APPENDIX B

CULTURAL HERITAGE ASSESSMENT

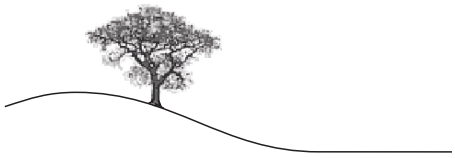
Snapper Mineral Sands Project
Environmental Assessment

Snapper Mineral Sands Project

Cultural heritage assessment

Report to BEMAX Resources Limited

March 2007



Landskape

Natural and Cultural Heritage Management

a division of M.L. Cupper Pty Ltd

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Date: **March 2007**

Version: **G**

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Executive Summary

The Snapper Mineral Sands Project (the Snapper Mine) involves the construction and operation of a mineral sands mine located approximately 10 kilometres (km) to the south-west of the Ginkgo Mineral Sands Project (the Ginkgo Mine) and approximately 170 km south of the Broken Hill Mineral Separation Plant (MSP), some 40 km west of Pooncarie in south-western New South Wales (NSW).

Landskape has been commissioned by the Proponent, BEMAX Resources Limited (BEMAX), to undertake a cultural heritage assessment of the Snapper Mine. This report presents an assessment of the cultural heritage related issues for the Snapper Mine in accordance with the general requirements of the NSW Department of Environment and Conservation's (DEC) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and is consistent with the NSW Heritage Office's *NSW Heritage Manual* (NSW Heritage Office, 1996) and *Assessing Heritage Significance* (NSW Heritage Office, 2001).

The specific objectives of the cultural heritage assessment were to:

- consult the local Aboriginal community to identify any concerns they may have;
- conduct a desktop assessment to delineate areas of known and predicted cultural heritage within the Mining Lease Application (MLA) area and ancillary infrastructure corridors (i.e. the 10 km long electricity transmission line [ETL] route [100 metre (m) corridor] from the Ginkgo Mine to the Snapper Mine and the approximate 7 km extension of highway access road [HAR] [100 m corridor]);
- undertake a stratified archaeological survey of known and predicted cultural heritage identified in the desktop assessment with representatives of the local Aboriginal community (consultation with the Aboriginal community was guided by the DEC's *Interim Community Consultation Requirements for Applicants* [DEC, 2004]);
- record any cultural heritage sites within the work areas and assess their significance;
- identify the nature and extent of potential impacts of the development on cultural heritage; and
- devise options in consultation with the community to avoid or mitigate potential impacts of the development on cultural heritage places and items.

The survey located 22 Aboriginal archaeological sites. Of these sites, 10 were scatters of stone artefacts, four were stone quarries with associated scatters of stone artefacts, four were isolated finds of stone artefacts, two were scatters of stone artefacts with associated hearths and two were hearth sites.

Nineteen of the Aboriginal cultural heritage sites are located within the Snapper Mine disturbance area. This assessment has concluded that these sites are not of high scientific or cultural significance. Moreover, the MLA area and ancillary infrastructure corridors are located in areas where significant impacts on cultural heritage will be avoided.

One historical heritage site was also identified during the survey. The site is under no immediate threat of disturbance or destruction. However, the Proponent should avoid disturbing the site, possibly by erecting a temporary protective barrier around it if works are occurring in its vicinity.

Based on the results of this cultural heritage investigation and consultation with representatives of the local Aboriginal community it is recommended that:

- BEMAX co-ordinate and implement the proposed management strategies by integrating them into a single programme and document in the form of the Aboriginal Cultural Heritage Management plan (ACHMP) (similar to the Barkandji Heritage Management Plan already implemented for the Ginkgo Mine). The ACHMP should cover all actions and requirements to be conducted at the Snapper Mine. The ACHMP should remain active for the life of the Snapper Mine and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities. The ACHMP should be developed in consultation with the local Aboriginal community and the DEC.
- BEMAX continues to consult with the relevant local Aboriginal community members in matters pertaining to development of the Snapper Mine. The conduct of actions involving the recording, salvage, monitoring, and curation (or replacement) of recovered materials, should occur with the invited participation of local Aboriginal community representatives. Consideration should also be given to providing employment opportunities to local Aboriginal community members and their organizations.
- BEMAX provide training to all on-site personnel regarding the ACHMP strategies and constraints relevant to their employment tasks.

- If human skeletal remains are encountered during the course of the development all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroners Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, BEMAX should contact the DEC zone archaeologist (tel: 03 5021 8914) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be devised with the involvement of the local Aboriginal community.
- The following specific management strategies be implemented for the Aboriginal archaeological sites identified within the disturbance areas of the Snapper Mine:
  - a representative sample of stone artefacts at cultural heritage sites SN01—03, SN07—19, SN21 and hearthstones/heat retainers at sites SN02, SN04, SN06 be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community and replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC;
  - the collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described; and
  - *in situ* hearths at site SN02 should be excavated and dated by radiocarbon and/or luminescence techniques to determine their age.
- The following specific management strategies be implemented for the Aboriginal and historical heritage sites identified outside the disturbance area of the Snapper Mine:
  - care be taken to avoid disturbing Aboriginal cultural heritage sites SN20 and SN22 by erecting temporary protective barriers around the sites. BEMAX should engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers and barrier maintenance monitoring; and
  - similar care be taken to avoid disturbance to Aboriginal archaeological site SN05 and historical heritage site SNH1. If future works occur near these sites, temporary protective barriers should be erected around them to avoid inadvertent disturbance.

B1 Introduction

The Snapper Mineral Sands Project (the Snapper Mine) involves the construction and operation of a mineral sands mine located approximately 10 kilometres (km) to the south-west of the Ginkgo Mineral Sands Project (the Ginkgo Mine) and approximately 170 km south of the Broken Hill Mineral Separation Plant (MSP), some 40 km west of Pooncarie in south-western New South Wales (NSW) (Figures B-1 and B-2).

