p. 89; Roderick 1975; Menghetti 1992; Megarrity 1997
Condition	<p>The condition of the site is poor. The only standing structure, the brick stack, is in sound condition. The other elements of the site have been damaged by earthmoving and are deteriorating.</p>
Integrity	<p>The integrity of the site is fair.</p>
Heritage Value	<p>The site is of historic value as the remains of one of the most important mines of the Ravenswood goldfield, and makes a significant contribution to Ravenswood's mining landscape.</p>
Policy	<p>Maintain the site in its present condition.</p>

Name	Duke of Edinburgh Mine
Other Names	Duke Mine
Location	Within fenced Carpentaria Gold lease, off School Street
Description	The site is on the ridge east of the Grant mine. The most conspicuous elements of the site are two large Cornish boilers, one still in its brick bed, the other overturned, and their collapsed steel stack. There is a caved shaft, timbers from a collapsed underlie headframe, concrete machinery foundations, a brick and concrete explosives magazine and a quantity of mullock.

Date	1908
History	The Duke was among the early reefs discovered in Ravenswood, and was worked in several episodes up to the 1890s. In 1908 the mine was taken over by Wilson, and re-organised as an underlie shaft with new haulage machinery. It was worked in conjunction with the nearby Grant mine until the New Ravenswood company was wound up in 1917. The Duke was worked again on a small scale in 1947, and the boilers probably date from that revival. The headframe had collapsed by the 1970s.
References	Roderick 1975; Menghetti 1992; Megarrity 1997
Condition	The condition of the site is poor. The most prominent structures, the boilers and their beds, are in fair condition. The other elements of the site have been damaged and are deteriorating.
Integrity	The integrity of the site is fair.
Heritage Value	The site is of some historic value as the remains of one of the last historic mines to operate on the Ravenswood goldfield, and makes a contribution to Ravenswood's mining landscape.
Policy	Stabilise the site in its present condition.

Name	Grant and Sunset Extended Mine
Other Names	Sunset Extended mine, Rob Roy mine
Location	Within fenced Carpentaria Gold lease, off School Street
Description	The most conspicuous element of the site is a tall red brick boiler stack, built with a square cross-section. There are brick and concrete winding engine foundations and remains of a mullock heap. An extensive area around the mine has been cleared of vegetation. The shaft has been recollared for use in recent years, and is now covered by a locked grid with modern headframe footings and machinery foundations nearby.

Date	1903
History	<p>The Grant & Sunset Extended is on the southern fringe of the principal historic mining area of Ravenswood, and in the nineteenth century small mines had been put down on the Rob Roy reef in the same area. The Grant & Sunset Extended mine was one of the deep shafts which was sunk in the early twentieth century in an attempt to intersect a hypothetical orebody at depth, and its name was presumably chosen to appeal to investors familiar with the Grant and Sunset reefs. It was floated in 1903 by a company independent of Wilson and the New Ravenswood group. Not surprisingly, production was disappointing, and it was closed by about 1910. The upper levels of the mine were worked by tributers until 1917.</p> <p>In 1987, opencut mining commenced in the Buck Reef West pit north of this site, and later underground operations extended into the Grant and Sunset reefs. The old Grant & Sunset Extended timber headframe was demolished in 1988, and the shaft was fitted with a new steel headframe and winding gear to provide access to the workings. The shaft remained in use until 1993, but is now closed and the steel headframe has been removed. Conservation work was carried out on the brick stack in the early 1990s.</p>
References	Cameron 1903; Roderick 1975; Menghetti 1992; Megarrity 1997; Lennon & Pearce 1996
Condition	The condition of the site is fair. The most substantial structure, the stack, is in sound condition. The other elements of the site have stabilised.
Integrity	The integrity of the site is fair.
Heritage Value	The site makes a significant contribution to Ravenswood's mining landscape.
Policy	Maintain the site in its present condition. Monitor the condition of the stack. .

Name	Carpentaria Gold Opencut
Other Names	Buck Reef West Pit
Location	Within fenced Carpentaria Gold lease, off School Street
Description	Abandoned opencut mine extending about 350m in length from just west of School Street, with water in the eastern end. Kidney-shaped in plan with a single berm around the wall and a haul road ramp at the western end. Drives of the old Sunset and Grant underground workings are visible in the walls of the pit. There is a large landscaped and revegetated mullock heap south-west of the pit.

Date	1987
History	Large-scale mining recommenced in Ravenswood In 1987, when Carpentaria Gold opened the Buck Reef West pit. This followed nearly ten years of prospecting by MIM Exploration, which concluded that the large low-grade gold deposits of the Buck Reef could be mined profitably for the first time by modern extraction and ore treatment methods. Besides the Buck Reef deposit, the mine also extended underground into the Grant and Sunset reefs. Ore was trucked to a treatment plant near Sandy Creek, 3km east of Ravenswood. The mine closed in 1993.
References	Carpentaria Gold 1997
Condition	The condition of the site is good.
Integrity	The integrity of the site is very good.
Heritage Value	The site is of historic value as the first workings of the modern mining era in Ravenswood, and makes a significant contribution to Ravenswood's mining landscape.
Policy	Maintain the site in its present condition.

Name	Archibald & Heuier's Mill Site
Other Names	Empire Mill site
Location	One Mile Creek, off Mackay Street
Description	<p>Ruins of crushing and cyanide plant on the bank of One Mile Creek just above its junction with Elphinstone Creek. This is a complex site with evidence from mineral treatment in five separate episodes. Major surviving elements of the site include: an intact building; ramps leading up to two crushing plants, one consisting of a large (4m diameter) Empire edge-running mill driven by belt drive from an Imperial diesel engine and fitted with an automatic ore feeder; the other with a hammer mill and Berdan pan, five cylindrical and four rectangular concrete cyanide tanks; two small ball mills, one made from a boiler shell and driven by a one-cylinder oil engine; a Wheeler grinding pan and smaller items including a dump of gravity stamp parts, ruinous timber structures and brick and concrete settling tanks.</p>

Date	1936-1974
History	There are at least five episodes of gold treatment at this site. The original short-lived plant was built by Heuier in 1936 to re-treat mullock. In 1938 Archibald and Heuier installed a much more powerful Empire edge-running mill powered by a diesel engine and discharging to a Wilfley table to treat mullock. This was reasonably profitable and operated for about twelve years. In 1950 Heuier built a pilot plant with a ball mill and cyanide tank to experiment with tailings re-treatment. Later the same year a large cyanide treatment plant was installed, and used to treat about 900 tons from the Deep Mill's tailings. (These were from custom crushings, not from the Deep Mine.) However the 1950s was not a promising era for gold treatment. In 1974 Heuier's son installed a hammer mill and Berdan pan in an unsuccessful attempt to treat mullock.
References	Information from Roy Heuier
Condition	The condition of the site is poor. There was a roof over the Empire mill, but it had collapsed by the 1970s. Timber structures are in an advanced state of decay and collapse. All machinery is exposed to the weather, and is subject to continuing deterioration.
Integrity	The integrity of the site is good. Despite its poor condition, it can be readily interpreted, and it shows evidence of several unusual mineral treatment processes.
Heritage Value	Archibald & Heuier's Mill site is the remains of two small and short-lived mineral treatment operations relatively late in Ravenswood's history. It is of value principally because (a) one of its elements, the Empire mill, is a very rare plant item in nearly complete condition, (b) it demonstrates the continuity of the mining industry over time and its responsiveness to economic forces, and (c) it is one of the three most complete collections of <i>in situ</i> mining plant in Ravenswood, and lends itself to interpreting the technology of the industry.
Policy	Stabilise the site in its present form and condition. Interpretation should be provided.

Name	Ravenswood Hotel Site
Other Names	Browne's Hotel; the Steps on the Corner
Location	Macrossan Street
Description	Empty allotment at the corner of Macrossan and Deighton streets, formerly the site of Ravenswood's leading hotel. The only building elements remaining are the elaborate brick and concrete front entrance stairs, and a less imposing set of stairs to the bar. There are trees and picnic tables on the site.

Date	c.1885
History	<p>The Ravenswood Hotel was built late in the nineteenth century by Charles Browne, to replace his older hotel of the same name which had traded since the 1870s. It was the town's only first class hotel, "the Pride of the North", offering superior cuisine and wine cellar. It was a two-storey timber building with 50 guest bedrooms, billiard rooms, sample rooms and consulting rooms for travelling health professionals. The hotel was still trading in 1918, but at some time in the 1920s it was dismantled and railed away to be re-erected somewhere else, perhaps in South Townsville; no-one seems to remember exactly. The site was dominated by several large fig trees along the Deighton Street frontage until about 1995 when they were cut down.</p>
References	Roderick 1975; Menghetti 1992
Condition	The condition of the site is fair.
Integrity	The integrity of the site is fair.
Heritage Value	The steps of the vanished hotel leading to an empty allotment are a highly evocative element of the Ravenswood townscape.
Policy	Generally maintain the allotment as an empty site. The loss of the fig trees is regrettable. The collection of direction signs and posts at the corner of the allotment might be rationalised.

Name Archibald Wilson's House Site

Other Names -

Location Raven Street

Description Empty allotment facing Raven Street adjacent to the Court House. There are a number of building elements remaining: brick and concrete front entrance stairs and ornamental rockery, brick kitchen fireplace and chimney, concrete floors and tree plantings.

Date	c.1900
History	Wilson was the dominant figure in the Ravenswood mining industry from 1899 to 1917, and the house was built early in that period. The symbolism of its location - on the hill overlooking the town, and next to the office of his close friend and supporter Warden Cusack - could hardly be clearer. After the collapse of the New Ravenswood company, Wilson remained in Ravenswood, and was prominent in local government on first the Ravenswood and then the Dalrymple Shire Councils until shortly before his death in 1935. During the Second World War, boarders from St Annes Anglican girls' school at Aitkenvale were billeted in the house. It was demolished in 1945.
References	Roderick 1975; Caspani 1987; Menghetti 1992; Megarrity 1997
Condition	The condition of the site is fair.
Integrity	The integrity of the site is very good. Enough remains to interpret the form of the house in detail.
Heritage Value	The site has great historic value for its associations with the most prominent and controversial figure of Ravenswood's past. The steps and other elements of the vanished house on the empty allotment are a highly evocative element of the townscape. The allotment has potential for archaeological investigation.
Policy	Maintain the allotment as an empty site and interpret it for visitors.

Name	Smelting Site, One Mile Creek
Other Names	Cassell Gold Extraction Company Plant?, Ravenswood Smelting Company Plant?, Queensland Smelting Company Plant?
Location	East side of One Mile Creek, near Shylock Street (GR 874774)
Description	Scattered ruins of brick and stone structures near a small gully draining into One Mile Creek about 300m north of the modern road crossing. Small quantity of smelter slag and clinker, partly dug out and removed. Extensive scatter of bottle glass, ceramic fragments and sheetmetal, large pile of oyster shells.

Date	unknown
History	The identity of this site is not known. The fragmentary evidence on the site suggests that the building that stood there was one of several experimental treatment works known to have operated somewhere on One Mile Creek in the 1880s and early 1890s, probably either the Ravenswood Smelting Company Plant with its “electric-dynamo machine” of 1884, or the Queensland Smelting Company Plant or the Cassell Gold Extraction Company Plant, both of which were mentioned in the warden’s report of 1888. If it is the Cassell plant, then it was probably also the site of the Macintyre brothers’ early cyanide experiments. It is intriguing to speculate whether something happened on the site to prompt a celebration involving a very large feast of oysters.
References	<i>AR</i> 1884, p. 26 & 1888, p. 35; Parkes 1892; Menghetti 1992
Condition	The condition of the site is very poor. It consists of fragmentary ruins on an unstable slope, and is subject to continuing deterioration.
Integrity	The integrity of the site is very poor. Because of its poor condition, very little can be interpreted from the visible evidence. It is possible that archaeological investigation would reveal more, but the site is not likely to be fruitful.
Heritage Value	As the site is unidentified, its heritage value cannot be assessed, except to say that it may be of some technological value as one of the early experimental treatment plants of Ravenswood. The site is inconspicuous and inaccessible.
Policy	No action is recommended for this site; simply avoid doing anything that would damage it. If further study is done on the mining and treatment plants of Ravenswood, this site should be investigated in more detail. The site does not have any priority for conservation or interpretation work.

Name	Wild Irish Girl Mine
Other Names	New England Mine?, Australasian Gold Extracting Company Plant?
Location	East side of One Mile Creek, near Lennox Street (GR 876777)
Description	Extensive building ruins on level ground above One Mile Creek about 600m north of the modern road crossing. Vertical mine shaft and brick water tank, both in fenced enclosures. Brick foundations, large in-ground pond with brick walls and 4m high stone retaining wall. Raised brick structure which has been heated (reverberatory furnace?) associated with a scatter of slag and clinker. Extensive scatter of glass and ceramic fragments and sheetmetal.

Date	1890?
History	The evidence on this site suggests that this was one of several experimental treatment works known to have operated on One Mile Creek. However, the identity of the site is not clear, as the Wild Irish Girl and New England mines were very close together, both had treatment plants in the late 1880s, and they may have amalgamated and worked as one operation. It is most likely to be the plant of the Australasian Gold Extracting Company, which was reported by the warden to have installed a Pollock's patent chlorinating plant at the New England mine in 1890. The plant was visited by James Parkes in 1891. Nothing more is known about it.
References	<i>AR</i> 1888, p. 35 & 1890, p. 57; Parkes 1892; Roderick 1975; Menghetti 1992
Condition	The condition of the site is poor. It consists of fragmentary ruins, and is subject to continuing deterioration.
Integrity	The integrity of the site is poor. Because its identity is uncertain, very little can be interpreted from the visible evidence. It is likely that archaeological investigation would reveal more.
Heritage Value	As the identity of the site is uncertain its heritage value is difficult to assess, but it is clearly of some technological value as one of the early experimental treatment plants of Ravenswood. The site is inconspicuous and inaccessible.
Policy	No action is recommended for this site; simply avoid doing anything that would damage it. If further study is done on the mining and treatment plants of Ravenswood, this site should be investigated in more detail. The site does not have any priority for conservation or interpretation work.

Name	Great Extended Mine
Other Names	-
Location	2km north of Ravenswood, 700m east of One Mile Creek (GR 878792)
Description	The mine site consists of a mullock dump and shaft dating from the 1880s, equipped with an offset steel headframe and winding and pumping gear from 1915, powered by a MAN diesel engine and Vickers generator from 1912, housed in a light steel-framed shed dating from 1949. There are also an ancillary shed and a workshop, mine buckets and cages and drainage earthworks dating from 1949-1964.

