Background

In assessing the impact of development projects on heritage values either prehistoric site or historic site issues normally predominate. Although the criteria for assessing their significance may be broadly similar, where ‘important’ sites or groups of sites of both these classes are present it is commonly very difficult to assess and ‘rank’ them in an integrated manner. One reason is that the social, environmental and temporal contexts in which the two different classes of sites came into being are often very different, making them difficult to compare. A related problem is that when the question ‘significant to whom?’ is asked, there is often little overlap between those knowledgeable about, and interested in the management of these two broad groups of sites.

These and other issues are illustrated with some of the findings of heritage investigations undertaken for the proposed Union Reefs Gold Mine, north of Pine Creek in the Northern Territory (Kinhill, 1992, 1993; presented as Appendices in the EIS 1993). At the outset of planning for the Union Reef project, impacts on both prehistoric and historic sites were identified as important issues to be addressed.

Geological History

About 1,500 million years ago geological events created resources in the Pine Creek region that have been the focus of three phases of mining. These were the prehistoric quarrying of hornfels by Aborigines; labour-intensive gold mining by large numbers of Chinese and Europeans in the late 19th century; and capital-intensive, large-scale open cut and alluvial gold mining which has been undertaken by major companies since the 1960s.

The Union Reefs project area is located on Early Proterozoic metasedimentary rocks of the Burrell Creek Formation (Stuart-Smith et al., 1987:10-13). These rock units trend north-northwest in the Pine Creek shear zone and have been intensely folded and subject to low grade regional metamorphism (Figure 1). The formation consists of mainly interbedded shale, slate, phyllite and siltstone, with localized occurrences of gold-bearing quartz veins and reefs.

Two major lobes of granites of the Cullen Batholith about seven kilometres apart were intruded into the Burrell Creek Formation to the northeast and southwest of Union Reefs. The metasediments in the contact zones with the granites were extensively metamorphosed by heat action to form
hornfels. The intrusion of the granites also played a major role in the emplacement of the gold-bearing quartz veins and reefs. The more resistant units in these Burrell Creek rocks have formed a series of north-northwest trending, rugged strike ridges which rise 20 to 200 metres above the surrounding valleys. The highest ridges are formed on hornfels.

Hence throughout the Pine Creek region there is a broad correlation between the occurrence of hornfels and gold, but outcrops of hornfels suitable for quarrying by Aborigines were very much more widespread and extensive than were economic occurrences of gold.

**Union Reefs Archaeology**

**Prehistoric Sites**

Seven prehistoric sites were found, three of which were comparatively small, discrete scatters of artefacts along a creekline to the south of the project area. None of these three sites was in an area that would be impacted by the mining project.

The other four sites made up a complex located along a creekline which is likely to be dammed during the construction of the proposed mine to supply water for the project. Two of these four sites were small hornfels quarries, and the other two consisted of scatters of stone artefacts comprising mainly hornfels. One of these latter sites had associated European artefacts, including a fireplace and flaked glass. It was concluded at the time of the initial survey that further archaeological investigations would undoubtedly result in the delineation of discrete clusters of artefacts which could be defined as sites, separated by background scatters of artefacts.

In discussing the significance of prehistoric archaeological sites it is important to realise that there are many ways of considering significance: these include scientific, Aboriginal, public, historical, aesthetic and educational.

In Environmental Impact Statement (EIS) investigations the two criteria most commonly used by consultants and heritage authorities to assess the scientific significance of Aboriginal archaeological sites are research potential and representativeness (c.f. Bowdler, 1983). A review of previous investigations showed that the nature and locations of prehistoric archaeological sites in the Union Reefs study area were very similar to those observed elsewhere in the region extending from the Douglas River in the north, through Pine Creek to Mt Todd in the south (Kinhill, 1992: Section 4.5). Sites were located in areas where hornfels cropped out (quarries and associated knapping floors and artefact scatters) and along creeklines (artefact scatters). The strong indications were, as concluded by Hiscock (1991) for the Pine Creek area, that the hornfels-rich hills to the west of Union Reefs were at least an order of magnitude more rich in prehistoric archaeology that other parts of the Union Reefs study area. More than 60 hornfels quarries and more than 25 artefact scatters have been listed to date in the NT Museum site register for the Pine Creek area, and similar additional, as yet unregistered sites are known to occur (Mitchell, 1993). He has identified current research questions to which these quarry sites could provide answers:

- What manufacturing processes (or reduction sequences) were employed?
- Which stages of reduction took place at the quarries, and which stages at knapping floors in the surrounding landscape?
- When were the hornfels quarries first used, and has there been variation through time in the intensity of their use?
- To what extent were methods of artefact manufacture standardised?
- What role did hornfels play in regional exchange networks?