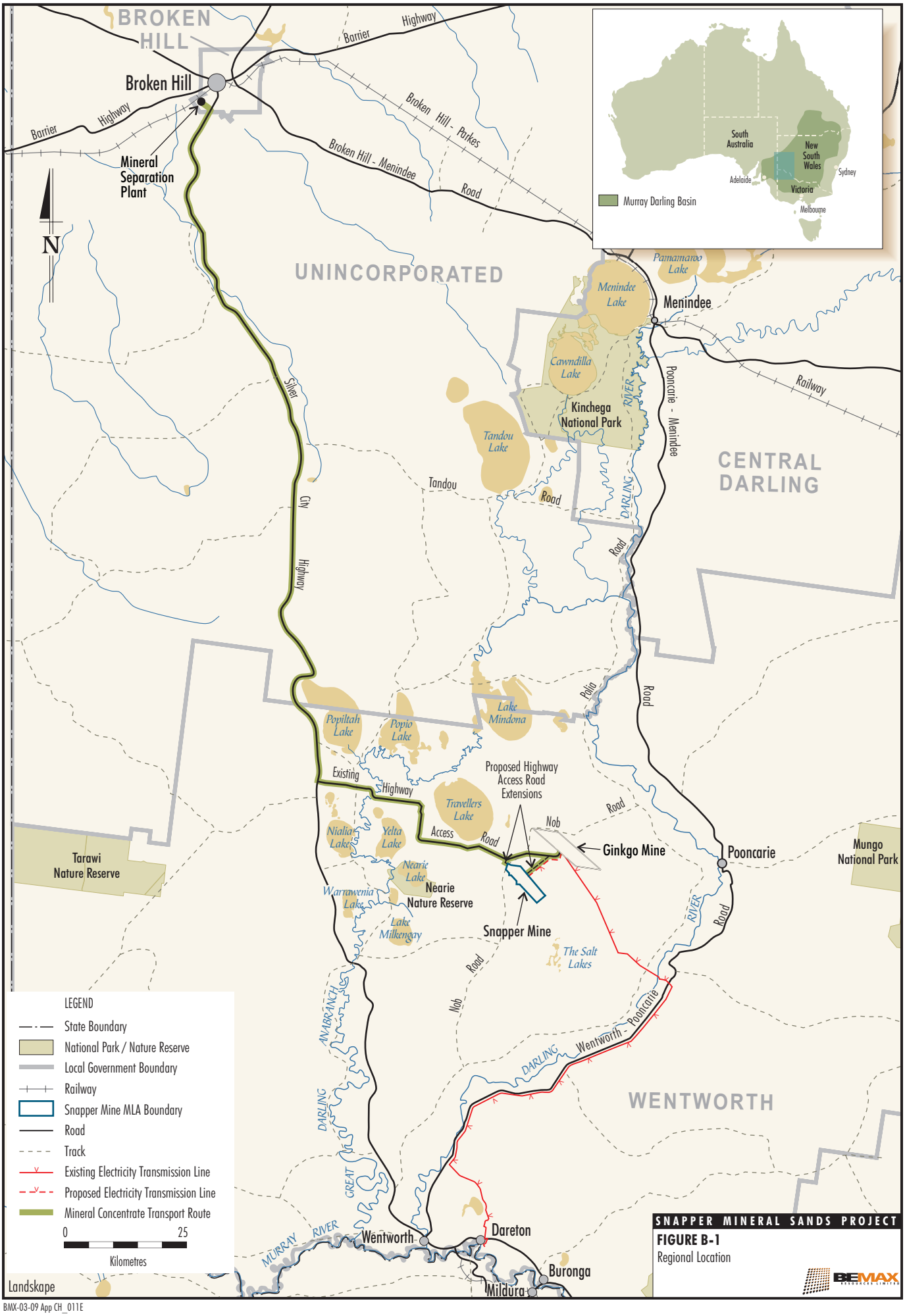
Landskape has been commissioned by the Proponent, BEMAX Resources Limited (BEMAX), to undertake a cultural heritage assessment of the Snapper Mine. This report presents an assessment of the cultural heritage related issues for the Snapper Mine in accordance with the general requirements of the NSW Department of Environment and Conservation's (DEC) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and is consistent with the NSW Heritage Office's *NSW Heritage Manual* (NSW Heritage Office, 1996) and *Assessing Heritage Significance* (NSW Heritage Office, 2001).

B1.1 The Development Proposal

Construction of the Snapper Mine would commence approximately between Years 3 to 5 of the Ginkgo Mine life.

The mining operation would comprise the following:

- clearance of vegetation and stripping of soils on a campaign basis ahead of the advancing mine operation;
- overburden stripping, slurrying and direct placement;
- predominantly dredge mining of ore by a conventional floating bucket wheel dredge located in the dredge pond;
- adjustment of dredge pond levels to maintain dredge access to the ore;
- supply of water from the borefields;
- disposal of water to the water disposal dam when lowering dredge pond levels;
- secondary mining of ore by conventional mobile equipment (i.e. dozers and/or scrapers), depositing ore in front of the dredge;
- ore concentration in the primary gravity concentration unit to produce heavy mineral concentrate (HMC);
- stockpiling of HMC;
- supply of desalinated water from the reverse osmosis (RO) plant for HMC salt washing;
- HMC separation via the Wet High Intensity Magnetic Separators (WHIMS) circuit either at the Snapper Mine or at the MSP, to produce three types of mineral concentrates (i.e. ilmenite-rich, leucoxene-rich and non-magnetic [rutile-rich and zircon-rich] concentrates);
- stockpiling of mineral concentrates;
- transport of HMC and/or mineral concentrates to the MSP;
- placement of wastes from the primary gravity concentration unit (i.e. sand residues) at the rear of the dredge pond as mining advances;
- treatment of process water to remove fines material (i.e. particles less than 53 microns in diameter);
- transport and placement of backloaded process waste from the MSP;
- replacement of overburden on top of sand residues; and
- staged replacement of soils and progressive rehabilitation.