Date	1883-1890, revived 1949-1953
History	<p>In 1883, at the height of the silver boom, the Great Extended Ravenswood Silver Mining Company Ltd was formed by a group of Townsville and Ravenswood businessmen including Hugh Barton to work a silver-lead deposit at Totlely, near Kings Mine. They sank a shaft and mined for five years before the company failed in 1890. The mine sat idle for nearly sixty years, then in 1949 Percy Kean re-equipped the mine with a second-hand plant installed at the Louisa mine on the Palmer in 1915, including a MAN diesel engine built in 1907 and now on its third site. He mined for four years before abandoning it in 1953. In 1964 another company, Silver Horizons NL, briefly worked the mine with no results.</p>
References	Kennedy <i>et al</i> 1981; Bell 1987b; Lennon & Pearce 1996
Condition	<p>The condition of the site is poor. Since 1980 the timber headframe brace has collapsed completely, one leg of the headframe has been undermined by erosion, heavy posts have collapsed on the engine and generator, the generator is submerged in water, the brick base of the winder has deteriorated, small electrical parts and tools have been stolen, part of the mullock heap has been removed, and the site is overgrown with vegetation and subject to continuing deterioration.</p>
Integrity	<p>The integrity of the site is good. Most of its major components are relatively intact and can be interpreted from the visible evidence. Continuing deterioration will threaten the site's integrity.</p>
Heritage Value	<p>The site is an interesting case study in improvisation and recycling of mining equipment, and of great technological value as a very unusual early electrically-driven mining plant. Two of its components, the asymmetrical steel headframe fabricated by Dorman Long of Middlesbrough, England, and the diesel engine manufactured by Maschinenfabrik Augsburg-Nürnberg AG of Germany, are probably unique in Australia. While out of sight over a ridge from the town of Ravenswood, the site is conspicuous and relatively accessible. The site is on the Institution of Engineers Register of Historic Engineering Monuments.</p>
Policy	<p>This is a site where some elementary maintenance at an early date will prevent major conservation problems in the longer term. It is also a site which can readily be interpreted to visitors. The Great Extended Mine has a high priority for both conservation and interpretation work.</p>

Name	King's Mine
Other Names	Ravenswood Silver Mining Company Mine
Location	2km north of Ravenswood, 700m east of One Mile Creek (GR 877793)
Description	The mine site consists of a mullock dump and shaft dating from the 1880s. The surroundings have been stripped bare and partly covered by a heap leaching deposit. The site is eroded and littered with rubbish.

Date	1878-1890, 1950-53, heap leaching 1983-86
History	King's Mine was the first and most significant of the Tootley silver mines, explored from 1878 and then developed for production in 1883. The mine produced nearly £140,000 worth of silver in the next four years. After over-spending on a new treatment plant, the company collapsed in 1890 and the mine closed. The headframe and winding gear were sold to the John Bull Mine in 1894. An attempt at re-opening the mine in 1924 came to nothing, then in about 1950 Percy Kean worked it for three years. In 1983 the Northern Queensland Company Ltd took the tailings dump from King's crushing plant for re-treatment by heap leaching nearby. In the process, most of the evidence of the 1880s silver mining and milling era was destroyed.
References	Roderick 1975; Kennedy <i>et al</i> 1981; Bell 1987b
Condition	The condition of the site is very poor. The bare surfaces created by the 1980s earthworks are being degraded by erosion.
Integrity	The integrity of the site is very poor. Most of its components have been destroyed by earthworks associated with 1980s re-treatment. Removal of the tailings dump was obviously an essential part of that process, but the damage to the 1880s mine and mill sites with their winding, pumping and milling machinery, tramways and settling ponds was simply pointless vandalism, achieving no mining objective. An Uskside two cylinder steam winding engine recorded on this site in 1980 is now at Kean's Mill at Copper Knob.
Heritage Value	The site has very little heritage value since the 1980s destruction.
Policy	No action is recommended for this site.

Name	Great Extended Mill
Other Names	The Buddles
Location	2km north of Ravenswood, on One Mile Creek (GR 872794)
Description	The mill site is on the east bank of One Mile Creek. Its most conspicuous elements are two 8m diameter Linkenbach buddles of brick and concrete. There are settling ponds, concrete building post bases and brick foundations on the site.

Date	1889-1890
History	<p>The Great Extended Ravenswood Silver Mining Company Ltd was formed in 1883 in competition with King's Mine at Topley. They sank a shaft nearby, and in 1889 spent £11,500 importing a state-of-the-art mill designed by Commans & Coy of London, incorporating Linkenbach buddles, which they built on the bank of One Mile Creek. The treatment plant was so sophisticated it was described and illustrated in detail in a mining textbook published in London in 1890. (See Appendix 1) Unfortunately, the company's name was only too appropriate, for their finances were seriously over-extended by the new mill. The company failed while the plant was still under construction, and it never processed any ore at Topley. The mill was dismantled in 1891 and taken to the Montalbion smelters near Herberton.</p>
References	<p>Warnford Lock 1890, pp. 400-403; Richards 1909, pp. 368-375; Simons 1914, pp. 352-355; Kennedy <i>et al</i> 1981; Bell 1987b; Lennon & Pearce 1996</p>
Condition	<p>The condition of the site is fair. There is active erosion on the site, although the building and plant foundations have not altered greatly since 1980. An erosion gully to the north of the buddles is of some concern.</p>
Integrity	<p>The integrity of the site is good. Most of its major components are relatively intact and can be interpreted from the visible evidence. Continuing erosion will threaten the buddles in future.</p>
Heritage Value	<p>The site is of great historic value as another example of mis-directed investment in a mining project, and of great technological value as a very unusual but well-documented ore treatment plant.. The buddles are a well-known landmark and make a significant contribution to Ravenswood's mining landscape. The only other site in Queensland with Linkenbach buddles is Montalbion, where the Great Extended plant was taken in 1891.</p>
Policy	<p>There is a pressing erosion problem at this site which should be dealt with now. Expert advice should be sought on stabilising the gully north of the buddles, and the rest of the site should be monitored for erosion, especially after rain. The site is obscure, but not difficult to find, and it is a site which can readily be interpreted to visitors. The Great Extended Mill has a high priority for both conservation and interpretation work.</p>

Name	King's Mill
Other Names	Ravenswood Silver Mining Company Mill
Location	2km north of Ravenswood, on One Mile Creek (GR 872796)
Description	The mill site is on the east bank of One Mile Creek. Its most conspicuous element is the ruins of a 2m tall brick structure associated with the end of the tramway from the tailings dump. There are partial brick foundations of a perimeter wall and parts of three circular brick bases of tanks or buddles.

Date	1889-1890
History	King's Mine was the first and most significant of the Totley silver mines, in production from 1883. The mine produced nearly £140,000 worth of silver in the next four years. However, the treatment plant was inefficient, and there was an estimated 40 tons of silver left in the tailings dump. In 1887 the Ravenswood Silver Mining Company raised £15,000 to build a new mill on One Mile Creek to treat the tailings. The mill was completed in 1889, and connected to the tailings heap by a 400m tramway. While the new treatment plant was still undergoing trials, the company collapsed in 1890 and the mill closed.
References	Kennedy <i>et al</i> 1981; Bell 1987b; Lennon & Pearce 1996
Condition	The condition of the site is very poor, and very little remains of the mill building or plant. The site has been degraded by erosion in the past, but appears to have changed very little since 1980.
Integrity	The integrity of the site is very poor. Most of its components have been reduced to fragmentary foundations, and the site is very difficult to interpret.
Heritage Value	The site is of some historic value, but has very little technological or archaeological value.
Policy	No action is recommended for this site.

Name	Totley Township
Other Names	One Mile
Location	2km north of Ravenswood, east of One Mile Creek (GR 873795)
Description	The site of a township dating from the 1880s, with some fragmentary building remains, wells, kerbing and surface scatter. Most of the area has been stripped bare and partly covered by a heap leaching deposit.

Date	1883-1890
History	Silver was discovered at One Mile, just north of Ravenswood, in 1878 and King's Mine was being developed for production by 1883. For the next few years silver mining, not gold, would be Ravenswood's economic mainstay. The township that grew up around the silver mines was called Tolley, and surveyed in 1886. With a population of nearly 200 it was a self-contained community with its own school, post office, licensed hotel, store, boarding house and brickworks. The mines closed in 1890, and Tolley immediately declined, although a few people continued to live there. The town site was finally abandoned in the 1920s. In 1983 the Northern Queensland Company Ltd took a number of tailings and mullock dumps from around the Ravenswood area and established a heap leaching plant at Tolley. In the process, most of the evidence of the 1880s silver mining township was destroyed.
References	Kennedy <i>et al</i> 1981; Bell 1987b
Condition	The condition of the site is very poor. A survey in 1980 identified a large number of cottage sites, wells, forges, street kerbing, tramway relics and an extensive scatter of domestic artefacts throughout the town site. Most of these elements of the town site have been buried under the 1980s re-treatment plant or destroyed by its associated earthworks. The bare surfaces created by the 1980s earthworks are now being degraded by erosion.
Integrity	The integrity of the site is very poor. Most evidence on the site has been destroyed.
Heritage Value	The site has very little heritage value since the 1980s destruction.
Policy	No action is recommended for this site.

Name	Kean's Mill
Other Names	Copper Knob
Location	2km north of Ravenswood, 700m east of One Mile Creek (GR 877791)
Description	<p>The mill consists of a small ore treatment plant under a steel-framed roof on the ridge about 200m south-west of the Great Extended Mine. It consists of a concrete sluice and sump with an elaborate circulating system of pipes and pumps. Its plant includes a Mason stonebreaker, a Thompson of Castlemaine oil engine driving a small ball mill, a Berdan pan, classifiers, two Wilfley tables and a diesel generator and switchboard. Much of this is plant that Kean installed at Partridge's Mill in the 1950s. Other machinery and parts are scattered in an extensive area south-east of the shed, including an Uskside two-cylinder steam winding engine from King's mine.</p>

Date	c.1980-present
History	In 1949 Percy Kean re-equipped the Great Extended mine with a second-hand plant and mined for four years before abandoning it in 1953. He also bought Partridge's Mill beside Elphinstone Creek in 1951 to treat the ore. For the next forty years Kean prospected for a variety of minerals around the district. The mill on Copper Knob was established in the 1970s to treat small ore parcels. Much of its plant has been brought from Partridge's Mill since 1980.
References	Kennedy <i>et al</i> 1981
Condition	The condition of the site is fair. It has been used until very recently, although some deterioration is evident.
Integrity	The integrity of the site is good. Most of its major components are relatively intact and can be interpreted from the visible evidence. Continuing deterioration will threaten the site's integrity.
Heritage Value	The site is an interesting case study in improvisation and recycling of mining equipment, and demonstrates the continuity of mining practice.
Policy	No action is recommended for this site.

Name	John Bull Mine
Other Names	Evlinton Township
Location	3km south-east of Ravenswood, south of Sandy Creek (GR 921756)
Description	The mine site consists of a caved shaft, machinery foundations and a long mullock heap. The site of the nearby township of Evlinton has been degraded by modern mining and farming activity.

Date	1894
History	<p>The John Bull Mine at Sandy Creek was developed in the 1880s as a minor gold producer. It was owned by a local syndicate who believed the mine would be profitable if they could raise enough working capital. In 1893 they raised money to send mine manager Archibald Wilson to London where he succeeded in floating a public company to invest in the mine. On his return in 1894, Wilson re-equipped the John Bull with better winding and pumping gear and its own mill and cyanide plant, attracting lavish praise for his initiative in Warden Cusack's official reports. The mine never paid a dividend, and faded within a few years, but the event was a significant milestone for several reasons: it was the first significant injection of London capital into the Ravenswood field; it was the first commercial (as opposed to experimental) use of the cyanide process on Ravenswood; and it established the credentials of Wilson, who went on to repeat the same formula on a larger scale with the New Ravenswood company in 1899.</p>
References	<i>AR</i> 1893-94; Roderick 1975; Caspani 1987; Menghetti 1992
Condition	The condition of the site is poor.
Integrity	The integrity of the site is very poor. Most evidence on the site has been destroyed.
Heritage Value	The site has historic value for its associations with Wilson and London investment, but the remains on the site are of very little interest.
Policy	No action is recommended for this site.

9 Ravenswood Conservation Management Plan: Statement of Heritage Value

The following provides both an extended and concise statement of heritage value for Ravenswood, treating the whole town as a place. The statement is expressed in terms of the criteria for the entry of a place in the Queensland Heritage Register which are set out in Section 23 (1) of the *Queensland Heritage Act 1992*. Ravenswood is a place of cultural heritage significance and meets the following criteria:

(a) It is important in demonstrating the evolution or pattern of Queensland's history

Ravenswood provides clear physical evidence demonstrating the pattern of settlement in the early goldfields of the colony, particularly those in the isolated tropical north. The development of the town and its individual buildings and mining structures over time can be read clearly in the townscape. Ravenswood is particularly notable historically for the difficulties in treating its ores, and its consequent dependence on innovative technology. The evolution of mining practices over time and the fluctuating prosperity of the associated settlement are demonstrated with remarkable clarity in the existing fabric.

(b) It demonstrates rare, uncommon or endangered aspects of Queensland's cultural heritage

Ravenswood has rare qualities because of the exceptionally high proportion of its extant built fabric which survives from the early twentieth century, principally c.1900-05, and because of the unusual range of mineral treatment processes which were practised there, evidence of which still survives.

(c) It has potential to yield information that will contribute to an understanding of Queensland's history

The good state of preservation of early Ravenswood, its buildings, mining sites and vegetation plantings, constitute physical evidence which has the potential to provide valuable information on nineteenth and early twentieth century industry and settlement in Queensland. The town has a number of sites with a high potential for archaeological investigation.

(d) It is important in demonstrating the principal characteristics of a particular class of cultural places

There are numerous nineteenth century mining townships in Queensland, but the great age, compactness and relatively good state of preservation of Ravenswood raise it out of the ordinary to make it an outstanding representative of settlements of this type.

(e) It is important because of its aesthetic significance

The specific and attractive character of the Ravenswood township, recognised by all observers as remarkable for its close juxtaposition of mining industry and habitation, has attracted several artists and photographers and continues to provide an aesthetic experience to visitors.

(f) It is important in demonstrating a high degree of creative or technical achievement at a particular period

There are two aspects of Ravenswood's fabric which satisfy this criterion: first, the small group of brick masonry buildings - possibly designed by a single architect - which survive from the early twentieth century boom, and second the remarkable legacy of Ravenswood's place in Queensland's mining history at the forefront of technological innovation, and the early adoption of chlorination, cyaniding and Wilfley tables in particular.

(g) It has a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

The intact state of the historic built environment of Ravenswood is in part the result of conscious community action over many years to preserve the town, demonstrating strong cultural associations for a community of present and past residents.

(h) It has a special association with the life or work of a particular person, group or organisation or an event of importance in Queensland's history

Ravenswood is associated with the life and work of a variety of historical figures such as William Hodgkinson, Edmund Plant, James Smith Reid, John Macrossan, Richard King and Hugh Barton. It is particularly closely associated with Archibald Wilson and the New Ravenswood company. Important events associated with Ravenswood are the first significant gold and silver discoveries in northern Australia, the opening of Australia's first railway to a silver field, the strike of 1912, and the first railway closure in Queensland.

