

HERITAGE ASSESSMENT REPORT

NAME: Prince Alfred Copper Mine Precinct

PLACE NO. 26450

Address: off Prince Alfred Road, via Cradock

1. BRIEF HISTORY OF PRINCE ALFRED COPPER MINE

Copper ore with a sprinkling of gold was discovered in a fairly wild and remote area of the Flinders Ranges about 100km north-east of Port Augusta in 1866, and the following year the Prince Alfred Gold Mining Company Ltd was formed in Adelaide. In a burst of monarchist enthusiasm the mine and the company were named after Prince Alfred, Duke of Edinburgh, the first member of the royal family to visit the Australian colonies, who spent three weeks in Adelaide in November 1867.

Newspapers provide most of our information about the early decades of operation of the Prince Alfred mine. No company records survive. Mining seems to have occurred in three separate episodes between 1869 and 1909, with a long gap from 1874 to 1889. Most of the production probably occurred in the 1870s, and the substantial masonry engine and crusher houses were built during that first period of mining. It appears that three separate companies operated the mine in those episodes, at least one of them based in Melbourne. It is not unusual for mines in remote areas with high costs to have sporadic periods of production, separated by long silences. It indicates that the mine was only viable at times of high copper prices, and always extremely sensitive to metal price fluctuations.

Something apparently went wrong with the first company float, for two years after the initial discovery the press reported:

A very fine discovery of copper has been made about 90 miles above Port Augusta, showing very rich surface specimens, containing a large proportion of native copper. Claims have been taken and abandoned on the same spot some years ago, when mineral speculations were not so lively, and now again the prospect is revived and takes the public fancy. It is known as the Prince Alfred Mine, and I believe the shares were rapidly absorbed by speculators.

(Pasquin 12 December 1868, p. 388)

In 1868 the first company was re-formed as the Prince Alfred Copper Mining and Smelting Company. By early 1869 ore was being extracted, apparently from an opencut. (*Observer* 30 March 1869, p. 5) Three shafts were put down on the site by July 1869. (*Observer* 31 July 1869, p. 5) At first the ore was taken by dray to Port Augusta, and shipped to the English and Australian Copper Company's smelter at Port Adelaide. By the end of the year, £3,000 worth of copper metal had been produced.

By 1870 the mine was concentrating ore with three small jigs, two of them obtained from Burra, where operations were winding down. (*Observer* 12 September 1870, p. 4) The mine employed 41 men and boys, and a steady stream of drays carried ore to Port Augusta. (*Observer* 31 December 1870, p. 6) At the end of the year, the directors decided the time had come to equip the mine with more efficient machinery and a smelter. (*Observer* 24 December 1870, p. 6) This was an energetic period of development, with the shafts being sunk to 270 feet (82 metres), 150 feet (45 metres) and 100 feet (30 metres), and the value of copper produced in 1870 trebled to £9,000. In 1871 a reverberatory furnace,

fuelled by firewood, was built to smelt copper on site. (*Observer* 15 April 1871, p. 5) It had its first firing in June 1871, by which time the engine houses were also under construction. (*Observer* 17 June 1871, p.12) The mine was equipped with a 45hp engine and a second-hand boiler from Burra, powering a crusher designed by a Mr Jones, who also became smelter manager. (*Observer* 1 July 1871, p.3)

Construction of the second furnace began in August 1871 (*Observer* 19 August 1871, p.3), and the engine and crusher were at work by 22 November 1871. (*Observer* 25 November 1871, p.4) Evidence on site shows that the machinery was powered by a horizontal steam engine, and crushing and concentrating were done by Cornish rolls and a jig. There is no remaining evidence of how the mine was pumped. The following month the second smelter was firing, and work had started on a third. (*Observer* 9 December 1871, p.7) It appears that the second smelter was to be a calciner or roaster to drive off sulphur before smelting proper. The third smelter was a backup, to take over when one or both of the others were down for maintenance. By March 1872 the engine was also pumping water from the nearest mineshaft, called the Engine Shaft. (*Observer* 30 March 1872, p.6) The third furnace was fired in April 1872, and the mine's infrastructure was completed in almost exactly twelve months from commencement. (*Observer* 13 April 1872, p.5)

Probably the greatest quantity of mullock, tailings and slag on the site today dates from this period of intense activity in the early 1870s. However, the mine's life was to be short. Construction of the engine houses and furnaces was barely complete before the directors called a special meeting of shareholders to tell them things were not going well. In the following weeks the newspapers reported the company's woes. The company's paid-up capital was £7,000, the engine houses and smelters had cost £4,500, and operating expenses at the mine had cost £4,600. Thus the company was £2,100 in debt, and copper sales were not covering the interest. The mine's water supply and firewood stocks were inadequate, and required large investments to improve them. The Union Bank refused further credit, and the only way out was for shareholders to buy a new share issue. Captain Bryant, who had managed the mine since its inception, was dismissed, but the directors would not disclose the reason to shareholders. His subordinate Captain Williams replaced him for a time, but did not have the personality to control the workforce. (*Observer* 8 June 1872, p.7; 29 June 1872, p.6; 6 July 1872, p.3; 27 July 1872, p.7) The troubles continued, and early the following year a private meeting of shareholders resolved that the company was "now suffering from a divided management at the mine", and requested the directors to send one of the board to manage the mine. (*Observer* 25 January 1873, p.4) Things had gone seriously wrong at the mine. Heavy rain had flooded the underground workings, and the firewood cutters had walked off because the price was too low for them to make a living. Mining was at a standstill, although it resumed within a few weeks. There was another call on shareholders in April 1873. (*Observer* 8 March 1873, p.6; 5 April 1873, p.1)