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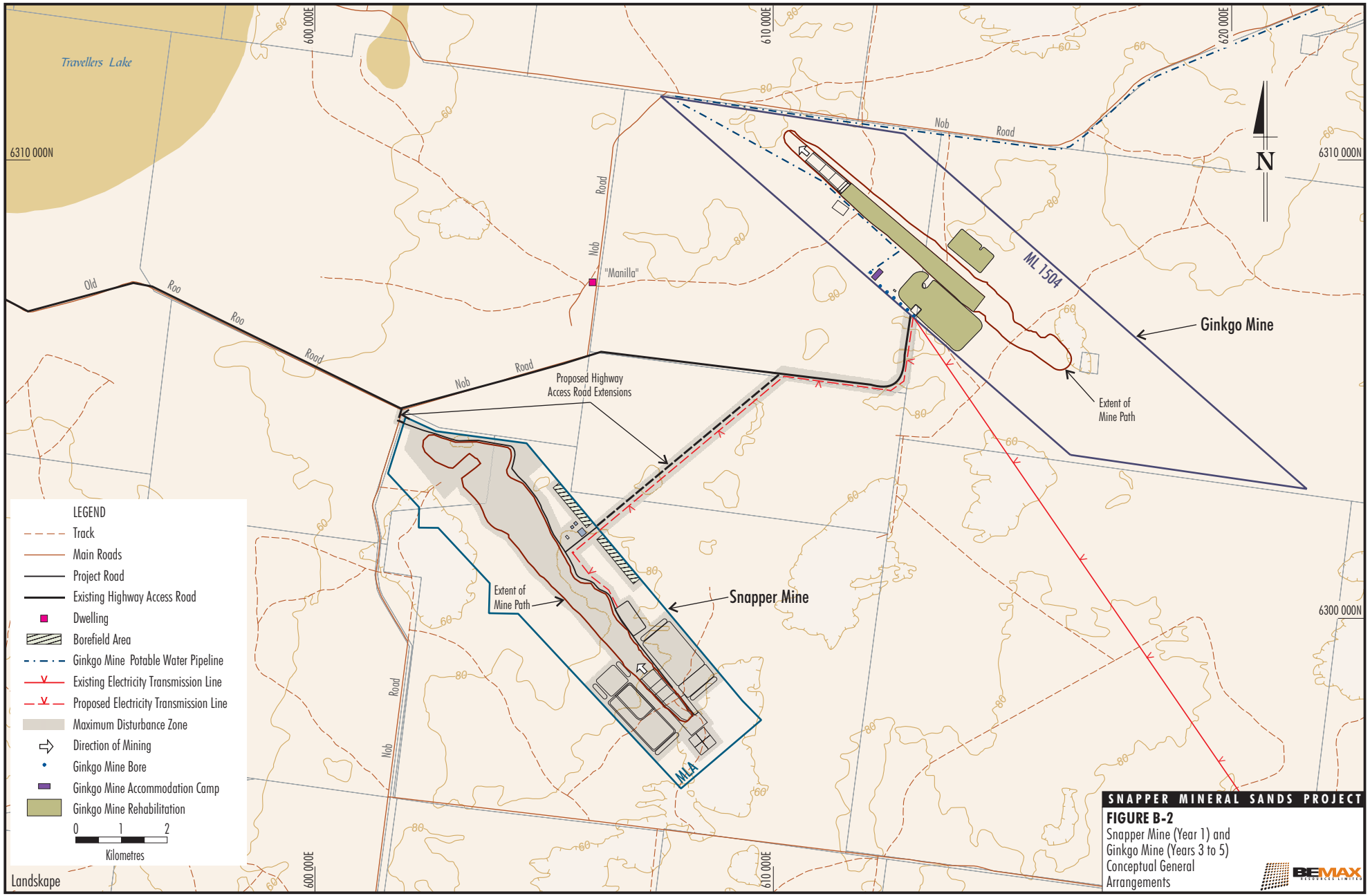

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The Snapper Mine has been designed to integrate with Ginkgo Mine ancillary infrastructure and facilities where practicable. For example, major ancillary infrastructure for the Snapper Mine comprises extensions/sharing of the existing Ginkgo Mine electricity transmission line (ETL), highway access road (HAR) and the Ginkgo Mine accommodation camp (Figure B-2).

The Snapper Mine area comprises the Snapper Mine MLA area and the ETL and HAR extensions (Figure B-2).

The study area referred to in this assessment includes the Snapper Mine area and surrounds.

The combined development of the Snapper and Ginkgo Mines would maintain up to 650,000 tonnes per annum (tpa) feed rate of mineral concentrate to the MSP during the life of the two mines.

The general arrangement of the Mining Lease Application (MLA) area at Year 1, Year 14 and post-mining is shown on Figures B-3 to B-5. These figures, in addition to Figure B-2, show the potential disturbance area (i.e. the maximum disturbance zone) associated with the Snapper Mine.

B1.2 Legislative Background

Approval for the Snapper Mine is being sought under Part 3A of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act). This Act recognizes the need to protect the cultural and natural heritage of NSW and provides for planning before development to determine the likely impact of an activity on the environment. Part 3A of the EP&A Act provides an approval process that is particularly adapted for major projects.

Approvals and Legislation that do not Apply to Approved Part 3A Projects

Section 75U of the EP&A Act outlines the authorisations that do not apply to approved Part 3A projects, including those relevant to cultural heritage, *viz*.:

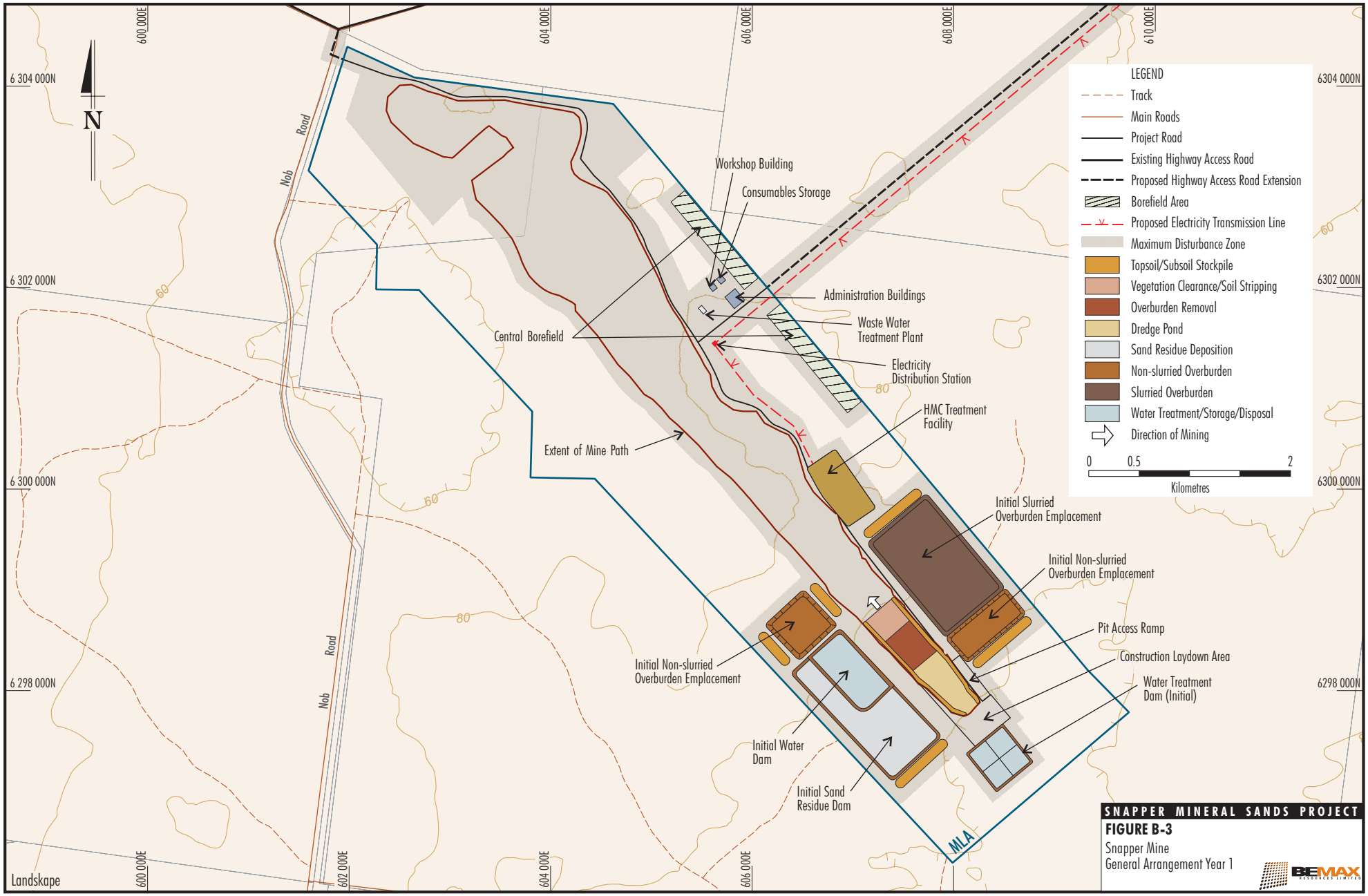
- division 8 of Part 6, Part 4 and section 139 of the *Heritage Act, 1977;* and
- sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

B1.3 Objectives of Study

The specific objectives of the cultural heritage assessment were to:

- consult the local Aboriginal community to identify any concerns they may have;
- conduct a desktop assessment to delineate areas of known and predicted cultural heritage within the MLA area and ancillary infrastructure corridors (i.e. the 10 km long ETL route [100 metre (m) corridor] from the Ginkgo Mine to the Snapper Mine and the approximate 7 km extension of the HAR [100 m corridor] [Figure B-2]);
- undertake a stratified archaeological survey of known and predicted cultural heritage identified in the desktop assessment with representatives of the local Aboriginal community (consultation with the Aboriginal community was guided by the DEC's *Interim Community Consultation Requirements for Applicants* [DEC, 2004]);
- record any cultural heritage sites within the work areas and assess their significance;
- identify the nature and extent of potential impacts of the development on cultural heritage; and
- devise options in consultation with the community to avoid or mitigate potential impacts of the development on cultural heritage places and items.

Preparation of this report involved collation of relevant archival, ethno-historical, archaeological and environmental information and the use of aerial photographs and topographic and geomorphic maps to identify areas likely to contain cultural heritage sites. Archaeological field investigation of the study area was undertaken between 16 and 27 October 2006 by Project Archaeologist Matt Cupper with the assistance of the following Aboriginal community representatives: Russell Andrews; Joshua Harris; Noel Johnson; Frank Kirby; Ray Lawson; Rodney Lawson; Justin Riley; David Smith; Clinton Squire; Desmond Webster; and Jeffrey Webster. Aboriginal community representatives Wayne Webster and Johanne Carr inspected the study area with the Project Archaeologist on 15 November 2006.



SNAPPER MINERAL SANDS PROJECT

FIGURE B-3

Snapper Mine
General Arrangement Year 1

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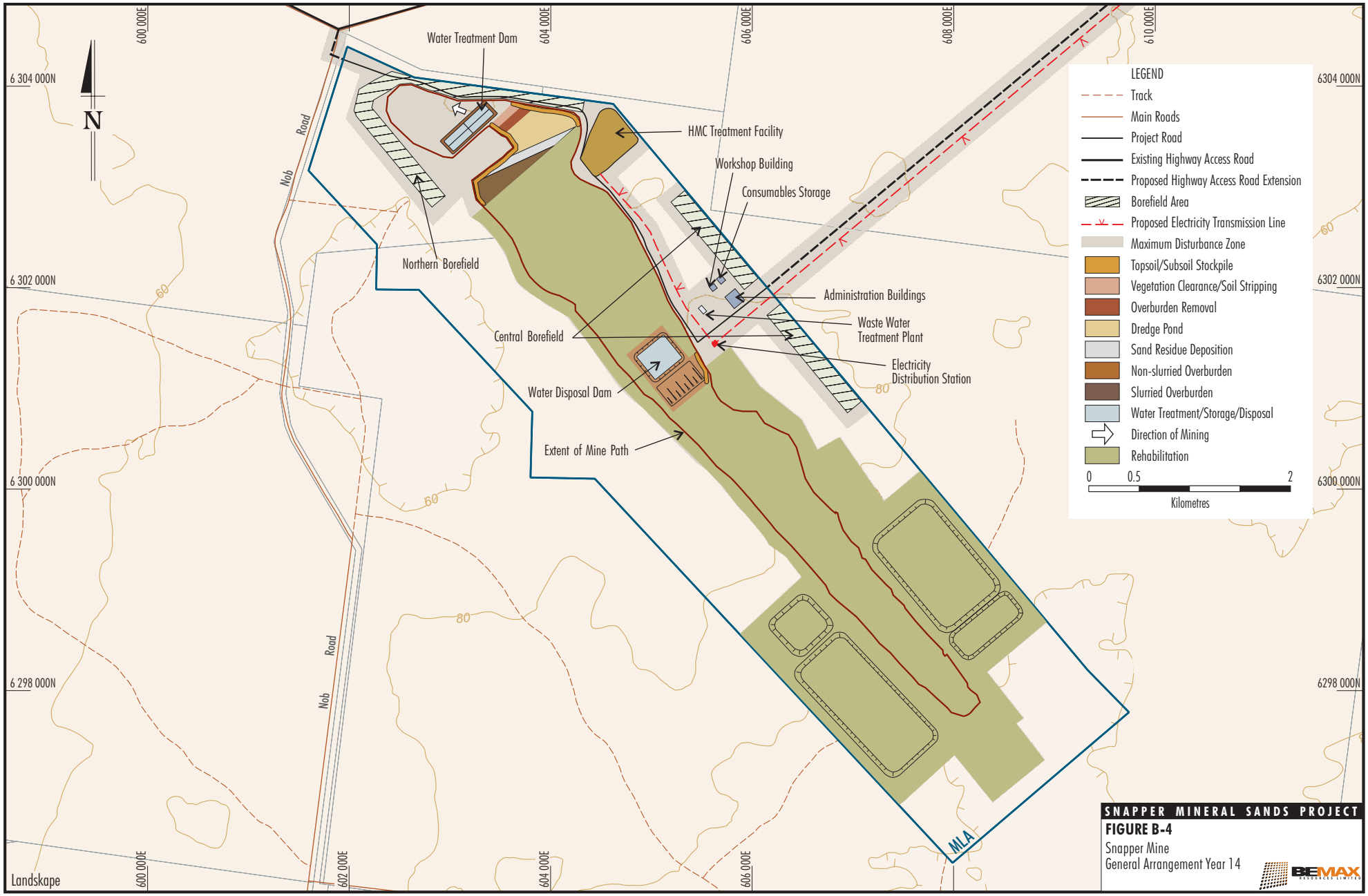