The above is summarized into the following Statement of Heritage Value:

The town of Ravenswood is of heritage value as the first significant discovery of both gold and silver in northern Australia, and for the physical legacy of its complex and innovative history of mining technology. It is of great value for its representation of nineteenth century settlement patterns in the North Queensland region, evidenced by the intact building stock and mining landscape of the town, dating principally from the period of settlement between 1870 and 1905. This degree of intactness is rare in Australia. In addition, the town is significant for its association with a number of historical figures and events, most notably Archibald Wilson and the rise and fall of the New Ravenswood company.

10 Ravenswood Conservation Management Plan: Losses

The following section of the report attempts to summarise the historic buildings and structures in Ravenswood that have been lost or damaged in recent decades. It is based principally on Roderick 1975, Walker 1979, Bell 1982, Menghetti 1992, aerial photographs taken in 1934, 1962 and 1976, personal observations between 1972 and 2000, and oral accounts from Ravenswood residents.

This is a broad impression rather than an exact count, because to some extent it relies on people's memories and indistinct aerial photographs which cover only part of the town. There are also the questions of what is "historic", and how far out the town extends. Even with these limitations, the broad impression may be interesting. It ignores modern buildings and structures.

- Between 23 September 1934 and 11 August 1962, the evidence of aerial photographs shows the following buildings were demolished or removed: Court House and Police Station, part of Browne's Buildings, Wilson's house, Anglican church, Methodist manse, St Johns School, Masonic Hall, several buildings at the Mabel Mill and Deep Mine, and about 11 private houses.
- In that same period, the following structures were built or moved onto new sites: Golden Hill headframe, Eureka Mine headframe, Kean's Great Extended Mine plant, Partridge's Mill, Judge's Mill, Archibald and Heuier's Mill and three historic (pre-1920) private houses.
- Between 1962 and Roderick's survey in 1975, the Methodist church was demolished or removed. Between 1962 and Bell's survey in 1979, three private houses were demolished or removed. During that same period, Kean's Mill at Copper Knob was built.
- The Eureka Mine and Sunset Mine headframes, St Agnes Convent and Duke of Edinburgh mine manager's house all collapsed or were demolished in about 1977. This sudden loss of buildings may have been accelerated by severe storm damage in 1974.
- The King's Mine tailings dump and Grant and Sunset mullock heaps were removed for heap leaching in about 1983. In the process of creating the leaching site, King's Mine and much of the Tolley township were destroyed.
- The Golden Hill headframe was demolished in 1980 and the Grant and Sunset Extended Mine headframe was demolished in 1988.
- In 1989 the Court House and Police Station were returned to their site.
- The Melaneur, Shelmalier, Black Jack and part of the Overlander mine sites were destroyed during opencut mining in about 1990 (none of these had ever been identified as being of great heritage value).
- Following damage in Cyclone Aivu in 1989, the School of Arts Library and former Sidley and Trenfield butcher shop in Macrossan Street were both demolished in about

1992. The Pie Shop in Macrossan Street and Butler Cottage in Railway Street were also both severely damaged, but reconstructed in the early 1990s.

- The remaining section of Browne's Buildings beside the Imperial Hotel was demolished in 1995. The large fig trees on the site of Browne's Ravenswood Hotel were cut down at about the same time.
- Between Bell's survey in 1979 and this project in 2000, five private houses have been demolished or removed. In that same period, two historic private houses were moved onto their present sites.

To sum up, since 1934 about 22 historic buildings and structures and 14 private houses in Ravenswood have been lost, an average rate of one historic place every three years. More surprisingly, in that time the town has **gained** about seven industrial sites and five historic private houses. This gives a net loss of 15 historic sites and nine private houses. These figures completely disregard modern (post 1980) industrial sites, commercial buildings and private houses.

These removals and arrivals have not been random, but follow distinct patterns. Nearly all the buildings and structures Ravenswood has lost have gone for one of three reasons:

- (a) they were impacted by a mining operation,
- (b) they were redundant, and a use was found for them somewhere else, or
- (c) maintenance had been neglected, leading to storm damage or decay.

The first reason directly accounts for the loss of two headframes, three mine waste dumps and the Tolley township site .

The second reason accounts for the loss of most of the sound buildings such as the churches and many of the private homes. They were not being used in Ravenswood, but were still functional and were taken for use elsewhere. Conversely, most of the buildings and secondhand mining plant brought **into** Ravenswood since 1934 have been following the same pattern; they have been brought in from smaller outlying settlements where they were still serviceable but unused.

The third reason accounts for the collapse or demolition of about seven buildings and structures. It also threatens about five more which are seriously at risk. The role of maintenance in shaping the patterns of loss can be demonstrated very simply. There was a group of four timber buildings in southern Macrossan Street, all dating from the 1870s or 1880s. One, the School of Arts Theatre, underwent extensive maintenance in 1978, while the others had not been maintained for decades. In April 1989, all four buildings were struck by Cyclone Aivu. The Theatre escaped with minor damage, while the others were all severely damaged, and two have been demolished. If the butcher shop and library had also received some basic maintenance from a skilled carpenter in the 1970s, they would probably be standing today.

It is significant that six of the nine timber buildings in Ravenswood surviving from the 1870s and 1880s - the School and Residence, Post Office and Residence, Court House

and Police Station - were government buildings. The reason they have survived is that government departments took building maintenance very seriously.

Another obvious pattern is the relative durability of timber and brick. With the exception of Browne's Buildings, damaged in a fire in the 1950s, all the brick buildings ever built in central Ravenswood are still there. On the other hand, nearly all of the timber buildings are now gone. The same pattern is visible on the mine sites. The New Ravenswood company equipped the mines with a new generation of plant in the decade 1900-1910, and many of those mines had a new brick boiler stack and a new timber headframe. A hundred years later, six of those stacks are still standing in good condition, and only one headframe is standing, in very poor condition. The lesson to be drawn from this is not that brick lasts longer; but that timber needs maintenance.

This study of Ravenswood's losses in the past leads to three recommendations:

- Find a use for buildings and they will stay in town,
- Routine maintenance helps buildings survive extreme conditions, and
- Look after timber structures before they need it.

Aerial photograph of central Ravenswood by
Chief Government Geologist Lionel Ball, 23 September 1934
(John Oxley Library: Ball Leica Series 10/27)

Elphinstone Street cottage (RW 13) and London North headframe (RW 37), 1979

Elphinstone Street cottage (RW 13) and London North headframe (RW 37), 2000

Losses: Sunset Mine underlie headframe (RW 43), early 1970s
(Ravenswood Restoration & Preservation Association photograph)

Losses: Imperial Hotel (RW 05) flanked by the remaining section of
Browne's Building and the Eureka mine headframe, early 1970s
(Ravenswood Restoration & Preservation Association photograph)

11 Ravenswood Conservation Management Plan: Discussion of Heritage Issues

Background

Ravenswood is probably most famous for its early buildings. While the number of buildings in the town is not great - even in the famous core of the town there are only eight buildings standing in Macrossan Street within 200 metres either side of the bridge - enough of the surviving buildings have an exuberant and prosperous style to give the town its distinctive character. Their exuberance is so out of keeping with the present size of the town that the visitor instinctively realises that Ravenswood has an interesting past. That character is enhanced by other early features such as kerbing, retaining walls, wells, drains, bridges culverts, remnant gardens and tree plantings, many of them associated with buildings that are now gone.

Another exceptional feature of Ravenswood is the mixture of historic functions in a small space. The surviving evidence suggests that houses, hotels, shops, a school, mine chimneys, mullock heaps, timber headframes and stamp mills were all mixed up together in the town, and that impression is perfectly correct. Ravenswood was a town planner's worst nightmare; the largest mine in town was across the street from the school. And the impression was once much stronger than it is today; only thirty years ago there was a mine headframe standing ten metres from the Imperial Hotel's bar.

What is just as striking to the visitor as the buildings are the gaps that exist between them. It is obvious that Ravenswood today consists of fragments of a much larger town, and much of its character comes from a sense of decay; of being in a town that has shrunk in size. Ravenswood is a town where one is greeted by gateways with no fences, and "steps that lead to nowhere" - at the sites of Browne's hotel, the Methodist church and A.L. Wilson's house, and for many years at the Court House, for example - and the visitor feels surrounded by the ghosts of buildings that have gone.

Hence there are two competing impressions that Ravenswood creates; a sense of the past, and a sense of the decay of the past. To put that in perspective, Ravenswood was a mining town for 47 years, from 1870 to 1917. After that, it was an ex-mining town for 83 years, from 1917 to 2000, if we disregard the modern mining era since 1987, which has had very little impact on the town centre. Ravenswood's post-mining era is now nearly twice as long as its mining era. It is important to recognise this in planning the conservation of the town. The aim should not be to return things to the way they were in the mining days, but to recognise that a lot of time has gone by since the early mining period, and Ravenswood has moved on a long way in that time.

Mines and Mill Sites

One of the outstanding features of Ravenswood is its stock of early mines and mineral treatment plants. From the 1870s to the early twentieth century, Ravenswood was famous nationally and internationally for the refractory nature of its ore, and hence also for the innovations that were tested on the field. Some of these experiments were of dubious value, but others were to lead the mining world to new technology, notably the cyanide process.

As most of these sites were composed of durable industrial works, many of them still present substantial remains today. Most people find early mining sites intrinsically interesting, but completely unfamiliar. Visitors are usually grateful for brief technical

explanations of how things worked, and generally relate easily to early photographs of the site in operation. The challenge the mining sites present now is threefold: (a) to identify what is most significant about them so they can be conserved efficiently, (b) to stabilise them so as to minimise the rate of decay, and (c) to interpret them to visitors at an appropriate level of detail, informative but not abstruse.

Machinery

We know that early Ravenswood was a museum of treatment plants, most of them unsuccessful. Reading the reports of early wardens and visitors, we could draw up an inventory of thousands of tons of machinery which once stood on the sites of at least thirty well-equipped mines and mills in the immediate vicinity of the town. Amazingly, almost all of this machinery is now gone. Only the Mabel Mill and Judge's, Partridge's and Archibald & Heuier's mills have any significant quantity of machinery still in place. Of the mines, only Kean's Great Extended mine of 1949-53 and the Duke of Edinburgh mine, last worked briefly about 1947, have any machinery at all remaining on site.

There is some other plant hidden from view. At some time in the past the Dalrymple Shire Council began to utilise boiler shells to form culverts under minor creek crossings. There are at least four Cornish boiler shells used in concrete culverts, three under the crossings of two unnamed creeks under Macrossan Street, and a large one under Cemetery Road where it crosses Jessops Gully.

The sites with extant machinery: Partridge's, Archibald & Heuier's and Judge's Mills, and Kean's mine, all date from 1938 or after. Significantly, when Judge began to build his mill in that year, he had to bring second-hand plant in from Mount Wright, implying that the stamp mill sites in the town area had already been stripped by that date. Presumably the machinery was all taken for scrap in the 1920s or 1930s. The machinery would all have belonged to the Mines Department, but there is no information in published departmental sources about its removal. Oral tradition in Ravenswood says that Archibald Woodville Wilson, son of Archibald Laurence Wilson, was responsible for stripping many of the mine sites. His father was a member of the Shire Council until 1933, which might explain the boilers used as culverts under roads.

The implications of this for heritage conservation management are that the few machinery items remaining in Ravenswood are very rare and precious. The three or four sites identified in this report as having machinery relics *in situ* require special care. The location of the machinery is important, and the removal of plant items from mining sites to a central museum site should be avoided.

The machinery that has already been collected on the site of the New Ravenswood company office at the Mabel Mill presents an anomaly in the Ravenswood landscape. It does not make sense in its present context, and it creates a confusing impression to the visitor, because there is no information to explain or interpret it. It would be best to remove this machinery from this prominent and historically important site, but it is not

easy to determine where it should go. Perhaps a public but less conspicuous site such as the camping ground would be appropriate. Wherever it is located, some interpretation should accompany it.

Chinese Sites

One of the neglected features of Ravenswood's heritage is the significance of its early Chinese community, and the evidence that remains of their distinctive culture and way of life. From the 1870s to about the turn of the twentieth century, there was a substantial Chinese community in Ravenswood engaged in alluvial mining, gardening, hotel keeping and commerce. Most unusual was Barton's employment of Chinese mill hands in the Mabel Mill, as generally speaking, Chinese labour was not tolerated in the mainstream mining industry. There was still a small Chinese population in Ravenswood as late as the 1920s.

The most substantial physical evidence of the Chinese community remaining in Ravenswood is the temple floor and the pig oven, which can be related to similar Chinese sites known in other Australian mining towns. The Chinese graves in the cemetery also present distinctive evidence, but it is a pity that most of the grave markers have been stolen. There is likely to be further archaeological evidence of Chinese gardens and habitation sites along the alluvial flats beside the creeks.

The temple and oven were at the core of the community and are also the most accessible elements of Ravenswood's Chinese heritage. They could be used as the focal point for some more active interpretation of the role of the Chinese in early Ravenswood.

Chimney Stacks

There are seven surviving brick chimney stacks on Ravenswood mine sites, probably all built in the early New Ravenswood period between 1900 and 1903. Most are made of very similar bricks. What is interesting is that for a small number of chimneys, there is a diverse representation of different forms and styles of chimney construction. Traditionally, round stacks, known as Cornish chimneys, were built on boiler houses, while square chimneys were referred to as Welsh, and were used on smelters. (In South Australia, where there were large numbers of Cornish miners and Welsh smelterers employed from the 1840s to the 1870s, the distinction can clearly be seen.) There is no difference in function or efficiency between the two cross-sections, simply a different technique of bricklaying.

In Ravenswood, there are four square "Welsh" stacks, at the Grand Junction, Grant and Grant & Sunset Extended mines, and a smaller one on the Mabel Mill assay office furnace. There are two round "Cornish" stacks, at the Deep Mine and the Mabel Mill boilerhouse. The seventh one, at the Sunset No.2 mine, goes outside the pattern, being octagonal in section. There is no reason for this diversity of form; perhaps the bricklayers were just showing off their skills. These are not all the stacks that stood in Ravenswood - photographs show other chimneys now demolished at the London and John Bull mines for example - but they are a high proportion of the stacks standing in the New Ravenswood era. On the Duke mine there is a collapsed steel smokestack, a victim of corrosion and strong winds.

The survival of the stacks is due to their massive masonry construction. They all appear to be in good condition, having been re-pointed and generally maintained less than ten years ago, and they can be expected to have a long life ahead of them. The stacks may be the last elements of Ravenswood's early mining heritage to survive. The principal threats to brick chimneys are (1) simple lack of maintenance, which allows water to penetrate the brickwork, (b) ground vibration, and (c) lightning. There has been concern about the effect of ground vibration on the stacks since mining recommenced in the 1980s, and they are monitored for movement. The characteristic sign of ground vibration damage to a brick chimney is vertical cracks running up the midsection of the shaft. The only indication of this is a short crack on the Mabel Mill boiler stack, but its location is a long way from any opencut operation, and is unlikely to be the result of modern mining.

Surprisingly, there is no sign that any of the Ravenswood stacks was ever fitted with a lightning conductor. Lightning can cause severe damage to a wet chimney, and there are historic mining stacks elsewhere in North Queensland at the Mount Elliott mine and the Chillagoe smelters which have been scarred by lightning strikes. (All these chimneys were built with lightning conductors, but they have subsequently been stolen.) If the Ravenswood stacks have survived for a century without visible lightning damage, it hardly seems to be a pressing conservation issue.