By the July 1873 shareholders' meeting, everything at the mine seemed to be rosy once more, under the management of one of the directors, James Lake, who was also the local Member of Parliament. However his report may have been window-dressing, for by November 1873 the crisis had deepened. The company was now £5,000 in debt and the bank wanted immediate repayment. The directors wanted to call up all unpaid capital of £4,000 from shareholders and borrow £2,000 with a mortgage on the mine. The only alternative was to wind up the company. The shareholders supported the motion. (*Observer* 15 November 1873, p.13) This only deferred the crisis for two months. By February 1874 the company still owed the bank £2,200, even after the calls and the loan, and the directors could see no way to raise the money: "they find themselves compelled to say that with the present capital it is impossible to carry on the mine." They recommended that the shareholders vote to voluntarily wind up the company. There was a long discussion which aired a number of technical difficulties not previously mentioned: that there were unstable

parts of the underground mines where the men refused to work, that there were chronic problems with the furnaces and a lot of downtime (probably to do with the poor quality of the bricks), that the water supply was still inadequate, and that ore-carting and firewood cutting stopped during the wheat harvest, because all the carriers were making more money carting wheat. The shareholders voted to wind up the company. The directors estimated that creditors would get five shillings in the pound. (*Observer* 21 February 1874, p.11) The Prince Alfred mine closed in 1874 and the Prince Alfred Copper Mining and Smelting Company was wound up by July 1874. Court cases with creditors went on for months. The miners were extremely unhappy with Lake's period of management, and burnt him in effigy at the mine. (*Observer* 4 April 1874, p.12)

The reasons for the debacle are not entirely clear. It seems to have been a well-managed and productive mine in its early days. However, the costs of transport and labour for serving such a remote site would have been extremely high, and it may simply be that the value of the mine's output could not pay its bills. There were times when reported copper production seemed very low. The copper price was not the reason for closure, as it was buoyant in 1874, although it would crash three years later. No-one made any suggestion of fraud. There are hints that as the mine went deeper, the copper grade was falling, and sulphide ore, more difficult to treat, was beginning to dominate the orebody. The reasons for the changes of management and the miners' anger at Lake are mysterious now, but apparently Bryant was disgruntled about his salary. James Lake was an Adelaide lawyer, and his qualifications for running a copper mine are doubtful. One account says the mine was still selling copper as late as 1877, when a disastrous price fall closed copper mines all over the world, but that date must be a mistake. (Cumming & Drew 1987, p. 131) That article estimates the total value of copper production at the Prince Alfred mine in the period 1869-1877 to have been £54,000, which seems far too high. All the newspapers go silent about the Prince Alfred mine after February 1874. The mine was almost certainly closed in 1874, certainly no later than 1877, and the underground workings were allowed to flood. In 1881 the crushing machinery was removed to the Blinman mine.

There is very little information about the Prince Alfred community. An occasional newspaper story mentions a New Year cricket match, or a visit from James Lake MP, or heavy rain flooding a few miners' dugouts. In 1873 the "Country Letters" column mentioned the Prince Alfred mine:

The Rev. Messrs Rofe and Pope, Wesleyan ministers ... held divine service in the primitive-looking little chapel here, which was crowded. A school held there during the week by Miss Renfrew has proved a boon to residents near the mine, the children under her charge having made considerable progress in the elementary branches of education. There is no school under the Board nearer than 70 miles.

(*Observer* 5 July 1873, p.6)

The same article noted that Police Trooper Campbell, who was based at the Prince Alfred mine, had been transferred away. The presence of a policeman in an outback town usually implied there was also a pub, and his removal usually suggested the pub had closed:

This is not regarded as fair to the community, it being considered that his presence was imperatively necessary. There is a population around the mine of three or four hundred persons, and the district is deprived of protection, whereas Mount Remarkable, with half the number of inhabitants, has two constables. There should be police in this locality, and the officer ought to be provided with a residence.

(*Observer* 5 July 1873, p.6)

In 1882, while the Prince Alfred mine was closed, a railway was built from Petersburg to Quorn, passing through Carrieton about 40km from the mine and significantly lowering

transport costs. In 1888 there may have been mining activity on the site. Something called the Prince Alfred S. L. and C. Proprietary Company [Silver, Lead and Copper?] reported that it was sinking shafts and driving adits. However, the newspaper did not identify the location clearly, and as it mentioned galena (lead ore) this may have been somewhere else. (*Observer* 19 May 1888, p.37; 7 July 1888, p. 19) In 1889 a syndicate certainly went to work, pumping out one of the shafts, employing fourteen men and boys, and sending eighteen tons of ore off to Port Augusta. In April 1890 the New Prince Alfred Copper Mining Company No Liability was formed to take over and work the mine. (*Observer* 29 March 1890, p. 39; 5 April 1890, p.14) They pumped out the mine and worked it on a small scale, installing jigs to concentrate the ore. (*Observer* 24 May 1890, p.38) The concentrate was sent away to Wallaroo for smelting. (*Observer* 16 August 1890, p.15) Reports from the mine in this period were generally brief and incoherent, and the quantities of concentrate being sent away were very small, but the new company did install crushing rolls and a buddle, and apparently built new timber headframes over shafts. (*Observer* 15 November 1890, p.40) The newspapers largely lost interest in the mine. Numbers employed and copper production both remained small, and they apparently never smelted on site. The company wound up in 1897.