SNAPPER MINERAL SANDS PROJECT

FIGURE B-4

Snapper Mine
General Arrangement Year 14

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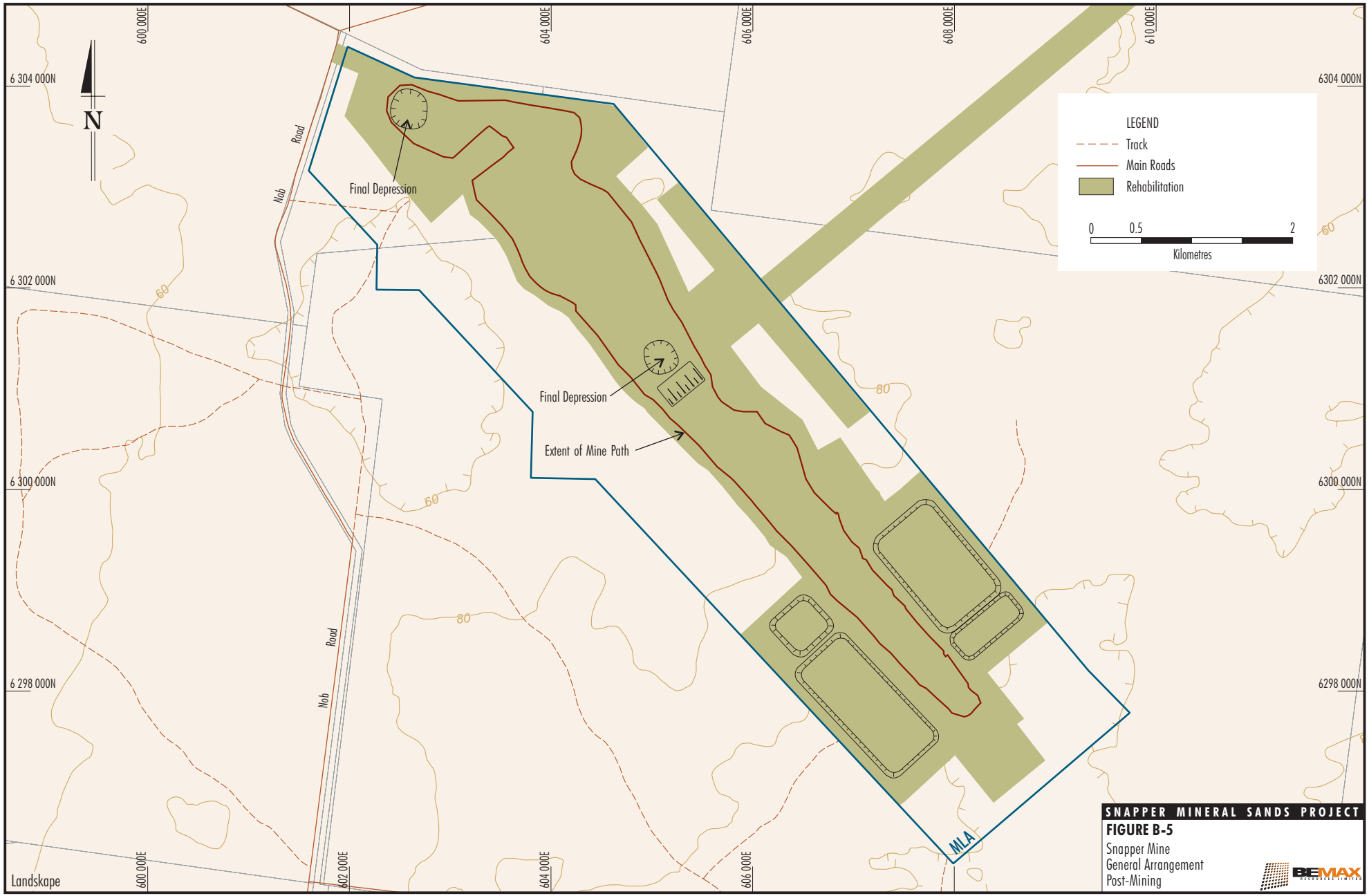

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B2 Aboriginal Social and Cultural Information

In accordance with the DEC's *Draft Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and consistent with the *Interim Community Consultation Requirements for Applicants* (DEC, 2004), this assessment has involved the appropriate representatives of the local Aboriginal community and considered their cultural values and concerns. The following sections describe involvement by the Aboriginal community and demonstrate that the input of the affected Aboriginal community has been considered when determining and assessing impacts, developing options, and making final recommendations relevant to Aboriginal cultural heritage outcomes of the development.

B2.1 Aboriginal Community Participation

Aboriginal community consultation for the Aboriginal cultural heritage assessment was conducted:

- before the field assessment to assess preliminary community views and organise a field survey team;
- during the field survey with the Aboriginal team members; and
- after the field survey to discuss the findings and recommendations for Aboriginal cultural heritage management.