Headframes

Unlike brick stacks, the survival rate of timber headframes has been poor. Only two survive, the London North and the Sunset Underlie, and both are in extremely poor condition. Four others - the Eureka, Sunset No.2, Golden Hill and Grant & Sunset Extended - collapsed or were demolished in the 1970s and 1980s. The life of a large timber headframe without maintenance in Ravenswood's climate seems to be about 70 to 80 years. The small Eureka and Golden Hill headframes were less than 50 years old. A steel headframe also stands at the Great Extended mine in reasonably good condition. Local people think of this as relatively new, but in fact it was built in 1915, and is nearly as old as the London North headframe.

By chance, the three headframes that survive form a representative range of different types: the London North is the type most commonly found on nineteenth century mines, a pyramidal vertical structure centred over the shaft; the Great Extended is the more efficient type which came into use in the early twentieth century, an asymmetrical structure built beside the shaft, forming a brace to withstand the pull of the winding cable; and the Sunset is an underlie headframe, built in the form of a ramp to operate a shaft inclined at about 45 degrees from horizontal.

Timber headframes of this age are now very rare in Queensland, and the two standing in Ravenswood are important relics of mining history. The Sunset headframe is almost certainly the only timber underlie headframe surviving in Queensland, and of great historic importance to Ravenswood because of the mine's pre-eminent production record. The London North headframe, although historically less important, is a highly significant landmark in Ravenswood, and its visual prominence makes it one of the icons of the town.

The London North headframe has deteriorated rapidly in the last ten years; it has lost many of its timbers and is affected by termites and fungal decay (dry rot). The structure has been reduced to only the four main legs and the top tier of diagonal braces. Its

principal structural problem is that the ends of the diagonal braces have rotted because of fungal attack, and have become disconnected from the main legs, greatly reducing its stability. A strong wind would probably bring the headframe down. It would be possible to carry out repairs by re-attaching the brace ends to the legs, scarfing new timber ends to the braces as necessary. This however would be costly and dangerous work, requiring a skilled carpenter experienced in dealing with historic structures. The aim of this work would be to retain a visual landmark at the entrance to Ravenswood. Its net effect would be to prolong the headframe's life for perhaps another ten years.

Work on the Sunset headframe would be much less difficult. That would involve propping up the main timbers to get them out of contact with the ground where they are decaying very quickly. The aim of this work would be to preserve a structure of great technological interest. Photographs can be used as a guide for this work: there are several photographs of the headframe both when it was in use and up to the 1970s, when its basic structure was still intact.

Historical Continuity

One striking feature of Ravenswood's history which is well illustrated by the surviving evidence is the continuity of mining activity through almost all economic circumstances. Commencing in August 1870 with Plant & Jackson's mill on the creek bank behind where the Post Office now stands, there has been a chain of mineral processing right up to the present. A virtually uninterrupted sequence of events connects the Macintyre brothers' experiments in the 1880s through Barton to Wilson, then on through Judge, Archibald and Partridge in the 1930s to Kean and Heuier in the 1950s. Carpentaria Gold's Nolan's project is the most recent of the plants that have been operating Ravenswood for 130 years now, with very few gaps. Only for a few years around 1930, and again around 1970 was there no mineral treatment at all going on in Ravenswood.

This is worth pointing out, because much of the written history and interpretation of Ravenswood understandably tends to concentrate on the romantic early years and the glories of the New Ravenswood era, but a large proportion of the evidence from those days is now gone, and what survives has been greatly altered. In fact a considerable part of what the visitor to Ravenswood can see today is the evidence of the small plants put up by the battlers of the Depression and more recent decades. It is important that Ravenswood's story be told in full, and that both conservation and interpretation reflect the continuity of mining up to the present.

History and Heritage

Reading the history of Ravenswood and looking at its heritage are related activities, but they are not the same thing. Many of the great events of the past have left no evidence today, and sometimes the most interesting things that survive were of no great historical importance in their time. There are plenty of examples to illustrate the point: the opening of Plant & Jackson's Lady Blanche Mill (later the Vulcan) was one of the most important events in Ravenswood's history, but it has left no evidence. We know exactly where it was, and even have a photograph of it under construction, but it has gone without trace. There are some stones on the ground which were probably once a paved floor, but that may have nothing to do with the mill. On the other hand Judge's Mill, late and short-lived, had very little historical impact on the town, but has left a magnificent site, interesting to visitors and readily interpreted.

At Trolley, one of the most productive mines in Ravenswood's history was King's Mine. Yet on the sites of the mine, its old mill and the new mill on One Mile Creek, there is now almost nothing of interest to see. However, the Great Extended Mine, which was a dud, and its expensive mill nearby which was never used, have left two very interesting landmark sites today. These accidents of history are found in every historic town. They require a conservation and interpretation strategy which is flexible in its approach, valuing places for different reasons: some for their historical significance, and others for their sheer intrinsic physical interest. The interpretation on site should make it clear which is which.

Heritage Registers

Both Ravenswood and Trolley in their entirety are on the Register of the National Trust of Queensland and on the Register of the National Estate, kept by the Australian Heritage Commission in Canberra. Yet neither is on the Queensland Heritage Register, which includes only a list of thirteen prominent buildings and structures in and around the town. This is apparently the result of a policy of placing only discrete elements on the Register, because the Queensland legislation has no satisfactory means of identifying significant towns or precincts. Very little harm has come to Ravenswood as a result of this omission, as the Dalrymple Shire Council has generally maintained an informal policy of opposing development harmful to Ravenswood's character, and the pace of development to the present has not presented much threat.

However, the failure to define Ravenswood in its entirety as a historic place in State planning terms has probably prevented the adoption of an integrated management plan for the town such as those advocated by Roderick in 1975 and Walker in 1979. The conservation efforts that have happened in Ravenswood in the last thirty years have been piecemeal: the School of Arts Theatre, St Patricks Church and Imperial Hotel have been conserved, while alongside them the School of Arts Library, St Agnes Convent and Browne's Building have been demolished.

The existence of a list of 13 places which the State officially regards as of heritage value contributes to this piecemeal approach. Organisations playing a part in the management of Ravenswood, such as Dalrymple Shire and Carpentaria Gold, tend to adopt this list in good faith as representing the significant elements of the town, and shape their conservation policies accordingly. This report has identified 59 individual buildings and structures which are of heritage value, but that is only the beginning; in the spaces between them there are at least as many more sites which have building foundations, brick culverts, or archaeological evidence of alluvial diggings, gardens or Chinese huts. It would make far more sense to think of Ravenswood as one place which is of heritage value, rather than as a list of buildings and mining structures.

Significance and Tourism

Just as a site's historical significance may be very different from its physical heritage, so its value for tourism may be different again. As tourism is likely to be an important future industry in Ravenswood, conserving the town's heritage assets is obviously an important part of its economic tourism strategy. Tourism is going to drive most heritage conservation policies in Ravenswood for a long time to come.

However, it is worth remembering that some places that are of little tourism potential may still be of great heritage value. This report has identified the ruins of the Sunset

underlie headframe as an important structure both for its historic contribution to mining in Ravenswood, and for its rarity as an engineering relic. However, only a small audience of specialist mining historians and engineers would be likely to find it a fascinating place to visit. Further, it is locked away in an active mining lease, and inaccessible to the public for the foreseeable future, so it might be tempting to disregard its conservation altogether. The advice of this report is that in a case like this, lack of short-term tourism appeal should not stand in the way of conservation. The Sunset headframe is important and should be conserved for future generations, whether the public are going to see it or not. One aim of conservation is to keep as many options as possible open for the future, even if we cannot foresee how they will ever be used.

Replication

One temptation when managing a place where historic buildings and structures are in danger of being lost is to propose to build replicas to replace them. After the cyclone damage of 1989, engineering firm Ullman & Nolan proposed to build replicas of buildings such as the School of Arts Library. A waiting room has been built as a tourism information shelter on the site of the Ravenswood railway station. It is not a replica, but suggests the character of an early railway building.

One problem with replicas is that they are rarely done well. All over Australia there are historic mining towns which have built replica mine headframes, usually in a park, and usually out of permapine logs. Most of them are done very badly, and simply look ridiculous. Good replication is possible - Sovereign Hill is Australia's largest and best example - but work of this quality can only be done at a cost of millions of dollars. And if replication in a genuine historic mining town is done well, then it misleads the public into believing in something that never existed. Modern experience is that most tourists are becoming historically sophisticated, and are looking for genuine historic places. Replication almost invariably lacks authenticity, and has very little public appeal.

Replication is not conservation, and would not attract support or funding from conservation agencies. The other danger of replication from a conservation viewpoint is that it absorbs resources which could be used for carrying out conservation work to extend the life of genuine historic resources. To let the London North headframe fall down and then build a replica of it would be very bad policy for two reasons: (a) it would cost several times more than conserving the original, and (b) the end product would be a fake. The advice of this report is to concentrate resources on the preservation of genuine historic structures.

Priorities

Establishing a program of conservation work in Ravenswood must involve a series of priorities. It is not possible to solve all the conservation problems of the town, and it never will be. Work must focus on the problems that are most urgent and the solutions that are most cost-effective. Generally timber conservation problems will be more urgent than masonry problems.

To achieve this, it is suggested that Ravenswood's conservation needs be divided into three levels of priority along the lines of **triage**, a technique used in hospitals to categorise accident victims:

- Category 1: urgent cases whose survival depends on immediate treatment. An example might be a timber building which is leaning and in danger of collapse. This case should have high priority because a few hours' work spent straightening it and consolidating its foundation can prevent a major collapse involving thousands of dollars worth of repairs. Highly cost-effective.
- Category 2: cases which need treatment, but are not urgent. Examples include cracking of brickwork, which will cause very slow deterioration. Fallen monuments in the cemetery should be re-erected, but if they are not going to come to further harm where they are lying, they can wait for a while.
- Category 3: hopeless cases which are not worth treating when resources are limited. An example might be a building which has collapsed completely and is overgrown with vegetation. The cost of conservation work might pay for minor work on five other places. This represents a poor return on expenditure.

This approach to cost-effectiveness may need to be modified by other considerations. If a problem arose in a place of great heritage value it would be justifiable to move it up the queue. Sometimes the publicity value of work on a conspicuous or high-profile structure may justify giving it higher priority. If there is a supply of unskilled labour, then perhaps routine non-urgent work like clearing vegetation or attending to gully erosion might be the best way to utilise it, although even this work must not be done without expert supervision.

Maintenance

This report has pointed out that Ravenswood retains nearly all its historic brick buildings and structures, and has lost nearly all its timber ones. The reason for this, put quite simply, is that timber has much greater maintenance needs than masonry, and as the early buildings of Ravenswood fell into disuse, their maintenance was neglected. The timber buildings that survive are the ones that were maintained with greatest care.

In the North Queensland climate, timber buildings have four principal enemies: fire, wind, termites and fungus. All can be defeated by routine maintenance, keeping vegetation clear of the building, nailing down loose iron, fixing windows and shutters, keeping gutters and downpipes intact and clean. Much conservation management comes down to these matters of elementary housekeeping.

Buildings should be fitted with stump caps, regularly checked for termites (preferably by an expert) and treated with insecticide when necessary. Fungus - dry rot to most people - penetrates the end grain of damp timber and eats the cellulose fibres. It does not attack dry timber. All of these things are matters for routine maintenance, and are best done every week or every month, not left for a few years. When a building develops a major conservation problem such as a roof blown off or termites in the floorboards, the cost of urgent repairs simply represents the money that was saved by neglecting elementary maintenance over the years.

Vegetation

Ravenswood has had three landscapes in the 136 years since European settlement. First until about 1870 there was the native eucalypt woodland, which can still be seen on the slopes of One Mile Hill and other places some distance from the town. Second from

1870 until the 1920s was the mining landscape, in which all the trees within about 3km radius of the town were cut down, and the ground was heavily grazed by goats. This landscape has now gone. Since about the 1920s it has been progressively replaced by the post-mining landscape of exotic plants which began to invade the town site in the 1930s, and have now come to dominate the environs of the town.

Since the 1960s, Ravenswood has had a serious general infestation of Chinesee apple (*Ziziphus mauritiana*) shrubs, with patches of rubber vine (*Cryptostegia grandiflora*) along creeks and in areas disturbed by mining. Despite its popular name, Chinesee apple almost certainly has nothing to do with the Chinese. Its natural habitat is in Africa, not Asia, and there is no historical evidence that it was introduced by Chinese miners. It appeared after mining had ended, typically infests areas that have been cleared and over-grazed, spreads along roads, and is found growing prolifically in areas around Townsville and Charters Towers that were first cleared during the Second World War. Rubber vine was introduced as a garden plant, and is common in abandoned mining areas where it probably spread from domestic gardens. Despite the abundance of these plants, they were kept under control, trimmed back and the ground under them kept clear by cattle and goats.

In the 1980s, grazing by goats in the town area virtually ceased. At the time, Jane Maggs discussed the possible outcomes of this policy, and predicted:

the lack of grazing would cause the regrowth of woody species, probably *Zizyphus*, *Eucalypts* and *Acacias* in the main, as well as *Melaleucas*, *Lophostemon* etc, along watercourses. This would alter the visible landscape entirely. No longer would Ravenswood be a sudden change in the *Eucalypt*-dominated landscape, but would become hidden in it. (Maggs 1986, p. 77)

Fourteen years later, Maggs' prediction has proved mostly correct, except that there has so far been little regeneration of native species; the regrowth is mostly confined to exotic pests. Since the 1980s, rubber vine has come to dominate the creek lines, and the noxious plant growth around Ravenswood has been joined by lantana (*Lantana camara*) and prickly acacia (*Acacia nilotica*). During the wet season conditions of April 2000 in many places around the town, all four pest plants were found growing together into a noxious impenetrable mass. Ravenswood now has a serious vegetation management problem. Not only is the present growth unsightly and restricting access to many places, but when dry it will present a major fire hazard.

The cheapest and most efficient way to manage the pest plants problem in the short term seems to be to re-introduce grazing by goats. Because most of Ravenswood is unfenced, this would inevitably lead to goats ranging freely over much of the town, undoubtedly arousing a degree of public opposition. However there seems to be no alternative in sight, as the present policy of selective clearance with herbicide and hand tools has clearly lost the battle.

A further objection may be that Chinesee apple seeds are known to be spread in goat dung. However, there are many large areas of post-Second World War infestation that have never been grazed by goats, suggesting that bird droppings are probably a much more effective agency for spreading the plant, and goats with their smaller range have much less impact.

Another aspect of vegetation management in Ravenswood is the domestic tree plantings which have given the town its botanical heritage of decorative and shade trees - figs, mangoes, tamarinds, bougainvillea and date palms - some of which are magnificent specimens, and certainly give a distinctive character to the town. Conservation of these historic exotic trees is very important. Maggs (1986) gives useful advice on their future management.