Hornfels quarries and associated knapping floors and artefact scatters have been found in all areas so far investigated where hornfels has been found to crop out. As demonstrated in Figure 1, the area of contact between the metasediments and the granite along the Pine Creek shear zone, which includes Union Reefs, is particularly large compared with most other parts of the Northern Territory, and outcrops of hornfels are ubiquitous throughout this area. It is highly likely therefore that prehistoric hornfels quarries are similarly ubiquitous throughout the Pine Creek area, from north of Union Reefs to as far south as Mt Todd. Mitchell (1993) has identified sites on Bonrook Station and other site complexes in the Pine Creek region as archaeologically significant, and therefore worthy of special management.

Archaeological sites along creeks have also been found in all areas in the Pine Creek region so far examined. The stone artefact assemblages in such sites have been predominantly on hornfels, and points of various kinds have been found on some sites. There are numerous similar creeks and rivers in both metasedimentary and granitic parts of the landscape and it is highly likely that sites along such water courses are ubiquitous throughout the area.

It was concluded therefore, that although the prehistoric archaeological sites located in the course of the investigation of the Union Reefs mining proposal were scientifically significant – in that they have considerable research potential – similar sites are very well represented throughout the region.
Historic Sites

Historical background

A considerable amount of research has been completed on the Union Reefs area and the following brief summary is drawn mainly from Jones (1987; 1990), McCarthy (1989:10-17) and Pearce (1992).

European activity in the area began in 1871, during construction of the Overland Telegraph Line. Telegraph poles made from pine were used in the initial construction phase. Those poles between Pine Creek and Brock’s Creek were replaced with metal poles in 1888.

Gold was discovered at Union Reefs by a party of six Queensland prospectors late in 1873. Initial prospects were promising; the party found alluvial gold and washed 600 ounces in a few days. The prospectors took out a claim and established a battery in 1874. By 1875 there were 65 Europeans, but no Chinese, at the Union Reefs settlement.

Chinese miners began arriving at the Union in 1875. By 1876, 190 Europeans and 80 Chinese lived at the Union. From this time the proportion of Chinese residents increased dramatically until, by 1879, Union Reefs settlement had become a Chinese township; by mid-1880 only three Europeans remained in the area.

During 1880 mining activity slowed, but a revival took place in 1883. By 1887 all claims were owned by Chinese syndicates. During 1888 and 1889 the Palmerston to Pine Creek railway was constructed; Union Town was gazetted in an area adjacent to the railway in 1889. This became a European settlement, and contained several stores, a hotel, a wheelwright and a blacksmith’s shop.

Railway contractors, C. and A. Millar, purchased all of the claims at Union Reefs in 1888. After considerable capital expenditure on a railway spur, a battery and a substantial new shaft, they sold the leases and machinery to a syndicate of Chinese merchants in 1892 for only £1000. From this date Chinese miners continued to work the reefs, mostly on a tribute basis. In 1899 the population was estimated at 400, of whom most were Chinese.

By 1903, however, mining operations at the Union were in financial difficulties. The last working battery on the field was inoperable by 1905. By 1906 the small amount of ore that continued to be mined there was sent to Pine Creek for crushing. The entire area was abandoned by 1914, and subsequent attempts to re-open mines in 1922 and 1934 were not successful.

Historical sites

Nine historical archaeological sites were recorded within the proposed project area. Three of them - the mainly or entirely Chinese sites referred to as Union Reefs Ridge Top Chinatown, Union Reefs Main Track Chinatown and the Millar’s Battery site - were identified as possessing particularly high significance, especially archaeological (Kinhill, 1992). Four criteria were employed to assess the historical significance of the Union Reef sites (after Bell, 1983:18-19).
1. Historical associations. A site may be held to be of historical significance if it was the scene of an event of great intrinsic interest, or of long-term impact on human affairs.

2. Level of interest, or the extent to which sites have claims to significance beyond the local region or even the Northern Territory.

3. Representativeness and/or distinctiveness. Good examples of commonly occurring sites may be considered to be significant if they typify the occurrence, and can be readily conserved. If sites found within a study area are not well represented elsewhere then their significance in terms of distinctiveness will be deemed to be high. This is especially the case for sites which are unique (i.e. the only one of their kind).

4. Archaeological research potential. This aspect of significance hinges on the ability of the site to shed light on questions that cannot be answered efficiently from documentary, pictorial or oral sources.