B2.1.1 Identification of Aboriginal Community Groups and Individuals

Relevant stakeholders from the Aboriginal community were identified using a process consistent with the *Interim Community Consultation Requirements for Applicants* (DEC 2004), as follows:

- written letters of notification to the Dareton Local Aboriginal Land Council[*], Registrar of the NSW *Aboriginal Land Rights Act, 1983*, NSW Native Title Services Limited, DEC and Wentworth Shire Council;
- public advertisements placed in local, regional and national newsprint media including the *Sunraysia Daily* (26/8/06) (Mildura, Wentworth, Pooncarie readership), *Barrier Miner* (1/9/06) (Broken Hill, Menindee, Wilcannia readership), *Barrier Daily Truth* (26/8/06) (Broken Hill, Menindee, Wilcannia readership) and *Koori Mail* (30/8/06) (National readership) (Attachment BA);
- previous involvement in assessments of cultural heritage significance for developments associated with the Ginkgo Mine (e.g. Witter, 2001; Cupper, 2003a) and the Snapper Mine (e.g. Cupper, 2006); and
- consultation with DEC zone archaeologist Harvey Johnston.

The only response to the written letters of notification was a letter from the office of the registrar of the NSW *Aboriginal Land Rights Act, 1983* stating that the study area does not have Registered Aboriginal Owners.

The Webster family, led by Wayne Webster, and Mark Sutton responded to the public advertisements within the registration period consistent with the *Interim Community Consultation Requirements for Applicants* (DEC, 2004). Les Bennett and Patricia Doyle responded after the registration period.

The Barkindji Elders Committee and in particular committee members Noel Johnson, Sheila Kirby and Ray Lawson were also identified as relevant Aboriginal community groups and individuals from the Lower Darling region to be involved in the cultural heritage assessment for the Snapper Mine.

The locations of the Snapper Mine and ancillary infrastructure and the nature of the works associated with the proposal were explained to the Aboriginal community groups and individuals, with BEMAX presented as the proponent of the development. Requirements for a cultural heritage assessment were discussed and the Aboriginal community groups and individuals were provided with a proposed methodology for the cultural and archaeological assessment. Input from the Aboriginal community about this study programme for assessing potential impacts on cultural heritage places and items was sought. Aboriginal representatives of the Aboriginal community groups and individuals participated in the social and cultural study and archaeological field survey and contributed to devising management protocols to avoid or mitigate disturbance to cultural heritage sites.

[*] The Dareton Local Aboriginal Land Council has not been operational since late 2005.

B2.1.2 Preliminary Aboriginal Involvement

Discussions were held with members of the Aboriginal community about the development prior to the fieldwork phase of the investigation. This was initiated from a whole-of-Project perspective (initially for the Ginkgo Mine) by BEMAX in 2000 and has been on-going since that time.

BEMAX and their Project Archaeologists (Dan Witter until 2002, Matt Cupper from 2003) have engaged in regular liaison with members of the local Aboriginal community. This has included Matt Cupper making a preliminary inspection of the Snapper Mine MLA area (i.e. a general traverse along the MLA area) with Barkindji Elders Noel Johnson and Ray Lawson on 16 March 2006.

B2.1.3 Aboriginal Involvement Prior to the Field Assessment

Project Archaeologist Matt Cupper and BEMAX Exploration Manager Ray Roberts met with Barkindji Aboriginal Elders Noel Johnson, Sheila Kirby and Ray Lawson in Dareton on 18 October 2006 to explain the developments associated with the Snapper Mine and the planned cultural heritage assessment. Telephone discussions were also held with Wayne Webster, Mark Sutton, Les Bennett, Patricia Doyle, Evelyn Crawford and Michael Gilby about the development and cultural heritage assessment prior to the commencement of the assessment.

Measures to avoid or mitigate any impacts on cultural heritage places or items were discussed with the Aboriginal community groups and individuals. They were given written copies of a proposed methodology for the cultural and archaeological assessment (Attachment BB). Opinions of the Aboriginal community groups and individuals about the development and its potential impacts on cultural heritage were sought and any concerns or queries were addressed.

B2.1.4 Aboriginal Involvement During the Field Assessment

On the recommendation of the relevant Aboriginal community groups and individuals, 11 representatives from the local Aboriginal community participated in the field survey:

- Barkindji Elder Ray Lawson, assisted by son Rodney Lawson and grandsons Russell Andrews, Joshua Harris and Justin Riley. Ray and his family reside in Dareton. Ray is chairperson of the Pooncarie Wiimpatya Paakandyi Aboriginal Corporation, a Barkindji Native Title applicant and former chairperson of the Dareton Local Aboriginal Land Council.

- Barkindji Elder Noel Johnson, assisted by son Frank Kirby and son-in-law David Smith. Noel is treasurer of the Pooncarie Wiimpatya Paakandyi Aboriginal Corporation and a Barkindji Native Title applicant. He lives in Wentworth and is head of the Brown and Whyman families.

- Desmond Webster, Jeffrey Webster and Clinton Squire. Desmond and Jeffrey are sons of Wayne Webster's sister, Leila Webster. Clinton is the son of Wayne Webster's brother, Larry Webster. Jeffrey and Clinton live in Broken Hill and Desmond lives in Wilcannia.

Records of Aboriginal field survey participation are provided in Attachment BC.

B2.1.5 Aboriginal Involvement Following the Field Assessment

Project Archaeologist Matt Cupper visited the study area with Wayne Webster and Wayne's partner Johanne Carr on 15 November 2006 to explain the developments and show them the cultural heritage sites identified during the field survey. The views of Wayne and Johanne about the social and cultural significance of the cultural heritage sites were sought and strategies for management of the sites discussed.

Project Archaeologist Matt Cupper also met with Mark Sutton and Les Bennett on 15 November 2006 to explain the results of the cultural heritage field survey and management proposals.

The registered Aboriginal stakeholders were advised of the availability of a draft of this cultural heritage assessment report on 27 November 2006, consistent with the *Interim Community Consultation Requirements for Applicants* (DEC, 2004) (Attachment BD). Draft copies of this report were provided for comment to Sheila Kirby, Noel Johnson, Ray Lawson and Wayne Webster on 27 November.

Project Archaeologist Matt Cupper and BEMAX environmental officer Greg Lamb met with Wayne Webster in Broken Hill on 5 December 2006 to discuss the recommendations of the cultural heritage assessment. Wayne Webster was satisfied that the report effectively detailed Aboriginal cultural and social values and that the strategies for managing Aboriginal cultural heritage within the development area were appropriate.