In looking at the long-term management of the landscape surrounding Ravenswood, the objective should be to plan for the return of landscape number one: the native sclerophyll woodland. It will inevitably return in the longer term, and there is no point in seeking to retard the process by artificial means. The second bare landscape of the mining era has already been lost, and the third landscape of exotic pests has no historic value, but simply arises from neglect in the post-mining era.

Ownership

The observations and recommendations in this report have disregarded questions of property ownership, and assume that owners will co-operate in proposed conservation or interpretation action. Where that is not the case, those suggestions must simply be disregarded for now. There is always the likelihood that a future owner will have a clearer understanding of the property's historic value and a different attitude to its management.

The study of Ravenswood makes it clear that conservation measures have been driven largely by patterns of ownership. Community or Council-owned buildings such as the Court House, School of Arts and Community Church have been well looked after, whereas privately owned properties such as some houses in Elphinstone Street and James Street are more likely to be neglected. While community properties naturally find it easier to gain the owner's approval and attract funding for conservation work, the result is to build a bias into the process of conserving historic Ravenswood. The end product of this process at some time in the future will be a town in which all the public buildings are old, and all the houses are new. The conservation of at least a representative sample of Ravenswood's early houses should be given higher priority.

While funding agencies have difficulties with the implications of giving grants to private owners, there are other ways to fund conservation of private houses and businesses. One is to make money for conservation work available as a low interest loan at rates more attractive than those commercially available. In recent years, there was a short-lived Commonwealth scheme for income tax rebates, which failed not because it was a bad idea, but because it was turned into an administrative nightmare. A similar scheme, more imaginatively and sensitively managed, would be worth trying.

There are also powerful tools available at local government level. Many Councils throughout Australia waive or reduce rates on heritage properties as an incentive to carry out conservation work; inspection of the work done is a condition of the rate waiver or rebate. Some more affluent Councils make direct funding available in the form of grants or loans. Councils usually have discretion to make planning conditions less onerous as an incentive for an owner to carry out conservation work. In order to use any of these management tools, Dalrymple Shire Council would need to recognise Ravenswood as a Cultural Heritage Place in its Planning Scheme under the *Integrated Planning Act*.

New Developments

Ravenswood has so far been largely spared inappropriate or obtrusive development within the town. This can be attributed to a sympathetic attitude within Dalrymple Shire Council to Ravenswood's historic character. However, Council appears to have no formal planning provisions in place to protect Ravenswood, and it is uncertain how long a sympathetic attitude would stand up to a determined developer with a large budget for legal representation. It might be more accurate to say that Ravenswood's principal protection so far has been lack of economic pressure for development, and it is difficult to predict how effective that protection will be in future. There is also no guarantee that future elected councillors will necessarily retain such a sympathetic attitude to their most historic town. These are further good reasons for Dalrymple Shire Council to recognise Ravenswood as a Cultural Heritage Place in its Planning Scheme under the *Integrated Planning Act*.

This does not mean that Council should set out to prevent development in Ravenswood. Indeed, it is essential for Ravenswood's conservation in future that the town remain economically healthy, and that must involve physical change and development. Conservation policies are useless unless they accept and seek to manage future development and processes of change. As James Kerr states in his book *The Conservation Plan* :

Conservation and development are not mutually exclusive objectives; they should, and can, be part of a single planning process. Conservation projects need provision for development just as surely as competent development requires an adequate approach to determining conservation policy. Developments do not take place in a vacuum but an existing place, in existing surroundings. (Kerr 1996, p. iv)

But it is important that development in a historic town like Ravenswood is encouraged to occur in ways that complement, enhance and capitalise on the values of the historic place. Not all physical change in Ravenswood in recent years seems to have been managed well.

- The toilet block recently erected beside the School of Arts is in marked contrast to the existing buildings in form and materials (i.e., built in brick, not timber, and with its axis at right angles), although it has been saved to some extent by matching its roof form and colour scheme to those existing.
- The shelter shed recently erected in the cemetery is glaringly modern in form and materials, puzzlingly located at the rear of the cemetery, looking out into surrounding bushland, and turned diagonally to the cemetery's plan. The design of the shelter seems more suited to passengers at a bus stop than to the needs of people visiting the cemetery. It is not clear why it was built this way. Surely a simple unobtrusive timber structure located a short distance inside (or even outside) the entrance and conforming to the cemetery's rectangular layout would have been both more useful, and more respectful to the historic character of the surroundings.
- Likewise it is not clear why the remaining section of Browne's Buildings beside the Imperial Hotel was demolished about five years ago. Even as an empty ruin, the building made a visual statement about Ravenswood's vanished streetscapes. The hotel is now an isolated building with its historic context in a bustling street difficult to visualise.

- At about the same time the large fig trees on Browne's Hotel site were cut down. There may have been good reasons for this, but the result has been the loss of a major landmark in the town centre. Was the decision to remove the trees made as a balanced judgment taking into account that this would be the case?
- About two years ago, new timber electric light poles were erected in Macrossan Street, with complete insensitivity to their visual effect on the adjacent buildings. One is sited directly in front of the Imperial Hotel when seen down Church Street - one of the most-photographed vistas in the town - when with a little more thought it could surely have been located a few metres to the left. Such decisions seem to be made on the spot without any consideration for Ravenswood's special status as a historic town.

Cases of this kind suggest that better co-ordination is called for in planning infrastructure and development within the town. People sent to carry out work in Ravenswood should be reminded that the town is a special case, not simply another job on a long list.

There may be cases where planning needs to look at the larger picture. When planning the location of new electricity poles along southern Macrossan Street, was any consideration given to the alternative of undergrounding that short length of cable and doing away with poles altogether in that very important 200m of streetscape? Overall coordination of policy in Ravenswood may need more work. While a Management Committee was formed in 1993, it appears to have fallen into disuse. It might be helpful to revive it with expanded membership.

Potential Funding Sources

There are a number of sources at both State and Commonwealth levels which might be contacted to provide funding for different aspects of conservation, interpretation and development work in Ravenswood. These funding bodies have different areas of emphasis and different criteria for funding, so it is important to recognise what field each one regards as its core business. Ravenswood's needs are complex, and might reasonably be put before funding bodies in the fields of:

- heritage conservation - to conserve historic buildings and sites,
- museum management - to conserve and develop the museum and its collection,
- regional development - to assist the local economy, and
- tourism development - to attract and enhance tourism.

State Government Sources

Queensland Community Heritage Grants

The Grants Officer
 Financial Services Branch
 Department of Environment
 PO Box 155
 Brisbane Albert Street 4002

Queensland's Heritage Trails Network

Penny Cook
Policy Co-ordination Division
Department of the Premier and Cabinet
PO Box 185
Brisbane Albert Street 4002

Queensland Museum Arts Division

Seamus Andrewartha
The Arts Office
GPO Box 1436
Brisbane 4001

Gaming Community Benefit Fund

Rod Setterlund
Manager
Gaming Community Benefit Fund
GPO Box 2796
Brisbane 4001

It might also be worth trying the following organisations:

Breakwater Casino Trust
Treasury Casino
Lotteries Commission
Museums Queensland
Arts Queensland

Commonwealth Government Sources

The Commonwealth has now co-ordinated the administration of a number of cultural heritage funding programs into one office within the Australian Heritage Commission. The funding sources involved are:

National Estate Grants Program
Cultural Heritage Projects Program
Federation Cultural and Heritage Projects Program
Federation Fund Projects
Heritage Properties Restoration Program
Commemoration of Historic Events and Famous Persons
Voluntary Cultural Heritage Organisations Grants-in-Aid

The contact person for all these programs is:

Leona Jorgenson
Cultural Heritage Projects Program

Conservation Policy

In order for conservation policies to work well, a clear understanding of the meaning of heritage terms, and clear policies relating to the management of change should be established. The following definitions are based on the terminology defined in the Burra Charter, which is the Australian standard established for conservation practice by the Australian chapter of the International Council for Monuments and Sites (ICOMOS). The Burra Charter was formulated by Australia ICOMOS and is used by heritage authorities within Australia. Adherence to its principles is a prerequisite for funding of many of the conservation and management works undertaken or offered by heritage authorities throughout Australia.

The following terms are used frequently in the assessment and management of conservation.

Cultural significance means aesthetic, historic, scientific or social value for past, present or future generations.

Conservation means all the processes of looking after a place so as to retain its cultural significance. It includes **maintenance** and may according to circumstances include **preservation, restoration, reconstruction** and **adaptation** and will be commonly a combination of more than one of these. (Article 1)

Maintenance means the continuous protective care of the fabric, contents and setting of a place, and is different to repair. **Repair** involves restoration or reconstruction.

Preservation means maintaining the fabric of a place in its existing state and retarding deterioration.

Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by re-assembling existing components without the introduction of new material. (Article 1.7)

Reconstruction means returning a place as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric. This is not to be confused with either recreation or conjectural reconstruction, which are outside the scope of this Charter (Article 1.8)

Adaptation means modifying a place to suit proposed compatible uses. (Article 1.9)
Compatible use means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact (Article 1.10)

Fabric means all the physical material of the place. (Article 1.3)

Compatible Use means a use which involves:
no change to the culturally significant fabric,
changes which are substantially reversible, or

changes which require a minimal impact (Article 1.10)

(For detailed notes on the Burra Charter see Marquis-Kyle & Walker 1992)

The process of conserving the heritage value of a township such as Ravenswood involves attention not only to the buildings of the town, but to its landscape and context. A sense of place comes from a composite of buildings, streetscape, the relationship of buildings and surrounding open space. Very importantly, it is the sense of approach and arrival that makes a heritage town notable, as the visual setting contributes a contextual value to the town's aesthetic and historic qualities. Conservation policies for Ravenswood need to address not only the buildings of the town, but the spaces between them, and the township's setting.

12 Ravenswood Conservation Management Plan: Historical Archaeology

(Written by Jane Harrington)

Ravenswood can be conceived as a historic landscape that incorporates evidence of past activities. The landscape is a totality, which includes a number of elements that give meaning to the history and heritage of Ravenswood. The most visible elements of the landscape are the imposing sites of past mining activity, and the small network of streetscapes that attest to 'present day' Ravenswood. However, these have the capacity to tell only one part of the history of Ravenswood.

One of the most exciting things about Ravenswood is its persistence as a town, through all the ups and downs of the mining booms and busts, and the sheer numbers of people who, for however short a period of time, lived, worked, played, visited, married or died there. From a population of around 900 in 1871, by 1903 Ravenswood boasted a population of 4,700 people. Approximately half of this number was made up of women and children. As with most mining towns in Australia, there was also a substantial population of Chinese people – around 300 in the 1880s. Yet the presence of these people – women, children and Chinese – can be rendered almost invisible today by the shadow of the overwhelming physical remains that relate to industrial mining processes. This is why an attempt to identify and preserve the totality of the elements that complement the industrial activity is so important in terms of the identity of Ravenswood and its people – both past and present.

As well as being significant in terms of the heritage value of Ravenswood, the capacity to tell a more comprehensive story of the past – and especially such an enriched past – can only enhance the visitor experience and understanding of the township and its surrounds.

Archaeology, and particularly an approach that incorporates cultural landscape concepts, can play an important role in identifying and preserving our heritage. An understanding and inclusion of archaeological methods allows a more comprehensive approach to heritage assessment as these allow us to look beyond the immediately visible – such as large standing structures – and can breath life into an otherwise invisible reminder of our past. Often this exists as little more than the foundations of a structure, or scatters of artefact material, or remnants of a garden bed. But careful investigation of even such minimal remains can tell us volumes about the past, which is why it is important to identify places with archaeological potential and to conserve such places. This highlights another important conservation principal; that is, it is important to understand the full range of evidence that contributes to the heritage significance of a place.

Often sites, or places, have limited significance in isolation: they only tell part of a story. This is why the concept of 'cultural landscapes' is valuable, and becoming more frequently used in heritage assessment projects. A landscape approach has the capacity to integrate the various lifeways and practices that characterise a society and to show how otherwise isolated places are interwoven into a tapestry of places, events and values that incorporate both cultural and natural elements of the environment.

The township of Ravenswood can be conceived as a cultural landscape that incorporates temporal layers of activity, some overlapping, arising from the occupation of the land by Aboriginal people, pastoralists and successive phases of mining operations.

This landscape is enriched today by the present residents of Ravenswood and by the overlay of tourist activity. Mining communities, in their various phases, have left the greatest physical mark on the environment, and contributed substantial elements that inform both the character of modern-day Ravenswood and the identity of many of the residents today. These elements are industrial, domestic and social, and include mining extraction and processing works, pubs, transport routes, trees, ruins, graves, the sites of structures that have been removed, and community gathering places. Together these tell a story about the past of Ravenswood and give the town – and its residents – a contemporary identity.

Often places can have a significance that is not grounded in physical remains. Some places are important to a community because of an attachment, or a memory, or a traditional use, or a spiritual connection. Within the ICOMOS Burra Charter, this is described as social and spiritual value. These are intangible elements, which can combine with physical features to create an enriched landscape. Landscapes can also be perceived to have another heritage value – aesthetic value. For many people, for example, the combination of mullock heaps, shafts, machinery and structural foundations make mining landscapes a place of special ‘beauty’ and grandeur.

The practical advantage of a cultural landscape approach is that, in addition to concerns for the management of specific places or sites, it: (1) provides a framework within which these places can be contextualised; and (2) provides a framework in which a larger area – such as the township of Ravenswood and its surrounds – can be managed. On the macro-scale, Ravenswood is part of the greater landscape of nineteenth and twentieth century mining activity that incorporates Charters Towers and links to Townsville. Individual sites and places can therefore be addressed in terms of their contribution to a wider significance and meaning.

This significance has to some extent already been identified in the citation for the listing of the township in the Register of the National Estate. In particular, the statement of significance notes:

The town is also significant as the remains of a late nineteenth century/early twentieth century mining community which, despite removals, has remained relatively intact and significantly free of later developments. The significant townscape of Ravenswood consists of the landform, exotic vegetation, the buildings and mining relics, particularly in close proximity to one another and this absence of recent development.

For these reasons, archaeological considerations have been incorporated into the assessment of the conservation and management priorities of Ravenswood’s cultural heritage. Although the material remains of mining activities are usually considered to be archaeological relics, they are covered in greater detail elsewhere in this report. The following discussion will concentrate on the places in Ravenswood that complement the industrial sites and contribute to the Ravenswood cultural landscape/townscape. All discussions relating to archaeological potential and protection, however, have equal application to the mining sites.

The discussion is divided into sections as follows:

- Management Issues
- Agencies and Legislative protection

- Types of places or sites
- Specific sites
- Archaeological Areas
- Recommendations.

Management Issues

The archaeology of Ravenswood is a significant component of both its heritage and visitor value. It is therefore important that recognition and protection be given to areas with archaeological potential. This is best achieved through a cultural landscape approach as it can provide a framework in which a larger area – such as the township of Ravenswood and its surrounds – can be managed; at the same time it can address the management of specific places or sites by providing a framework within which these places can be addressed.