The following year another company called the Prince Alfred Copper Mining Company No Liability was formed in Melbourne, equipping the mine with its third lot of machinery and new or rebuilt smelters. In 1900 (a bad drought year) a dam was built to supply the mill with water. (*Argus* 15 August 1900, p. 8). Previously the mill's water supply had come from the mine shafts. (*Observer* 1 January 1870, p. 3) The mine worked on a small scale through the early years of the twentieth century, producing about 12,000 tonnes of ore. However another worldwide fall in the copper price closed it in 1907, and the Prince Alfred Copper Mining Company No Liability was wound up in 1909.

In the 1950s the Mines Department reviewed South Australia's copper resources. They investigated the Prince Alfred lode by diamond drilling, but no copper of commercial interest was found. In 1967 a group of former Broken Hill miners took over the Prince Alfred mine while the copper price was high, and set up a new plant. Their plan was not to re-open the mine, but to extract copper from old mine tailings by leaching. They first came to the notice of Carrieton District Council in February 1967, and the following year Council rebuilt the road into the Prince Alfred mine. (Carrieton Centenary Committee 1978, pp. 182-183) They are said to have formed a company called Minerals, Metals Reclamation and Mining Pty Ltd, but the Australian Securities Investment Commission (ASIC) database has no record of a company of that name. A journalist visited the site in 1971 and described a self-sufficient small community built out of recycled bits, with prefabricated former Housing Trust houses powered by a second-hand diesel generator. (*Sunday Mail* 7 August 1971, pp. 83 & 85)

There is very little other documentary record of their operations at the mine, but the evidence of their plant makes it clear what they were doing. They were extracting copper metal from the old mill tailings by means of acid leaching, a process pioneered in Australia at Moonta Mines in 1901 and used there until 1944. The tailings contain a small amount of copper sulphide. They are immersed in water acidified with a small amount of sulphuric acid, and the sulphide is oxidised to copper sulphate, which is soluble in water. When all the acid has been consumed, scrap iron is placed in the tank of leachate. Copper metal is deposited on the surface of the iron, and ferrous sulphate precipitates out of solution. It is an extremely cheap method of extracting copper from tailings or mullock. The large concrete tanks where the leaching and precipitation processes were carried out still stand at the Prince Alfred mine. There must have been other processes as well, for they had a ball mill and flotation tanks. They built a small waterjacket blast furnace for smelting the copper metal product, which was then sent to Port Kembla for refining. The tailings would have been collected from below the 1870s crusher house, and the creek bed downstream. After leaching, the tailings and sludge were pumped to a new deposit some distance from the

plant, probably so there would be no confusion between leached and unleached tailings. The plant apparently operated until some time in the 1970s, but it is not known when it closed or how much copper it produced. Mines Department notes record about 600 tons of copper, which was worth \$1,600 per ton at the time.



**Prince Alfred Copper Mine, 1915 - View is toward the northeast. (*Mining Review* No. 25).
[The Engine Shaft headframe is still standing. Note the large quantity of tailings in this photograph before they were removed for leaching.]**



Prince Alfred Copper Mine, 1952 - View is toward the southeast. (Wade & Wegener 1952)



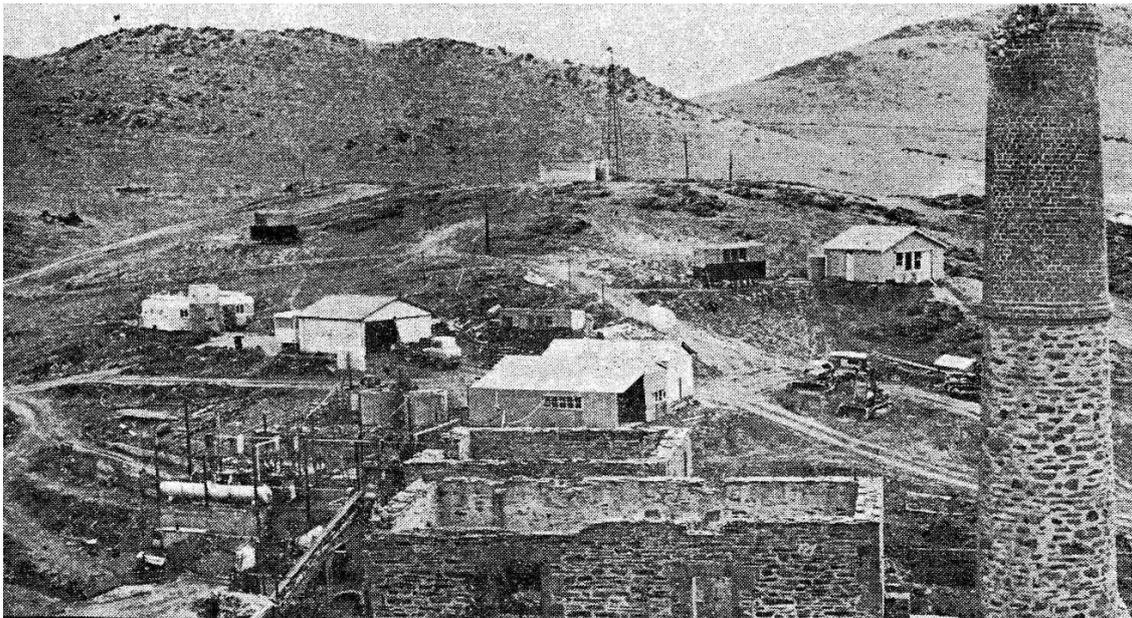
Prince Alfred Copper Mine, early twentieth century (Carrieton Centenary Committee 1978)
[Stope extending underground from opencut]