Kinhill (1992:16, 20-21) indicated clearly the considerable importance of the Union Reef Chinese sites under criterion 4 and, for Main Track Chinatown, under criteria 1 and 2. Difficulties were encountered, however, in attempting to determine the extent to which the three Chinese sites at Union Reef were distinctive, or were representative of contemporary mining/habitation sites elsewhere in the region. Fourteen other Chinese habitation/mining sites were known from the Pine Creek area (Figure 2). Research had focussed on the historical records relating to these places. Detailed archaeological research had been conducted on only one of these sites, the Pine Creek Chinatown (McCarthy, 1986).

Kinhill (1992) highlighted the good state of preservation of the Chinese sites at Union Reefs. The report also stressed the large number and range of structural features at these sites, together with their extensive, dense and diverse scatters of associated mining and domestic artefacts. These features were argued to impart to the Union Reefs sites high archaeological significance and research potential. Nonetheless, further research was required to determine whether these characteristics of the Union Reef sites were repeated at other Chinese sites in the Pine Creek region.

**Regional assessment of significance**

The following sites listed in Table 1 were inspected: Brock’s Creek, Yam Creek, Twelve Mile North, Twelve Mile Settlement, Twelve Mile Chinatown, Extended Union, Pine Creek Chinatown, Eveleen Mine and Settlement, Wandi Settlement, Driffield and Horseshoe Creek (Kinhill, 1993). It was considered highly likely that all the major concentrations of Chinese archaeological remains in the Pine Creek Region were documented as part of this survey.

The data present in Kinhill (1992 and 1993) indicated that the three Chinese archaeological sites at Union Reefs, together with the Pine Creek Chinatown, were the regionally most significant on two of the four criteria – distinctiveness and archaeological research potential. In addition, Union Reefs Main Track Chinatown and Pine Creek Chinatown were considered to have high significance in terms of their historical associations and level of interest. With regard to representativeness/distinctiveness, it was concluded that it was highly unlikely that any other Chinese sites as large or as complex as these occurred in the region and hence, on this criteria, their significance was deemed to be high.

In Kinhill (1992:17) it was considered that at least four of the other mining areas with Chinese may have been broadly archaeologically comparable to the Union Reefs sites. These were: Pine Creek Chinatown and the three Chinese settlements at Twelve Mile, Brock’s Creek Chinatown and Driffield. This contention was not supported by the results of the regional investigation and it was concluded that only Pine Creek Chinatown was archaeologically comparable with the Union Reefs sites (Kinhill, 1992).

**Comparisons**

Geological events about 1,500 million years ago created a context which eventually resulted in both prehistoric and historic sites of scientific/research significance occurring in close association with gold-bearing ore bodies in the Pine Creek region. The criteria upon which the significance of these two different classes of site were assessed were also similar. The similarity between the two classes does not, however, extend much beyond this.

The kinds of Aboriginal archaeological sites found at Union Reefs and other gold mining areas such as Mt Todd (Paton, 1992), although individually deemed to have considerable scientific/research significance, have been rated as having moderate to low significance in terms of representativeness. The reason for this is that although hornfels quarries and associated scatters of stone artefacts with scientific (archaeological) importance have been found at gold mining sites in the region, large numbers of similar sites are known and others can be reasonably inferred to occur widely, and away from prospective mining areas. Thus alternative representative sites could be identified for conservation management from areas not proposed, or likely to be proposed for mining activities. In no sense can sites of this type be considered as a group to be threatened by renewed, capital-intensive gold mining.

In contrast, at Union Reefs the significance of several of the historic sites was rated high on both research grounds.
and representativeness. Similar sites at other former gold mining localities have also been rated as having high significance, as evidenced by their inclusion on the National Trust of Australia (NT)'s Register of Significance and the Register of the National Estate. By definition such sites occur on or in close proximity to gold-bearing ore bodies. Many of these ore bodies are now being, or are likely to be, open-cut mined; as a consequence a high proportion of these historic mining sites are under threat. Indeed, given the rate at which ore bodies with known associated historic mining heritage sites are being mined or explored, it is highly likely that the majority of the most significant sites in the Pine Creek region will have been destroyed by early next century.

Unlike the prehistoric sites, these historic sites are also significant - not only scientifically, but also because of their historical associations and their level of interest to a wide cross-section of the Northern Territory and Australian public. It is to be hoped that pressure from a wide range of interest groups will be exerted to ensure that these important sites are properly considered in the impact assessment and management process.

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