The guiding philosophy for the protection of the archaeological component of Ravenswood's heritage is based on the following:

- the intrinsic value found in the capacity of relics and places to tell us about Ravenswood's past
- the contributory value of these relics and places to the cultural heritage significance of Ravenswood
- the recognition of Ravenswood and its surrounds as a landscape that makes a valuable contribution to the past and present identity of Ravenswood
- the understanding that this landscape gives voice to much larger historical community than can be heard through the mining relics and historic buildings of Ravenswood.

In a more global sense, the archaeological potential of the Ravenswood historical landscape has contributory significance in terms of our understanding of the growth and development of northern Queensland.

The management of this landscape, and of specific sites, is based on the need to retain this significance, balanced by constraints and the requirements of potentially conflicting land usage. The aim is to provide protection where possible, and to ensure that any potentially destructive activities are managed in a way that allows the greatest retention of meaning and significance, and the opportunity to record archaeological material that may be disturbed or destroyed.

Due to the constraints of this project it has not been possible to undertake a comprehensive on-the-ground assessment and survey of the entire landscape that should be included in a Ravenswood Heritage Area. It is therefore not possible at this point in time to make an accurate statement about the archaeological potential of specific areas. However, there are some guidelines that can assist with management objectives and planning. Places can be deemed to have high, medium or low archaeological potential based on a combination of their likelihood to contain archaeological remains and on the level of disturbance to the site.

High archaeological potential would mean that the place has a good probability of containing archaeological material and that it has not been disturbed by more recent development or land use.

Medium archaeological potential would mean that the place has a reasonable probability of containing archaeological material and that it has not been disturbed to a great degree by more recent development or land use.

Low archaeological potential would mean that the place is unlikely to contain much by way of archaeological material, and that anything that may have been there has been disturbed or destroyed by more recent development or land use.

The National Estate listing has already noted that one of the significant contributory factors in Ravenswood's heritage significance is the absence of later developments. As many parts of Ravenswood have not been subject to ongoing development or changed land-use patterns it can be assumed that there is likelihood that undisturbed archaeological remains exist throughout the area, particularly in those areas that were once highly populated but have since been abandoned. Until more comprehensive identification and survey work is undertaken in the greater township area it is not possible to pinpoint those places that may have decreased potential due to lack of archaeological material and to localised disturbance. It should therefore be assumed that the greater part of the historical landscape/townscape of Ravenswood will have high archaeological potential. This is in addition to the historical and social significance associated with this landscape.

A realistic management of the archaeological values can only be undertaken in the context of a comprehensive archaeological survey. In the interim, however, these values can be best protected through engaging the 'precautionary principle', which is to manage any proposed work that could potentially disturb below-ground material, or visible above-ground features (such as foundations, artefact scatters or plantings of exotic vegetation). This is not to suggest, for example, that regular maintenance activities (e.g. grass cutting) should be curtailed, but that due care and attention should be paid to relevant places and areas.

The guiding principal is that significant places, sites, features, complexes and landscape elements should be protected and conserved. It is not feasible – or desirable - to protect and retain everything. However, it is important that any decision to disturb or destroy a site or an element of a site, is based on an understanding of the significance of the material and that all attempts are made to undertake a thorough recording of it if removal or destruction is unavoidable.

To some extent, the work that can be undertaken at a specific area will be guided by relevant legislation or statutory heritage listing. Certain types of works may not be allowed, or only allowed if an appropriate permit is obtained. In the latter case, the permit may impose conditions, such as supervision by a qualified professional.

When dealing with specific sites (A.L. Wilson's house, for example) the possible discrepancy between existing fence-lines and the original property boundaries should be kept in mind. That is, it should not be assumed that any contributory archaeological material is contained within the modern boundary.

Above-Ground Features

The most obvious precaution is to avoid any impact on or disturbance to visible above-ground features. This includes drainage, exotic vegetation, structural remains and so on. In the event that such impact could occur, no work should be undertaken without first liaising with an officer of the Cultural Heritage Unit, Environmental Protection Agency. After seeking such guidance, if it is not deemed necessary or possible to retain some or all of the elements of the site, then an appropriate record should be kept of the features that have been removed.

No work that could disturb any of the features at a site that is potentially of state significance should be undertaken before appropriate liaison with and permission from the Cultural Heritage Unit. In the event that any such work is unavoidable, it should be carried out under the supervision of an appropriately qualified professional.

Below-Ground Features

Where possible, all below-surface disturbance of areas with archaeological potential should be avoided. No major disturbance should be undertaken without first liaising with an officer of the Cultural Heritage Unit, Environmental Protection Agency. Depending on guidance from the Agency, it may be necessary to have a qualified archaeologist in attendance to monitor the disturbance works. In the event that any disturbance works are undertaken that are not monitored by an archaeologist, and archaeological material is uncovered then the works should be stopped to allow an appropriate level of recording by a qualified archaeologist. The EPA should be consulted for guidance in this circumstance.

No work that could disturb a site that is potentially of state significance should be undertaken before appropriate liaison with and permission from the Cultural Heritage Unit. In the event that any such work is unavoidable, it should be carried out under the guidance and supervision of an appropriately qualified archaeologist.

Government Agencies And Relevant Legislation

There are several government agencies that have an interest in the cultural heritage of Ravenswood. In addition, there are a number of pieces of legislation that have direct application for the protection of archaeological places.

1 Dalrymple Shire Council

- *The Integrated Planning Act 1997 (Queensland)*

The Dalrymple Shire Council has an obvious interest in the management of the cultural heritage values of Ravenswood, and in future tourism development programs. In addition, the Council can take steps to recognise the heritage values of the area and implement policies to manage and protect them through the planning scheme.

Schedule 1 (Part 1, Section 4) of the Integrated Planning Act notes that core matters to be addressed in a planning scheme include 'valuable features'. 'Valuable features' are defined to include the following:

Areas or places of cultural heritage significance (such as areas or places of indigenous cultural significance, or aesthetic, architectural, historical, scientific, social or technological significance, to the present generation or past or future generations).

It is therefore possible to provide a level of planning scheme protection to areas designated as having cultural heritage significance in the township of Ravenswood. This includes those areas that have archaeological potential.

2 Queensland Heritage Council & Environmental Protection Agency

- *The Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987*
- *The Queensland Heritage Act 1992 (amended 1995)*

The Environmental Protection Agency (EPA) is the administrative body for the Queensland Heritage Council; the EPA also administers both of the above pieces of legislation. In addition, the EPA has responsibility for protecting archaeological places in Queensland. This can be effected to some extent through either Act. They are already involved with heritage management issues at Ravenswood as several places have been included on the Queensland Heritage Register. It is possible, and desirable, to expand this listing to include places that are of archaeological significance.

Because of their close involvement with the management of cultural heritage, including archaeology, the Cultural Heritage Unit of the EPA should be consulted prior to undertaking works that have the potential to damage any cultural material. There is an office of the EPA, including officers in the Cultural Heritage Unit, located in Townsville (Ph. 07 4722 5211).

The Queensland Heritage Act 1992 (amended 1995)

The Heritage Act has application to the protection of the cultural heritage of Ravenswood in two ways. The first is through the addition of places of significance to the Queensland Heritage Register. The definition under the Act provides that:

'cultural heritage significance' of a place or object, includes its aesthetic, architectural, historical, scientific, social or technological significance to the present generation or past or future generations.

Archaeological significance is deemed to be an important type of 'scientific' significance. There are several individual sites in Ravenswood that could be considered for addition to the Heritage Register – such as the site of Wilson's Residence – on the basis of their combined historical, social and archaeological significance. These sites would complement those intact buildings, such as the Railway and Imperial Hotels, that have already been added to the Register. In addition the archaeological potential of certain parts of Ravenswood, notably the main street frontages of Barton and Macrossan Streets, is of sufficient contributory significance to make the argument that the entire precinct should be included on the Heritage Register.

The second application under the Heritage Act comes under Part 7 of the Act, which provides for the protection of cultural relics. Section 50, in particular, is relevant as it allows for the declaration of protected areas (areas of archaeological interest) if the area contains objects of cultural heritage significance. Accordingly, under Section 51, it is an offence to destroy, damage, excavate or disturb a protected area without an appropriate permit.

There is a good argument that a substantial portion of the township of Ravenswood would be eligible for declaration as an area of archaeological interest.

The Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987

The definitions contained in this act provide that:

'Landscapes Queensland' means area or features within Queensland that-

- (a) have been or are being used, altered or affected in some way by humans: and
- (b) are of significance to humans for any anthropological, cultural, historic, prehistoric or societal reason;

and includes any item of the Queensland Estate found therein.

'Queensland Estate' means evidence of human occupation of the areas comprising Queensland at any time that is at least 30 years in the past, but does not include anything-

- (a) made or constructed as a facsimile; or
- (b) made or constructed at or after the commencement of this Act for the purpose of sale: or
- (c) that is not of prehistoric or historic significance.

The Cultural Record Act requires that a permit must be obtained by any person wishing to 'perform systematic survey or any excavation, examination or research of or upon any designated landscape area or in respect of Landscapes Queensland or the Queensland Estate' (Section 27(3)). In addition, Section 56(2) provides that it is an offence to 'take, destroy, damage, deface, excavate, expose, conceal or interfere with an item of the Queensland Estate' unless authorised to do so under the Act.

The Act also reinforces the responsibility of the relevant Local Government Authority towards the protection of relevant areas. This is detailed in Section (45)1:

The preservation of Landscapes Queensland or the Queensland Estate is a function of local government in relation to which a local government has and may exercise the powers and authorities had by it for the purposes of local government of its area in accordance with the Minister's request.

Under the definitions provided above it is clear that this Act has relevance for the protection of a great part of the township and surrounds of Ravenswood. The Act is administered by the Environmental Protection Agency, through the Cultural Heritage Unit and any works that have the potential to disturb archaeological relics should be undertaken in liaison with that Unit.

The Cultural Records Act is currently under review, and if the proposed amendments are ratified it is likely that the new Act will afford little protection to non-Aboriginal sites and places. In this event it is possible that the Queensland Heritage Act will become more relevant in the protection of post-contact archaeological sites.

Types of Places or Sites

The Ravenswood area has had three stages of occupation, all of which have the potential to contribute to cultural heritage values:

- areas and places that may have significance to the Aboriginal history of the area (both pre- and post-European contact)
- areas that have been used for pastoral activities
- areas and places associated with mining activity and communities.

Evidence of the latter stage is obviously more prevalent and of immediate relevance in terms of the current project. However, the possibility of cultural heritage places and areas that are related to the other two phases should be taken into account and incorporated in any future investigation of cultural heritage values in the area.

Undeniably, mining heritage is a major component of the Ravenswood cultural landscape. Most of the major sites of mining activity – both extraction and processing – have been well documented in previous studies and are discussed elsewhere in this report. It is often the nature of studies of mining heritage that the industrial sites are well documented, while associated and supporting sites, including evidence of domestic activity, are given only cursory attention.

Goldfields, and other places of mining activity, were populated by an interesting array of individuals and groups. As the fields become more established the miners were joined by their families, adding a domestic veneer and creating the need for superstructure to support a growing and demographically diverse population. The growth of Ravenswood epitomises the development of a mining settlement, as does its gradual depletion in size with the waning of the mining industry. Within five years of the discovery of gold at Ravenswood, a town plan was laid out, giving the settlement a degree of significance and permanency – even if the plan was somewhat unconventional to cope with the idiosyncrasies of the existing street patterns . This is important as it provides a spatial

framework which can be interpreted today. In addition, in the absence of an archaeological survey to identify boundaries, it provides a historical boundary which can be used to define the area of heritage significance.

Facilities and services were established in line with the growing needs of the community: schools, shops, banks, pubs, blacksmiths, a police station and courthouse, a hospital, and the railway line. Not to mention the numerous residences, ranging in grandeur from the Wilson home to humble tents and make-shift humpies. Other features were added to service the township's needs, such as drains and footpaths.

An inspection of present-day Ravenswood clearly tells only a small portion of its history, and the mines and structures still visible represent but a fraction of the heritage of a town once inhabited by over 4000 people.

The transience of mining fortunes was reflected in the character of many of the structures that made up mining settlements. The major building material was wood: easily recyclable, but also easily destroyed. The light-weight nature of the buildings also made for easy transportation to a 'more favourable' environment. A brief review of the fate of many of the major buildings in Ravenswood highlights the impermanence of these buildings, various numbers succumbing to fire, removal in-toto, or the effects of weathering and negligence over time. Tents were easily rolled up, and vernacular bark structures would have been quickly absorbed into the surrounding natural environment.

The massive population increase about 1903 saw the construction of several hundred new homes, many of which were small cottages but a few were larger high-set buildings. No doubt many of these were included in the hundreds of houses that were railed elsewhere in the 1920s. So, while one question is 'where are they today?', a second is 'what was left behind on (or under) the ground that might still be there today?'

So, today, other than the elements associated with mining activity (such as mullock heaps, shafts, sets of stamper-heads and machinery foundations) what could we expect to find that may provide us with evidence of earlier lifeways at Ravenswood?

People modify and use their surroundings in many ways and remnants of these changes can often be seen in the landscape. Some of the more obvious examples are:

- transport routes: tracks, bridges, railway lines and cuttings
- vegetation: planted tree lines, gardens, orchards
- cemeteries
- structural remains
- rubbish dumps
- artefact scatters.

Where people live and work they always create and discard rubbish. Years later, the material found in rubbish tips has the capacity to tell us a lot about earlier lifestyles and habits – bottles, glass containers and pieces of ceramic can indicate what type of consumables people were eating and drinking, and what type of domestic wares were in use. Similarly, people lose and drop things, especially around domestic sites, so miscellaneous artefact material (such as small toys, beads, spoons) is often left at a place when the residents move on. At places of specialised activity, a hospital for example, it would be expected that the site would contain items that relate to associated functions: for example, small pieces of medical equipment and medicine containers.

Although many buildings at Ravenswood have been removed or destroyed, and many structures may have been too insubstantial to have left much in the way of physical evidence, there is potential for the remains of structural material throughout the Ravenswood township area. Some of the more obvious sites, such as the hospital and the Wilson home, are discussed below. Places such as these have the potential to fill in details about a place that are no longer observable; these include construction methods and materials, floor plans, how different areas of a building were used, and the location of outhouses.

Often, one of the more obvious elements left on the landscape is represented by remnant vegetation. People plant things for various reasons: functional, such as windbreaks; commercial, such as Chinese market gardens; domestic, often represented by fruit trees; and purely ornamental. Once again, something as simple as a line of trees can tell us something about the earlier presence and actions of people.

Examples of all the above types of sites are likely to be present in and around Ravenswood, with a huge potential to fill in the gaps of the story of the town and of its people.

Specific Sites

There are a number of individual places located on or near the main Ravenswood streetscape that have already been identified and have the potential for archaeological remains. This contributes to the overall heritage significance of these sites and consequently to the heritage value of the Ravenswood landscape. Several of these places, when considered in their historical and social contexts, should be considered for addition to the Queensland Heritage Register. Most of the sites listed below are comprehensively discussed elsewhere in the report.