Prince Alfred Copper Mine - Opencut, 1915 (*Mining Review* No. 25)



Leaching at Prince Alfred Copper Mine, 1970s (Flinders Ranges Research)



Leaching at Prince Alfred Copper Mine, 1971 (*Sunday Mail* 7 August 1971, p. 83)

2. DESCRIPTION

Self-contained 19th century copper mine complex comprised of:

- 1 main shaft adjacent to the crusher house and possibly 3 other shafts to the south
- open cut workings (mainly to south of main shaft)
- open stopes
- tailings
- stone retaining walls and revetments
- formed earth roadway from the southern workings to the crusher house
- engine house of stone and brick (ruins) with an engine bed for a large single cylinder steam engine
- boiler house of stone with associated chimney and water supply tanks (ruins)
- crusher house of stone and brick (ruins)
- mine office of stone (ruins)
- smelter site
- slag dump
- assay office including an assay furnace base and flue (ruins)
- a water supply dam. Large earth dam with stone walled lining and cement render on upstream face

An associated 19^h century township includes:

- house sites (ruins) - approximately 20
- school site (ruins)
- church site (ruins)
- possible pub site (ruins)
- cemetery site, fenced with 2 standing headstones
- a well

There are also remnants of 20th century mining activities including:

- a copper leaching plant (mainly the concrete vats and other foundations)
- a portable water jacket blast furnace powered by a 6 cylinder petrol truck engine. The blower has been removed (except for part of the air delivery pipe) but the cooling water tank still remains
- a tailings dam
- building and plant foundations (concrete)
- a roofed stone building (assay lab or office?)

3. ASSESSMENT OF HERITAGE SIGNIFICANCE

Comparability / Rarity / Representation:

Comparability with the quality of other similar places entered in the South Australian Heritage Register

There are about 80 places associated with mining industry entered in the South Australian Heritage Register. The majority of these are a single structure such as a quarry, a chimney, a settling tank or a single building such as a magazine or engine house. Some more extensive mining sites such as Burra, Moonta, Blinman, Sliding Rock, Tarcoola, Aclare, Talisker and Paull's Mines are registered in their entirety. Very few of these sites have associated housing precincts included in the registered place: Burra, Moonta, Tarcoola and the Delabole slate quarry. The Prince Alfred mine complex is thus one of a very small number of mine-and-settlement combinations, and its state of preservation and the quality of its historical evidence is very high by comparison.

Comparability with the quality of other similar places entered in the heritage registers of jurisdictions of other Australian States

There are many mines and small mining settlements included in heritage registers in other states. But if we focus on the evidence of Cornish mining technology, that is restricted almost entirely to South Australia. There were only ever about five other Cornish engine houses built in Australia: at Cadia in New South Wales, and in Victoria the Duke of Cornwall mine at Fryerstown, the Duke & Timor at Maryborough, and two on the Berry Deep Lead at Creswick. Most of these survive as ruins. But all these are pumping houses, not crusher houses. No Cornish crusher houses comparable to the one at Prince Alfred are known anywhere outside South Australia.

The rarity (uniqueness) or commonness of the Place in South Australia

The combination of surviving elements at the Prince Alfred Copper Mine Precinct is very rare. Very few places have evidence of engine houses, a smelter, miners' habitations and a cemetery within such a small space. All of those elements are present at Burra, but there they are distributed over square kilometres of land. At the Prince Alfred mine they are all within easy walking distance. Some of the individual elements at this mine are also rare. Within South Australia there are copper or silver smelter remains at Glen Osmond, Wallaroo, Burra, Talisker, Apoinga, Yelta and The Peake. There are only three broadly similar crusher houses standing, at Burra, Balhannah and Talisker.

Assessment against Criteria (Under Section 16 of the *Heritage Places Act 1993*):

(a) it demonstrates important aspects of the evolution or pattern of the state's history.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

The place should be closely associated with events, developments or cultural phases which have played a significant part in South Australian history. Ideally it should demonstrate those associations in its fabric.

Places will not normally be considered under this criterion if they are of a class of things that are commonplace, or frequently replicated across the State, places associated with events of interest only to a small number of people, places associated with developments of little significance, or places only reputed to have been the scene of an event which has left no trace or which lacks

substantial evidence.