Project Archaeologist Matt Cupper and BEMAX exploration manager Ray Roberts also met with Sheila Kirby, Noel Johnson and Ray Lawson in Dareton on 7 December 2006 to discuss the management proposals for Aboriginal cultural heritage. Sheila Kirby, Noel Johnson and Ray Lawson endorsed the recommendations of the cultural heritage assessment report.

Formal responses of Aboriginal stakeholder groups are provided in Attachment BE.

B2.2 Aboriginal Social and Cultural Information About the Study Area

Aboriginal people of the Lower Darling region are concerned about any development that might impact upon Aboriginal heritage and other values on land that is traditionally theirs. All land has high cultural significance for individual Aboriginal people and for the Aboriginal community collectively. It should also be noted that any development upon, or disturbance of land is contrary to principal Aboriginal beliefs regarding land, its values and its inherent cultural significance.

Aboriginal community representatives involved in this cultural heritage assessment contributed to providing specific information about the social and cultural values of the study area.

With the exception of a preliminary inspection by Barkindji Elders Noel Johnson and Ray Lawson on 16 March 2006, none of the Aboriginal community representatives had previously visited the study area. Wayne Webster and Clinton Squire had driven past the area on a visit to Pooncarie.

Wayne Webster explained that his great-great-grandparents, who had lived at Pooncarie, were the last of the Barkindji to be married in a traditional wedding ceremony. Wayne's father William Webster had been born at the Pooncarie Aboriginal Mission reserve, but had been required to move to Menindee in the 1930s when the mission was closed. Wayne had recently spent seven months living on the Darling River near the old mission site, spending time fishing and also protecting human burials in the area from erosion.

Wayne Webster stated that he has a strong spiritual connection with the landscape of the Lower Darling region. Wayne explained that when visiting cultural heritage sites on the Darling River, he can often feel the presence of his ancestors and "almost hear [the past adults of the tribe] talking and the children laughing". He thought that Aboriginal people would have walked out to the study area from the Darling River to hunt kangaroos and collect plants for food and medicinal use. Wayne explained how Emu Bush (*Eremophila sturtii*), which grows in the study area, was used by Aboriginal people to treat a range of physical ailments. Smouldering leaves of a tree taxon related to Emu Bush, Sugarwood (*Myoporum platycarpum*), also growing in the study area, were used to bless people at birthing and funeral ceremonies. Wayne also suggested that male warriors might have patrolled the study area to watch for people from rival clans entering Barkindji land.

Noel Johnson recounted that his mother, grandmother and great-grandmother had been born at "Cuthero" Station, some 50 km north of the study area. His ancestors had lived along the Darling River north of Pooncarie, although they also made overland journeys west to the Great Anabranch of the Darling and Lake Victoria. Noel thought that Aboriginal landuse of the study area would have been limited to people walking through the region, because it is "red sand country" where occupation would have been restricted due to an absence of reliable sources of water.

Ray Lawson similarly stated that Aboriginal people would have only made brief excursions through the study area. He explained that these people might have camped overnight near small, temporary water sources such as claypan depressions that retain surface water following rain. These occupants could have lit campfires at these sites and made stone artefacts. Ray noted that he had not seen any Quandong trees (*Santalum acuminatum*) during his visits to the study area, which were a particular plant taxon that Aboriginal people exploited for its fruit.

Noel Johnson and Ray Lawson had visited a decommissioned mineral sands mine owned by BEMAX near Newcastle that was being rehabilitated with native vegetation. They were satisfied that BEMAX would have similar success restoring native vegetation communities to the Snapper Mine at the end of its effective life.

B3 Landscape Context

B3.1 Landscape Setting

The study area is located in the Lower Darling region of the Murray Basin. It lies within an area bounded to the east by the Lower Darling River and to the west by the Great Anabranch of the Darling. The surface geology of the region is mostly aeolian (wind-blown) sediments, while underlying sequences within the basin were deposited by shallow seas and lakes over the past 60 million years (Brown and Stephenson, 1991).

B3.2 Landforms and Vegetation

B3.2.1 Dunefields and Sandplains

Dunefields and sandplains are the main landforms in the region. These aeolian features consist of linear dunes, which are subdued, elongated ridges with rounded crests; or sandplains, which are low, undulating regions of irregular sandy hummocks. Dunefields and sandplains are vegetated by mosaics of Black and Pearl Bluebush (*Maireana pyramidata* — *Maireana sedifolia*) low-open shrublands or Belah (*Casuarina pauper*) — Rosewood (*Alectryon oleifolius*) — Wilga (*Geijera parvifolia*) low-open woodlands. Mallee (*Eucalyptus* spp.) tall shrublands also occur on dunes.

B3.2.2 Rivers and Lakes

Fluvial and lacustrine systems comprise a contrasting landscape to the aeolian dunefields and sandplains. The two permanent watercourses, the Darling River and the Great Anabranch of the Darling, are part of the regulated Murray Darling system. They join the Murray River some 75 km to the south of the Snapper deposit. Many of the lakes along these rivers are now either permanently dry or only episodically filled by floodwaters. The nearest of these is Travellers Lake, some 9 km north of the study area. River Red Gum (*Eucalyptus camaldulensis*) fringe the margins of the rivers and lakes. Black Box (*Eucalyptus largiflorens*) woodlands, often with a Black Bluebush (*Maireana pyramidata*) or Lignum (*Muhlenbeckia cunninghammii*) understorey, grow on the alluvial floodplains.