The places have been divided into those that have high archaeological potential and should be considered for addition to the Queensland Heritage Register, and those that

have medium archaeological potential. Management guidelines for works at these sites are detailed above.

Sites that should be assessed for addition to the Queensland Heritage Register (High archaeological potential)

- A.L. Wilson's House (Raven Street)
- Browne's Hotel (Macrossan Street)
- Chinese Temple Complex (near Deighton Street)
- St Paul's Church of England (Elphinstone Street)
- Methodist church (Elphinstone Street)

Other sites (medium archaeological potential)

- Malpass Exchange Hotel (Macrossan Street)
- Queensland National Bank (Macrossan Street)
- Railway Station and cutting (Barton Street)
- Hospital
- Swimming pool (near John Street)

Archaeological Areas

The places listed above are specific elements in a more inclusive cultural landscape. It is not possible to place boundaries on this landscape without a further program of investigation. In the interim, two major precincts/areas can be identified that have high archaeological potential *as a complex*.

AREA 1: The major Ravenswood Streetscapes incorporating Barton Street/ Macrossan Street, and the immediate arterial arms of Deighton Street, Raven Street and Elphinstone Street. Included in these streetscape are the remnant elements of drainage, retaining walls, and road lines.

AREA 2: The land covered by the town grid on the northern side of Elphinstone Creek.

Although the present study has identified some of the major individual sites and contributory landscapes, it is important that further survey and identification be done in the latter to adequately identify and protect significant zones. This would include the identification of component sites, features, structures, vegetation and so on, and also the identification of those areas that may have associative meaning. A study of this nature would allow the identification of significant zones and distinct boundaries that would more effectively facilitate the management of heritage values.

Recommendations

- 1 The archaeological and cultural landscape values of the Ravenswood area should be recognised.
- 2 Steps should be taken to ensure an adequate level of liaison with the Government Agencies who have an interest in the protection of the cultural heritage of the Ravenswood Area. These include the Dalrymple Shire Council, the Environmental Protection Agency (both the Queensland Heritage Council and the Cultural Heritage Unit) and Environment Australia (the Australian Heritage Commission). This should include investigation of funding availability for ongoing management and interpretation programs.
- 3 Areas 1 and 2 should be identified as 'valuable features' and included in the Shire of Dalrymple Planning Scheme. The individual sites listed above should be addressed as separate components, identifiable within the zones. Individual Management policies within the Planning Scheme should be consistent with the objectives of this management plan.
- 4 Areas 1 and 2 should each be assessed for their eligibility to be recognised under the Heritage Act for declaration as a Protected Area (area of archaeological interest).
- 5 The following places should be assessed for their eligibility for listing on the Queensland Heritage Register:
 - A.L. Wilson's House (Raven Street)
 - Browne's Hotel (Macrossan Street)
 - Chinese Temple Complex (near Deighton Street)
 - St Paul's Church of England (Elphinstone Street)
 - Methodist church (Elphinstone Street)
- 6 Any works that may potentially disturb above- or below-ground archaeological material should be undertaken within the guidelines suggested below. This includes the need to liaise with the EPA Cultural Heritage Unit and to have certain works supervised by an appropriate professional.
- 7 Further investigation should be undertaken to locate, investigate, record and assess the potential archaeological significance and cultural heritage values of the landscapes associated with the Ravenswood township. This research should also aim to determine the boundaries of the Ravenswood heritage area. The research should incorporate consultation with the local community, and any other relevant groups. The results should be incorporated into future assessment, management and interpretation plans.
- 8 Future interpretation programs should seek to incorporate the more extensive cultural landscape of the Ravenswood Heritage area, including the more characteristically archaeological and associative landscape components.
- 9 Opportunities should be explored to incorporate the interpretation of the cultural heritage of Ravenswood with places that identify the natural heritage values of the

area, particularly those areas that are listed on the Register of the National Estate (e.g. Ravenswood Environmental Park).

- 10 A Ravenswood Heritage Advisory Group should be established, which includes representatives of local users and owners and any other stakeholder groups. This advisory committee should include representatives of the relevant government agencies. The committee would be best served if it was granted status as a committee of the Dalrymple Shire Council.

13 Ravenswood Conservation Management Plan: Recommendations

Overall Philosophy

- 1 That Ravenswood is a place of great cultural heritage value which must be conserved for future generations, and conserving its physical heritage should be undertaken in the knowledge that:
 - Ravenswood is a special place, and calls for special measures which may not be the same as the policies applied to other places, and
 - Decisions must be undertaken with the intention of planning for the future conservation of Ravenswood, rather than the needs of the present.

Co-ordinated Management

- 2 That a Heritage Advisory Group be established, either under the auspices of the Ravenswood Management Committee, or perhaps in place of it. It should be a Committee of Dalrymple Shire Council, and include representatives of the following bodies:

Dalrymple Shire Council,
Ravenswood Restoration & Preservation Association Inc,
Carpentaria Gold Pty Ltd,
Environmental Protection Agency,
Museums Development Officer,
History Department, James Cook University, and
Tropical Weeds Research Centre.

The Advisory Group should meet about twice each year. Its function is not to make routine management decisions, but to exchange information and co-ordinate policies and actions relating to such matters as:

promotion of tourism and economic development in Ravenswood,
priorities for conservation of historic buildings and sites,
fund-raising for historic conservation,
incentives for conservation work by private owners,
provision of visitor interpretation facilities,
advice on proposed development and infrastructure works,
priorities for vegetation management,
management of the Court House museum,
rationalisation of street and information signs, and
provision of visitor car and bus parking and public toilet facilities.

The Advisory Group should draw up a vision for the long-term future of Ravenswood, to provide a reference statement against which all management decisions should be assessed.

State Recognition

- 3 That the Queensland Heritage Council be encouraged to enter the town of Ravenswood (Reserve R20, Gazetted as Ravenswood Town Reserve) in the Queensland Heritage Register.

If that is not considered appropriate, then the number of individual places within Ravenswood on the Heritage Register be increased, using as a starting point for assessment the 59 buildings and places identified in this report.

Further, that consideration be given to amending the *Queensland Heritage Act* to allow larger heritage precincts or areas such as Ravenswood to be recognised as they are under heritage legislation in other jurisdictions.

Council Recognition

- 4 That Dalrymple Shire Council be encouraged to recognise the town of Ravenswood as a Cultural Heritage Place in its Planning Scheme under the *Integrated Planning Act*.

That Council consider how it can provide incentives to encourage private owners within the town of Ravenswood to carry out conservation works on their property.

That Council draw up guidelines in its Planning Scheme for the design of developments and works within the town of Ravenswood.

That Council do everything possible to encourage corporations or government departments providing public utilities to conform to these guidelines when planning works within the town of Ravenswood.

Support from Mining Industry

- 5 That Carpentaria Gold Pty Ltd be encouraged to continue its support, both in funding and provision of services, for the conservation of Ravenswood's heritage.

As conservation work in Ravenswood has depended heavily on funding from Carpentaria Gold for the past ten years, the company be encouraged to play a major role in planning for the future of Ravenswood.

That Carpentaria Gold recognise that the inevitable cessation of mining at some time in the future will leave Ravenswood reduced in population and lacking its principal source of conservation funding, and join with the community in planning ahead to mitigate those impacts on local heritage management.

Priorities for Site Conservation

6 The site records for 59 buildings and sites earlier in this report (pages 45-165) suggest brief management policies for each individual place. The following recommendations summarise those policies:

- The historic heart of Ravenswood extends along Barton and Macrossan Streets for a distance of about 500m from the Mabel Mill to the School of Arts Theatre, and for a short distance along Elphinstone, Raven and Deighton Streets. All management decisions affecting this area should be made with great care and sensitivity.
- The majority of site records in this report recommend either (a) take no action, (b) maintain in present condition, or (c) stabilise in present condition.
- "Take no action" generally means the site is of low heritage value and is in an outlying location, of little interest to visitors. No positive measures are called for. However, no action should be taken which would damage the place.
- "Maintain in present condition" generally means the place is in satisfactory condition, and the present management policies should be continued.
- "Stabilise in present condition" generally means the place needs some short-term maintenance or repair, but then the existing management policies should be continued.
- All timber structures are at highest risk. They should be regarded as having a high priority for monitoring, maintenance and repair if necessary.
- Brick structures are generally stable and under little threat. (But see some exceptions below) They should be subject to on-going monitoring.
- Adopt a regular program for scheduled inspection and maintenance of all structures, especially timber ones. This program should be documented by means of a signed and dated logbook and checklist.

Urgent Conservation Cases

7 Several buildings and structures have been identified as having high priority for conservation work because they are of significant heritage value or make an important contribution to the townscape, but are under urgent threat of being lost:

- The London North headframe is the last vertical timber headframe left in Ravenswood, and a prominent landmark on approach to the centre of town, but is in imminent danger of collapse. It can be saved by carpentry repairs, but the job will take care and will not be easy.

- The Sunset underlie headframe is probably the only underlie headframe left in Queensland. It has partly collapsed and conserving it will be a major exercise, but in the short term its timbers could at least be propped up on a steel scaffolding frame to slow their decay.
- The two timber cottages in Elphinstone Street immediately north of the London North mine are important visual elements in the mining landscape, and some action should be taken to stabilise them. This does not mean make them habitable; it would be sufficient in the short term to brace up their collapsed framing timbers and nail on enough wall cladding and roof sheeting to keep out most of the weather and restore their external appearance.
- The buddles at the Great Extended Mill are threatened by gully erosion. Advice should be obtained on the best way of stabilising the gully immediately to the north of the buddles. This should be expert advice from an organisation such as the CSIRO or Landcare; home remedies for these situations usually do not work very well.
- The brick chimney on the assay house at the Mabel Mill appears to have developed a lean towards the building. It should be investigated by a bricklayer experienced in dealing with historic structures.
- The brick arch bridge on Chapel Street at the crossing of Slaughter Yard Creek needs some conservation work by a skilled mason. This is probably not urgent. However, in the short term a decision needs to be made whether the bridge is unsafe and closed, or safe and open to traffic. At present it seems to be somewhere in between.

Priorities for Site Interpretation

- 8 The present five heritage trails with their associated booklet (Menghetti 1992) are appropriate and successful. However, in eight years some of the signs have disappeared or deteriorated, and because of changes in tracks and vegetation growth, the off-road trails are not always easy to follow. Like buildings, heritage trails also need regular maintenance and repair.

Consideration should be given to updating signage on the trails, if funding can be found. Larger lectern style enamel or aluminium signs would be appropriate. Further interpretation could be provided for visitors at some sites on the existing trails, such as the Mabel Mill and Partridge's Mill.

If the trails are expanded, consideration could be given to adding some sites, including the following, although they would require some track works to make them accessible:

- Chinese Oven and Temple site,
- Great Extended Mill (the buddles),
- Great Extended mine, and
- Archibald & Heuier's Mill.

Vegetation Management

- 9 Action must be taken to manage Ravenswood's infestation of feral exotic plants. Besides generally transforming the appearance of the landscape, the weeds are preventing visibility and access to historic sites, and creating a fire hazard. Expert advice should be sought from the Tropical Weeds Research Centre on the most efficient strategies for managing the problem.

In the short term, one option is to re-introduce goats, which played a major role in keeping the infestation under control for decades. It is recommended that a trial be made of grazing goats on a weed-infested area of the Ravenswood landscape to observe the results. Goats could be introduced into a fenced area, perhaps towards Totley along One Mile Creek, and their effect on the landscape carefully monitored.

In the long term, the only viable conservation management option for the Ravenswood landscape is to allow it to return to native woodland. The transition from the short term to the long term policy will involve a long process of fencing, grazing and re-planting which is beyond the scope of this study.

Archaeological Investigation

- 10 In a historic environment as rich and complex as Ravenswood's, it is likely that any disturbance of the ground may expose, and potentially destroy, archaeological evidence. There should be a policy that any development or activity which involves external excavation or soil disturbance should be preceded by an archaeological assessment. Such work is likely to include:

- mining or mineral exploration
- road construction
- earthmoving of any kind
- excavation of footings for new buildings
- new drainage or sewerage
- undergrounding of power lines
- excavation involving old wells or cess pits (long drop toilets)
- in-ground swimming pool construction
- demolition of old buildings or structures

Court House Museum

- 11 The management of the Court House museum is satisfactory and should continue with only minor changes. Gai Copeman has prepared a separate report on details of museum management for the Ravenswood Restoration and Preservation Association. One deficiency in the management of the museum is that there appears to be no job description or clear statement of responsibilities for the caretaker. This needs to be remedied, and a job description should be drawn up and agreed between the Association and the caretaker.

Replication

- 12 The construction of replicas of historic buildings and structures is generally not acceptable, as it confuses the historical record, and sends false messages to the observer. Where a new building must be constructed on a historic site, it should be as unobtrusive as possible. It may follow the general form and appearance of an earlier building, but must not attempt to imitate its details, and should be obviously of modern materials and construction.

Machinery Collecting

- 13 Mining machinery and other movable relics should not be removed from their sites unless it is absolutely necessary to protect them from immediate destruction if they remain on that site. If that is necessary, a secure new site must be found, and resources must be provided for their conservation, cataloguing and interpretation.

The machinery collected on the site of the New Ravenswood office at the Mabel Mill represents very poor conservation practice. Nothing has been done about protecting it from deterioration, there appears to be no record of what any of it is or where it came from, and nothing has been done to interpret it to visitors. It is cluttering up and confusing an important historic site. It is a mistake, and should be removed.

In the short term, no more machinery should be taken to this site. Another less conspicuous site should be found for it, somewhere not of historical significance, perhaps at the camping ground. The machinery should be progressively removed from this site, catalogued, provided with bases to keep it off the ground, and given some form of interpretation on its new site.

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Appendix 1: Descriptions of Ravenswood Gold and Silver Treatment Plants

The following extracts reproduce little-known descriptions of four Ravenswood gold and silver treatment plants: the first is of the Great Extended silver mill on One Mile Creek, published in an English mining textbook in 1890, the others are reports on three of the principal gold mills by two visiting mining experts, James Parkes in 1891 and Donald Clark in about 1902.

Great Extended Mill, 1890

The inclusion of this description of the Great Extended mill plant in a prestigious mining textbook published in London shows that it was regarded as the state of the art in silver milling technology when it was built, and the description particularly dwells on the operation of the Linkenbach round tables, which were clearly a novelty in the English-speaking world, even though they had been patented in Germany twelve years before. The Great Extended company unfortunately failed before this plant went into production. The remains of the plant on the site today do not correspond closely to the diagrams accompanying this description, suggesting that the company made some shortcuts in its construction.