The Prince Alfred mine, smelter and township complex demonstrates many aspects of nineteenth century immigration, technology transfer and mining practice in South Australia, in particular mining practices imported from Cornwall, and the adaptation of a Cornish immigrant community to life in an isolated rural location. Other places in the state (Burra and Moonta for example) demonstrate similar themes and events in South Australian history, but Prince Alfred is subtly different in being a smaller settlement occupied for a shorter time in an arid and difficult location. While there are other comparable small mine and settlement sites in South Australia, Prince Alfred has more monumental mining evidence and is better-preserved than most. The additional layer of evidence created by the 1970s leaching operation also reflects a common pattern of old mining operations being re-worked in the modern era with newer, cheaper technology.

For these reasons, the Prince Alfred Copper Mine Precinct meets Criterion (a).

(b) it has rare, uncommon or endangered qualities that are of cultural significance.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places, that note:

The place should demonstrate a way of life, social custom, industrial process or land use which is no longer practised, is in danger of being lost, or is of exceptional interest. This encompasses both places which were always rare, and places which have become scarce through subsequent loss or destruction.

Places will not normally be considered under this criterion if their rarity is merely local, or if they appear rare only because research has not been done elsewhere, or if their distinguishing characteristics have been degraded or compromised, or if they are at present common and simply believed to be in danger of becoming rare in future.

There are very few sites comparable to the Prince Alfred mine, as examples of Cornish mining technology. The masonry engine and crusher houses are of particular interest. Eight Cornish pumphouses survive in South Australia (out of 33 built), whilst the Prince Alfred does not have a pumphouse, it has a crusher house, where ore was crushed to a fine particle size and copper was separated from waste rock. Those are rare. Burra, Talisker, Balhannah and Nuccaleena mine sites have the remains of crusher houses, and those are probably the only other ones remaining in South Australia.

For these reasons, the Prince Alfred Copper Mine Precinct meets Criterion (b).

(c) it may yield information that will contribute to an understanding of the state's history, including its natural history.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

The place should provide, or demonstrate a likelihood of providing, information that will contribute significantly to our knowledge of the past. The information should be inherent in the fabric of the place. The place may be a standing structure, an archaeological deposit or a geological site.

Places will not normally be considered under this criterion simply because they are believed to contain archaeological or palaeontological deposits. There must

be good reasons to suppose the site is of value for research, and that useful information will emerge. A place that will yield the same information as many other places, or information that could be obtained as readily from documentary sources, may not be eligible.

The Prince Alfred mine site is an example of a self-contained 19th century copper mine complex with later 20th century phases of development apparent. It retains physical evidence of all phases of its history in terms of the physical fabric of the standing industrial buildings, and the low level structural and archaeological remains of mining infrastructure, domestic dwellings and public buildings. The site is remarkable for its completeness, intactness and integrity. Due to its isolation, the site has had little post-mining disturbance by fossickers and treasure-hunters. It therefore has a high degree of archaeological potential which is likely to provide information not available from other sources. Such information may include the design and layout of features such as the Welsh reverberatory smelting furnaces, the assay house and furnace, intra-site roads and circulation patterns, ore haulage and transportation arrangements, and possibly pumping and water management arrangements. There may also be the remains of a brickworks near the site. The township was a small settlement occupied intensively for only a short period (1869-1874) and then probably in later episodes up to 1907 by smaller numbers of people. It had the basic community infrastructure of twenty or more houses, some of them semi-dugouts, a chapel and a school, a police trooper and possibly a hotel. In regard to the township, the archaeological potential relates to the design and layout of the miner's houses and outbuildings, and information on the material culture and lifestyles of these pioneers that may be recovered from associated cesspits and rubbish dumps. It was set in an arid and inaccessible location, giving it a distinctive culture when occupied, and tending to preserve its evidence since.

It is therefore concluded that the site has a high degree of archaeological potential and that any information and relics recovered would have a high degree of significance.

For these reasons, the Prince Alfred Copper Mine Precinct meets Criterion (c).

It is also recommended that the Prince Alfred Copper Mine Precinct be designated as a place of archaeological significance.

(d) it is an outstanding representative of a particular class of places of cultural significance.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

The place should be capable of providing understanding of the category of places which it represents. It should be typical of a wider range of such places, and in a good state of integrity, that is, still faithfully presenting its historical message.

Places will not be considered simply because they are members of a class, they must be both notable examples and well-preserved. Places will be excluded if their characteristics do not clearly typify the class, or if they were very like many other places, or if their representative qualities had been degraded or lost. However, places will not be excluded from the Register merely because other similar places are included.

As a representative of the many small copper mines that once operated in the Adelaide Hills and Flinders Ranges, Prince Alfred is among the best. It was well-equipped in its period of operation and protected by its remote site, today retains more evidence than most others. The masonry engine and crusher houses are particularly fine representatives of their type.

For these reasons, the Prince Alfred Copper Mine Precinct meets Criterion (d).

(e) it demonstrates a high degree of creative, aesthetic or technical accomplishment or is an outstanding representative of particular construction techniques or design characteristics.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places, that note:

The place should show qualities of innovation or departure, beauty or formal design, or represent a new achievement of its time. Breakthroughs in technology or new developments in design would qualify, if the place clearly shows them. A high standard of design skill and originality is expected.

Places would not normally be considered under this criterion if their degree of achievement could not be demonstrated, or where their integrity was diminished so that the achievement, while documented, was no longer apparent in the place, or simply because they were the work of a designer who demonstrated innovation elsewhere.

The masonry engine and crusher houses demonstrate the century-long tradition of Cornish mining engineering, using the power of expanding steam to do the work of many miners. As mentioned under Criterion (b), South Australia has eight examples of buildings that housed Cornish pumping technology, but this is one of only four remaining buildings that housed ore crushing and separating machinery, and is probably among the best-preserved of that class. There is also an aesthetic accomplishment at Prince Alfred, for the stone masonry of the engine house complex is particularly fine. Rather than being the standard one would expect of utilitarian industrial structures built in South Australian outback, some of the stonework in the Prince Alfred buildings would not look out of place in King William Street, Adelaide. The abandoned concrete leaching tanks and small blast furnace associated with the 1970s leaching operation are also of considerable technological interest.

For these reasons, the Prince Alfred Copper Mine Precinct meets Criterion (e).

(f) it has strong cultural or spiritual associations for the community or a group within it.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places, that note:

The place should be one which the community or a significant cultural group have held in high regard for an extended period. This must be much stronger than people's normal attachment to their surroundings. The association may in some instances be in folklore rather than in reality.

Places will not be considered if their associations are commonplace by nature, or of recent origin, or recognised only by a small number of people, or not held very strongly, or held by a group not widely recognised, or cannot be demonstrated satisfactorily to others.

Criterion (f) does not apply.

(g) it has a special association with the life or work of a person or organisation or an event of historical importance.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places, that note:

The place must have a close association with a person or group which played a significant part in past events, and that association should be demonstrated in the fabric of the place. The product of a creative person, or the workplace of a person whose contribution was in industry, would be more closely associated with the person's work than would his or her home. Most people are associated with many places in their lifetime, and it must be demonstrated why one place is more significant than others.

Places will not generally be considered under this criterion if they have only a brief, incidental or distant association, or if they are associated with persons or groups of little significance, or if they are associated with an event which has left no trace, or if a similar association could be claimed for many places, or if the association cannot be demonstrated. Generally the home or the grave of a notable person will not be entered in the Register unless it has some distinctive attribute, or there is no other physical evidence of the person's life or career in existence.

Criterion (g) does not apply.

Extent of Listing / Significant Fabric / Curtilage:

The extent of this listing includes:

All of the mining and domestic remains identified in this report which lie within CR5769/172 Crown Land Section 1011, Out of Hundreds (Orroroo) and portions of Crown Lease 1438/9 Block 310, Out of Hundreds (Orroroo), as defined in this report and shown in Figure 2. It should be noted that two areas of the site extend beyond the boundaries of the Crown Land into the adjoining pastoral lease as shown in Figure 2.

Given that the Prince Alfred mine meets one or more of the criteria under section 16 of the *Heritage Places Act 1993*, the components/elements which are critical to the heritage significance of this place are listed below:

- The ruins of the boiler, crusher and engine houses and associated chimney and water tanks
- The shafts, stopes and open cuts where ore was mined
- The assay office ruins, smelter site and slag dump
- The mine office and miners dwellings around the main mine site
- The earth dam and various tailings deposits
- The cemetery and ruins of the houses, school and church in the township
- The remains of the 1960s-70s leaching plant including structural foundations, the portable blast furnace and the tailings heap

The curtilage for the site is shown in Figure 2.

Exclusions

The listing excludes:

The modern pump house, diesel pump and poly pipeline from a bore located near the earth dam. This pump supplies water for stock on the adjacent pastoral station.

REFERENCES:

Government Sources

Brown, H.Y.L., *Record of the Mines of South Australia*, Government Printer, Adelaide 1908 (fourth edition, reproduced in facsimile 1982)

Cumming, Dennis & Greg Drew, "Copper Smelting in South Australia: the first fifty years", in Jonathon Selby (ed), *South Australia's Mining Heritage*, Department of Mines & Energy, Adelaide, 1987, pp. 115-137

Drew, Greg & Jack Connell, *Cornish Beam Engines in South Australian Mines*, Department of Mines & Energy, Adelaide, 1993

Drexel, John (ed), *Mining in South Australia: a pictorial history*, Department of Mines & Energy, Adelaide 1982

Mines Department Newspaper Cuttings Books (available on CD)

Nixon, L.G., *Diamond Drilling at Prince Alfred Copper Mine*, Department of Mines Report Book 51/17, Adelaide, 1960

"Red Boulder Copper Mine", *Mining Review* No. 25, 1916, pp. 81 & 84A

Wade, M.L. & C.F. Wegener, *Prince Alfred Copper Mine*, Department of Mines Report Book 34/29, Adelaide, 1952

Books and Articles

Bell, Peter, "The Copper Triangle's Spanish Legacy: Leaching the Waste Dumps at Moonta Mines 1901-1944", *Journal of Australasian Mining History* 5, 2007, pp. 1-19