Fig 582 shows an elevation of a complete dressing plant designed by Commans & Coy., 52, Gracechurch Street, London, E.C., for the Ravenswood Extended Silver Mining Co. in Queensland, and is said to be the most perfect arrangement of continuous ore dressing machinery in the colony. The ore from the mine is delivered direct to the top of the building by means of a hoist. Later on it is intended to employ an endless aerial ropeway some 720 yd. in length, on the Otto system. The ore to be treated is a rich argentiferous lead, somewhat finely disseminated, and requiring careful sizing. As the ore arrives on the top floor, it is tipped over a coarse screen; the lumps are passed on to the stone-breaker, and after being crushed rejoin the ore that falls through the screen, the whole passing on to a large revolving trommel where a preliminary sizing takes place. The finer particles go direct to a series of sizing trommels or classifiers, over the jiggers, the coarser being delivered, if rich, onto a picking table, or otherwise direct to the crushing rolls (Fig. 583). The ore, after passing through the crushing rolls, falls into the elevator pit, and is raised to the sizing trommels. Two pairs of crushing rolls are used, so as not to unnecessarily reduce the ore, and to retain the same in a granular condition, and so avoid a loss by production of slimes. The rolls are fitted with forged steel shells, and are of the most modern design, the upper pair being fitted with an automatic feed to ensure a regular supply of ore. The sieves of the sizing trommels, as with the jiggers, have a gradually reducing size of hole, the smallest being 1.5 mm. diameter. The ore below these trommels is sized in pointed boxes, the sand passing on to the fine jiggers; and the very fine slimes, which cannot be effectually treated on the jiggling machine, after flowing over large V-shaped boxes, are concentrated on patent Linkenbach buddles (Fig. 584), they being the best form of concentrator for the purpose.

This buddle is so arranged that the slimes and wash water are distributed over the bed or table of the buddle, which enables a very large concentrating surface to be secured, the latter being no less than 26 ft. in diameter; a diameter which would be impossible to obtain by employing an ordinary continuous revolving buddle. The wash-water pipes are supported from the vertical shaft by means of a light framework, and are arranged in such a manner that the concentrates can be washed off at any desired point into the channels around the bed. The slimes are delivered from the pointed boxes by means of a pipe, and fed into the spreader or distributor at the centre of the buddle. The washwater is conveyed to a small tank attached to the upper part of the framework (or it may be delivered through the vertical shaft, which may be made hollow for the purpose), and from thence it passes to the horizontal pipes; the flow over the bed being regulated as the circumstances require.

The finished products are washed off the bed over aprons into annular troughs, from which the minerals are delivered into their respective settling pits. These aprons are secured by means of angle-iron rings to the framework supporting the water pipes, and revolve along with the latter. The tailings flow direct into the channels set apart to receive them. Water is also passed through these channels, the products being thereby carried off and deposited in settling pits, out of which they are dug as the pits fill up. By using these aprons in connection with a series of troughs circulating around the bed of the buddle, the ore under treatment can be separated into any number of component parts varying in richness as desired. This, combined with the very large concentrating surface, gives to the Linkenbach buddle advantages for the concentration of rich slimes possessed by no other concentrator at present in use.

(Warnford Lock, C.G., *Mining and Ore-Dressing Machinery*, E. & F.N. Spon, London, 1890, pp. 400-403)

Cassell Plant, 1891

James Parkes was a Mines Inspector employed by the South Australian Department of Mines. In 1891 he was sent to report on the Pine Creek goldfield of the Northern Territory, which was then administered by South Australia. While returning from Darwin by sea, he took the opportunity to detour from Townsville for a few days to inspect the gold mines of Charters Towers and Ravenswood. His reports of his observations in Ravenswood on 24-25 October 1891 provide the best surviving descriptions of the three principal gold plants while experimentation with a variety of techniques was at its height. He described both the chlorinating and cyaniding processes in the short period when they were still in active competition.

Parkes' notes on the Macintyre brothers' Cassell plant are the most detailed description we have of what was probably the first application of the MacArthur-Forrest cyanide process in Australia. It was obviously on a very small scale, and much of it sounds like something improvised in a backyard shed:

Inspected the Cassell's Gold Extraction Company's works, which are erected about one mile from the railway station at Ravenswood. The process in use is known as the McArthur-Forrest process, the manager of which is Mr. P. Macintyre, who kindly did all he could to enable me to see the plant at work. The plant is simple in construction, as the following will show. The ore is trucked on to an elevated floor, and under which are two iron agitators, somewhat after the pattern of a Wheeler's pan. The ore is tipped through a hole in the floor into the agitator, which have a holding and working capacity of 2 tons each. The cyanide of potassium to the amount of 11lbs., and one ton of water is then put in the agitator, and it is set to work. After from three to four hours, according to the nature of the ore, the contents of the agitator is emptied into a leaching vat, which is set on a floor below. In the bottom of the vat there is a false bottom; this false bottom is perforated with half-inch holes. On the false bottom a filter is placed, composed of broken glass for the first layer, and on top of this gravel of about the size of beans, and on top of the gravel a two-inch layer of ordinary sand; the whole constituting a filter bed 7 in. thick. On the top of the filter a wooden rack is placed, for the purpose of facilitating the removal of the ore without injuring the filter bed. The liquor, now containing the gold in solution, is drawn through the filter by suction, and pumped up into elevated tanks. After the mother liquor is drawn off the ore is washed with waste solution, when it is found to be free of gold. From the elevated tanks the liquor is run through a small pipe, and caused to pass through eight five-gallon oil drums with a division in each. These drums are connected with other by small tubing, and are also fixed so that the solution may gravitate from one to another, the last drum being about a foot below the first. The drums are each filled with zinc shavings, which is the precipitant. As the solution passes through the zinc chemical action takes place, and the gold and silver are deposited as a black powder, and are sieved from the undecomposed zinc in clean water. The powder is then dried and fused for bullion. Mr Macintyre informed me that by this process he can treat arsenides and sulphides of iron, zinc, lead, antimony and telluride of gold. The ore which presents the most difficulty is that which contains over 3 or 4 per cent. of copper. The action is that sulphide of copper is soluble in cyanide, and hence causes a waste of chemical. It is not always necessary that the ore should be passed through the agitator, for in the case of treating soft friable ores they can be treated by allowing the cyanide to simply percolate through the ore, which is treated in a filter vat. No calcining of the ore is needed, no matter how dense the pyrites may be.

(Parkes, James, "Report on Northern Territory Mines and Mineral Resources", *South Australian Parliamentary Papers* No. 32 of 1892, p. 30)

Pollock Plant, 1891

The Australasian Gold Extracting Company (Pollock's Patent), Limited. This company's works are situated about one mile from Ravenswood township, and on the New England Mine, which belongs to them. They are very extensive, and cost, with the New England Mine and its machinery, about £30,000. I am indebted to Mr. Pollock, who is the inventor of the process bearing his name, for kindly showing me over the works and explaining, with minute exactness, the whole working of the process, which was in full work at the time of my visit. The ore is first crushed by a stonebreaker, and then automatically fed into the Krom rollers, which reduce it to powder, and any coarse stuff that may have happened to have escaped the action of the rollers is separated by revolving screens and returned to the rollers again. The crushed ore, after having passed through the screens, is elevated into the bins above the furnaces. There are two furnaces erected, one known as the Bruckner and the other as the Howell-White. The latter is not being used at present, but is being altered, when it is expected to do good work. The Bruckner is a large steel revolving furnace, lined with brick. It can work several tons in a charge, which takes from eighteen to twenty-four hours to thoroughly calcine. This applies only to the calcining of the ore from the New England Mine, and ores of like nature, which contain a large percentage of sulphur and arsenic. What may be termed as average ore may be calcined in from eight to twelve hours. Towards the end of the calcining 5 per cent. of salt is added, to convert the metals with soluble oxides, such as copper, lead and zinc, into chlorides and sulphates. When the ore is sufficiently calcined, it is taken from the furnace and spread on a cooling floor; from the cooling floor it is trucked and tipped into the hoppers, which are fixed over the chlorinating barrels; from these hoppers the barrels are charged with ore (2 tons to a charge), with bisulphate of soda and chloride of lime, in the proportion of 2 to 1 1/2 per cent. respectively. Mr. Pollock informed me of another and improved re-agent which he uses instead of the bisulphate of soda, but the nature of which he does not at present wish to be disclosed. When this is used it is in the proportion of 1 per cent. to 1 per cent. of chloride of lime. The chlorinating barrels are made of steel, lined with wood and lead. When the barrels are charged the cap is tightly closed and the barrel reversed, so as to bring an escape valve uppermost. The valve is then closed, and water is forced in and dispels the air from the chlorinator. When the air is forced out the valve is closed, and the pressure of water is allowed to accumulate to 100lbs. to the square inch. The barrel is then revolved for one and a half hours. . . .

From the barrels the ore is discharged into movable filter vats placed on trucks. The vats are of wood, with lead linings, with a filter at the bottom composed of gravel and sand, in alternate layers. The mother liquor is drawn through these filters by means of a vacuum pump, and which takes from three to four hours. It is pumped from the filters into a series of settling vats or tanks. There are three rows of tanks. In the first row the liquor is allowed to remain for some hours to allow it to deposit any sediment. From the first row it is run into the second row of tanks, where sulphate of iron is added in the proportions of 1 1/2 per cent.; this precipitates the gold in the form of a brownish-black mud to the bottom of the tank. After a few hours the liquor is run off into the third row of tanks, where a certain proportion of another re-agent is added. This precipitates any gold that may not have been thrown down previously. After being allowed to settle for twenty-four hours the liquor is allowed to run away. In the vats the gold deposit is allowed to accumulate until the end of the week, when all liquor is draw off, the precipitates are collected and dried on trays and then smelted.

(Parkes, James, "Report on Northern Territory Mines and Mineral Resources", *South Australian Parliamentary Papers* No. 32 of 1892, p. 31)

Mabel Mill, 1891

The Ravenswood Gold Mining Company's Chlorination Works are situated in the town of Ravenswood, Queensland. The process adopted is that known as the Newbery-Vautin, with some slight modifications. The manager is Mr. H.H. Barton, who did all in his power to help me in my inspection. The plant is what may be rightly termed a model one, on account of its compactness and completeness and the order in which it is maintained. It consists of a ten-head stamping mill. All ore treated is passed through this battery and crushed to that degree of fineness until it passes through a screen with 220 holes to the inch. From the stamping mill it is caught in pits, where it is washed perfectly clean. The water used in crushing the ore after it passes from the battery is discharged onto a bed of sand which acts as a filter. This is for the purpose of catching the fine gold which may have been carried away in the water during the process of crushing. This bed of sand will be subsequently treated by chlorination, when a fresh bed will be laid down. Before reaching the pits in which the reduced ore is washed, it passes over blanket tables for the purpose of arresting any particles of rough gold that may have escaped from the battery box, and also to prevent, as much as possible, any rough gold finding its way to the chlorinating barrels, as it is found that more time is required in treating rough gold than fine. The ore is conveyed from the pits to the calcining furnaces, of which there are two of 50ft. long by 7ft. wide built on an angle of 1 in 4. From the furnaces the ore is taken up by an elevator and deposited in a hopper which is built over the chlorinating barrels, of which there are two and having a capacity to treat 24cwts. of ore each. From the hopper the ore is passed into the barrels and 30lbs. of chloride of lime and from 30lbs. to 40lbs. of sulphuric acid is used to every 24cwts. of ore, with sufficient water to form a thin sludge. The barrels are then closed and made to revolve for three hours, after which they are emptied into filter vats. The filter is made of broken glass, stones and sand placed in layers one above the other, and forming a bed 2ft. thick. The liquor is drawn from these vats by a suction pump and delivered into precipitating vats, which are nearly filled with sawdust. Mr. Barton informed me that the using of sawdust as a precipitant was introduced by him. The waste liquor after passing through the precipitating vats is run into two underground cement tanks charged with scrap iron. It is these tanks that the copper is precipitated from the water which held it in solution, and becomes a valuable by-product of the ore treated. After the gold is deposited in the sawdust the latter is collected and burnt in an oven constructed for the purpose, and which is heated externally. The ash from the sawdust is then treated in the usual way by smelting and cupellation. The ores treated at these works are, without exception, the most refractory gold ores that I have ever met with. They consist of arsenide and sulphide of iron and copper and zinc sulphides. . . . I consider the mode of treating ores by this company to be excellent, and not to be surpassed by any other process in extracting the largest quantity of gold from a given quantity of ore.

(Parkes, James, "Report on Northern Territory Mines and Mineral Resources", *South Australian Parliamentary Papers* No. 32 of 1892, pp. 30-31)

Mabel Mill, c.1902

Donald Clark, a metallurgical engineer and journalist writing for the *Australian Mining Standard* newspaper of Melbourne, toured Australia in 1902-03 inspecting mining operations, and published his observations in a book called *Australian Mining and Metallurgy*. This extract from his account of the Mabel Mill describes Wilson's early and still experimental operation, when there were only ten head of stamps and two Wilfley tables at work. Clark's sneering dismissal of Barton's old chlorinating plant is rather unfair - it was nearly twenty years old, and had been the most successful technology of its time - but his account gives an interesting description of the technological innovations of the New Ravenswood era while they were still exciting news within the Australian mining industry.

In the early days of Ravenswood many miners were attracted thither from the southern States on account of the richness of the alluvial diggings. Later on the outcrops of reefs almost innumerable were discovered, and these when worked gave very rich returns. The stone was oxidised and porous, and highly charged with iron oxides, and locally obtained the name "brown-stone". Deeper down the unaltered mineralised veins were struck, and each man with a process rushed to Ravenswood, only to fail as others failed before. The remains of a matting furnace, and a heap of slag with sows strewn over its surface, silently testifies to the failure of that process.

Almost adjoining the old smelting works one sees the remains of the antiquated Newbery-Vautin chlorination barrels, and a furnace, constructed at variance with all the principles of economic and effective roasting. There is little wonder that the men who were expected to work that process also failed

In happy contrast to the failures on this field, one sees at the battery owned by Mr. A. Laurence Wilson, M.I.M.E., a method which shows that he has weighed the methods adopted in this State, and found them wanting. For present purposes he has adopted a system which commends itself as being rational and sound. The ores from the various mines contain more or less quartz and free gold, but, in addition, a small quantity of metallic bismuth and bismuthinite; also a large quantity of galena, arsenical pyrites, iron pyrites, copper pyrites, and zinc blende. The stone containing these minerals is put through a Dodge stone-breaker, 12-inch face, and is fed into a 10-head battery. No mercury is used in the box, nor are amalgamated plates made use of. The crushed material is fed on to two Wilfley tables, and these useful machines show their streaks of concentrates as a Luhrig vanner does. At the back of the table there is a long streak of gold which at once indicates the yield. next to it is a glistening parallel band of bismuth, then follows a wider band of galena, then arseno-pyrite, another of pyrite, a yellow band of chalco-pyrite, and a black band of zinc-blende, finishing up with a broad seam of waste sand almost deprived of its metallic ingredients. A strip of about 3 inches in width is caught on the golden side of the concentrates, and this is ground specially in Berdan basins, the water in the Berdans not being allowed to overflow. The amalgam obtained from the Sunset mine, the ore from which was being treated, retorted one-sixth, but the retorted mass would have puzzled many a mining manager. Analysis of a sample supplied showed it to contain from 91 per cent. to 93 per cent. of bismuth, and from 7 per cent. to 9 per cent. of gold and silver.

(Clark, Donald, *Australian Mining and Metallurgy*, Critchley Parker, Melbourne, 1904, pp. 305 -06)

Appendix 2: Project Brief