Bell, Peter & Justin McCarthy, "The Evolution of Early Copper Smelting Technology in Australia", part one, *Journal of Australasian Mining History* 8, 2010, pp. 1-22; part two, *Journal of Australasian Mining History* 9, 2011, pp. 22-35

Blainey, Geoffrey, *The Rush that Never Ended: a history of Australian mining*, Melbourne University Press, Carlton 1969

Carrieton Centenary Committee, *Carrieton in the Gum Creek Country: a Story of One Hundred Years of the Carrieton District 1878-1978*, Carrieton, 1978

Cumming, D.A. & G.C. Moxham, *They Built South Australia: Engineers, Technicians, Manufacturers, Contractors and Their Work*, the authors, Adelaide, 1986

"Copper Smelting and Refining", *International Library of Technology* 22, International Textbook Company, Scranton Pa 1902

Eissler, Manuel, *The Hydro-Metallurgy of Copper*, Crosby Lockwood & Son, London, 1902

Percy, J., *Metallurgy: the Art of Extracting Metals from their Ores, and Adapting them to Various Purposes of Manufacture*, John Murray, London 1861

Ritchie, Neville, "Is There an Optimum System?: The Recording and Assessment of Historic Mining Sites", *Australian Journal of Historical Archaeology* 9, 1991, pp. 37-44

Schnabel, Carl & Henry Louis, *Handbook of Metallurgy*, (Two Volumes), Macmillan, New York 1898

Newspapers

The Advertiser (Adelaide)

Argus (Melbourne)

Chronicle (Adelaide)

Adelaide Observer (Adelaide)

Pasquin: Pastoral, Mineral & Agricultural Advocate

South Australian Register

Sunday Mail (Adelaide)

Unpublished Reports

Donovan & Associates and Austral Archaeology, Flinders Ranges Heritage Survey, report to Department of Environment and Natural Resources, 1995

Websites

Australian Heritage Database:

www.environment.gov.au/cgi-bin/ahdb/search.pl/

Flinders Ranges Research, History of Prince Alfred Mine:

www.southaustralianhistory.com.au/alfred.htm

Manning Index of SA history:

www.slsa.sa.gov.au/manning/

PIRSA Database : SARIG

<https://info.pir.sa.gov.au/geoserver/sarig/frameSet.jsp>

Australian Dictionary of Biography: Prince Alfred:

<http://adb.anu.edu.au/biography/edinburgh-duke-of-3467>

Trove newspaper searches:

<https://trove.nla.gov.au/newspaper>

NAME: Prince Alfred Copper Mine Precinct

PLACE NO.: 26450

SITE RECORD:

FORMER NAME: Not Applicable

DESCRIPTION OF PLACE: 19th century copper mining site with extant industrial and domestic building ruins, archaeological remains and a cemetery.

DATE OF COMPLETION: 1869 (First mine episode)

REGISTER STATUS: **Description:** Nominated
Date: 23 December 2014

CURRENT USE: **Description:** Crown Land
Dates: c.1980-present

PREVIOUS USE(S): **Description:** Mining and pastoral
Dates: 1869-1980

ARCHITECT: **Name:** Not Applicable
Dates: Not Applicable

BUILDER: **Name:** Not Applicable
Dates: Not Applicable

SUBJECT INDEXING: **Group:** 1. Cemeteries & Burial Sites
2. Manufacturing & Processing
3. Mining & Mineral Processing
Category: 1. Cemeteries & Burial Sites:
• Cemetery
2. Manufacturing & Processing:
• Blast Furnace
3. Mining & Mineral Processing:
• Assay Office
• Chimney
• Crusher
• Dwelling
• Engine House
• Furnace
• Mine
• Smelter
• Tailings Dump

LOCAL GOVERNMENT AREA: **Description:** Orroroo

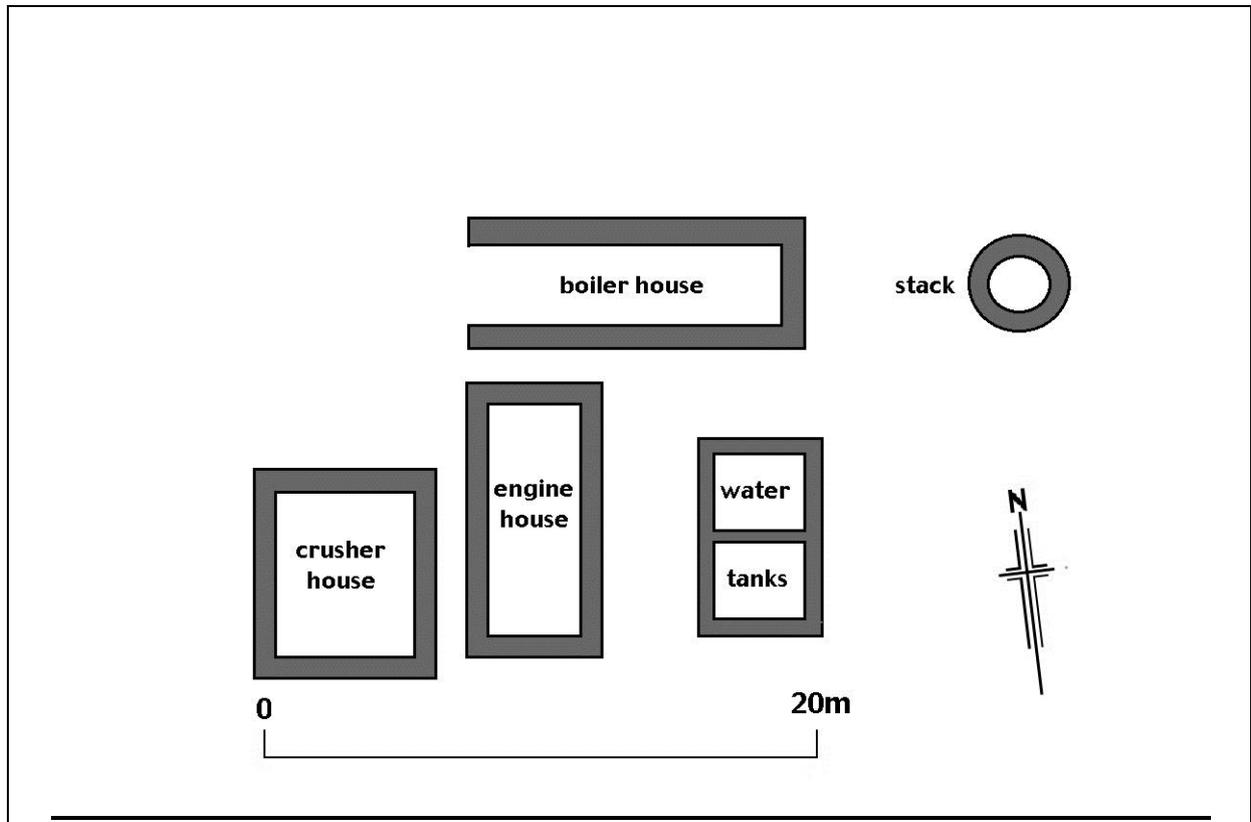
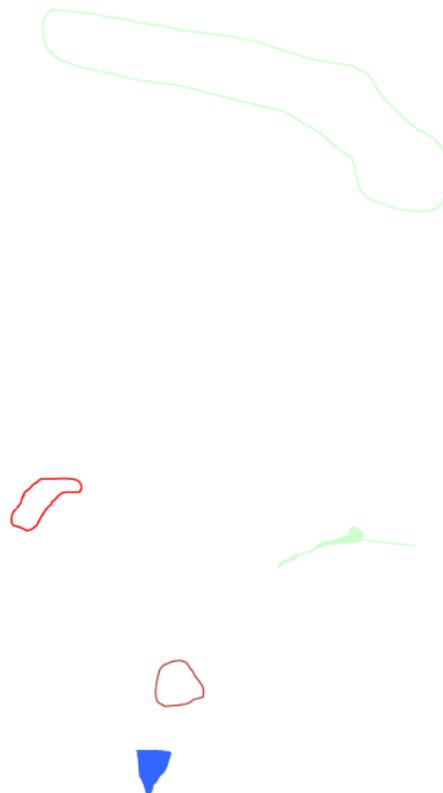


Figure 1

Prince Alfred Copper Mine Precinct Mine, via Cradock
[Schematic layout of crusher house, engine house, boiler house,
chimney and water tanks - Not to scale.]
(P. Bell)



State Heritage Unit, DEWNR



Figure 2 Site Plan!

!

NAME: Prince Alfred Copper Mine Precinct

PLACE NO.: 26450



**Prince Alfred Copper Mine Precinct, via Cradock - View to south east
[Crusher house (right), engine house (centre), boiler house (left) with chimney
and flue at rear and remnant drystone walling and tailings in foreground.]
(DSCN P42490059 J. McCarthy)**



**Prince Alfred Copper Mine Precinct, via Cradock - View to north
[Crusher house, engine house and water tanks to supply boilers; chimney
and flue at rear; two shafts in mid-ground and open stope at right.]
(DSCN 1993 P. Bell)**

NAME: Prince Alfred Copper Mine Precinct

PLACE NO.: 26450



Prince Alfred Copper Mine Precinct, via Cradock - View to south west
[Assay house ruins and assay furnace base.]
(DSCN 2087 P. Bell)



Prince Alfred Copper Mine Precinct, via Cradock - View to north west
[Slag dump and smelter site with track from crusher house in foreground.]
(DSCN P42490050 J. McCarthy)

NAME: Prince Alfred Copper Mine Precinct

PLACE NO.: 26450



**Prince Alfred Copper Mine Precinct, via Cradock
[Stone-lined earth dam showing breach at west end.
View is of downstream face looking south.]
(DSCN P42490115 J. McCarthy)**



**Prince Alfred Copper Mine Precinct, via Cradock – View to north east
[House or pub ruin in township.]
(DSCN P42490111 J. McCarthy)**

NAME: Prince Alfred Copper Mine Precinct

PLACE NO.: 26450



Prince Alfred Copper Mine Precinct, via Cradock – View to north east
[Grave of George Whitlock in the fenced cemetery.]
(DSCN P42490090 J. McCarthy)



Prince Alfred Copper Mine Precinct, via Cradock – View to north west
[1970s leaching plant, showing concrete tri-level layout.]
(DSCN 1990 P. Bell)