B3.2.3 Swamps, Claypans and Other Depressions

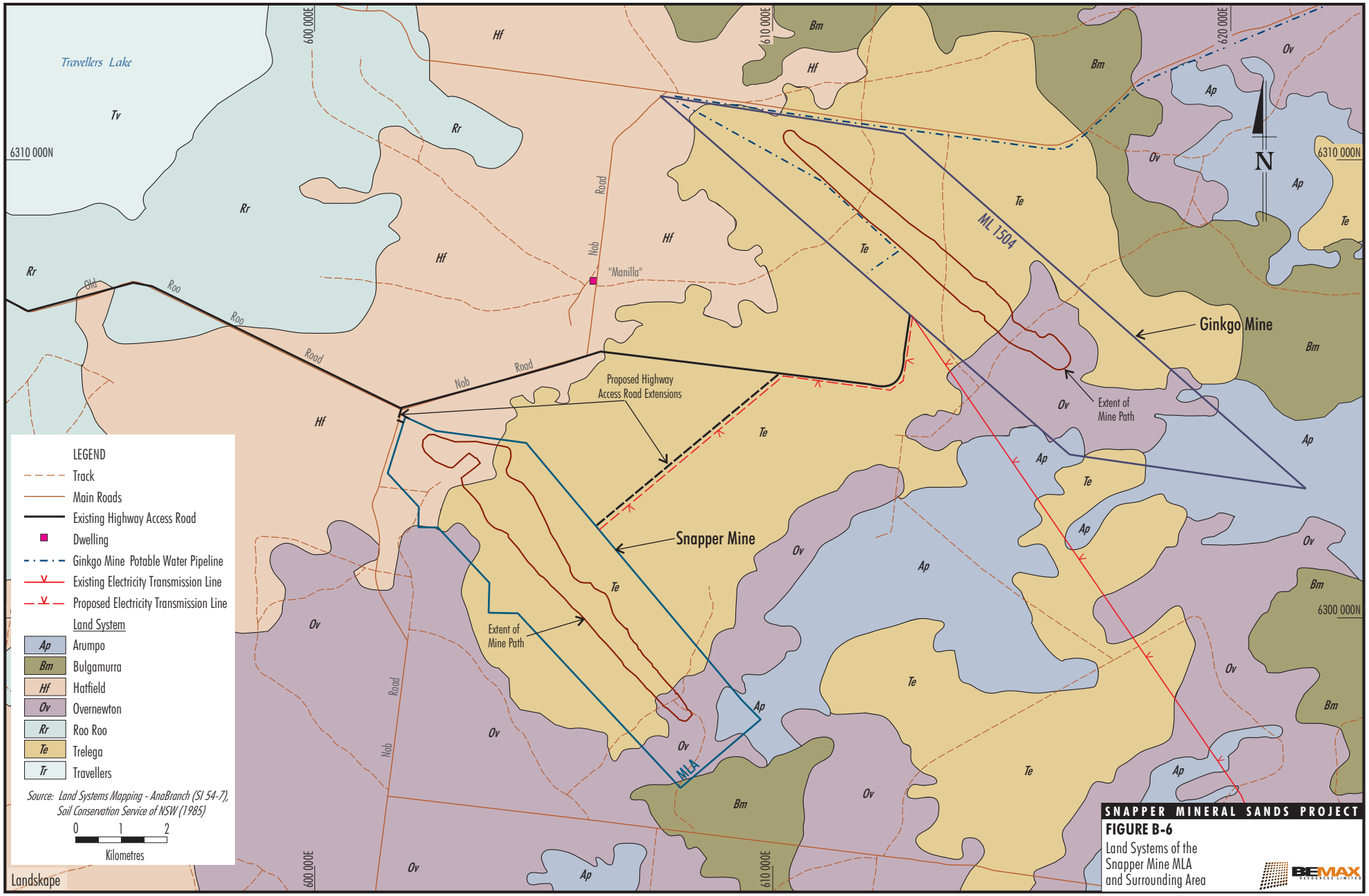
Swamps, claypans and other depressions usually occupy low-lying areas, intermittently holding surface water from runoff after rain. They may be inundated for a few days to a few weeks. Swamps occur in abandoned river channels, relict playas and dune swales. They are often vegetated by Canegrass (*Eragrostis australasica*) and surrounded by Black Box. Claypans are planar clay hardpans, often located in dune swales and sandplains. They usually lack vegetation.

B3.3 Setting of the Snapper Mine and Ancillary Infrastructure

The Snapper Mine and associated ETL and HAR would be located in dunefields and sandplains some 30 km north-west of the Darling River (Figure B-1). The MLA area falls predominantly within the Trelega sandplain land system (Soil Conservation Service, 1985, 1991) (Figure B-6). The ETL would traverse the Trelega sandplain land system, as would most of the HAR. The features of the Trelega sandplain land system are provided below:

- *Trelega: level to slightly undulating sandplains and swales of loamy solonised brown soils. Aligned low dunes and low rises of deep brownish sands and calcareous red earths; relief to 3 m. Moderate to dense belah, scattered wilga, mallee and rosewood; dense to scattered pearl and black bluebushes; abundant porcupine grass on dunes; short grasses and forbs.*

The Overnewton land system occurs in the south of the MLA area and the Hatfield land system occurs in the north of the MLA area (Soil Conservation Service, 1985, 1991). Both land systems are largely outside Snapper Mine disturbance areas (Figure B-6). The Arumpo land system (Soil Conservation Service, 1985, 1991) occurs in the south-eastern extremity of the MLA area, but does not occur within the mine path.



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The features of the Overnewton, Hatfield and Arumpo land systems are:

- *Overnewton: extensive slightly undulating sandplain with isolated sandy hummocks and depressions; relief to 5 m. Sandplains of calcareous loams and sandy loams with moderately dense clumps of belah, rosewood, scattered bluebush and inedible shrubs. Areas of deep brownish sands with white cypress pine or nelia. Abundant short grasses and forbs throughout.*
- *Hatfield: extensive, slightly undulating sandplains with isolated small depressions, relief to 10 m. Sandplains of solonised brown soils and sandy red and brown texture-contrast soils with scattered clumps of rosewood and belah, moderate to dense stands of black or pearl bluebush, abundant short grasses and forbs. Areas of deeper sandy soils with scattered white cypress pine and abundant short grasses and forbs. Depressions of grey clays with canegrass, rimmed by scalded red texture-contrast soils.*
- *Arumpo: parallel dunes of deep loamy sand to sandy red soils with dense mallee and areas of porcupine grass; relief to 10 m. Narrow swales of calcareous loamy red earths with belah and rosewood, areas of inedible shrub, abundant short grasses and forbs.*

B4 Cultural Heritage Context

B4.1 Aboriginal Cultural Heritage Context

Some of the earliest evidence of human occupation of Australia comes from south-western NSW (Bowler *et al*., 1970, 2003; Thorne *et al*., 1999; Cupper and Duncan, 2006; Olley *et al*., 2006). Stone artefacts found at Lake Mungo, about 100 km to the east of the study area, have been dated to between 46,000 to 50,000 years ago (Bowler *et al*., 2003). The burials of a male and female at Lake Mungo are 42,000 years old (Olley *et al*., 2006, cf. Thorne *et al*., 1999). People were also at nearby Lake Menindee from 45,000 years ago (Cupper and Duncan, 2006) and at Lake Victoria on the Murray River by around 21,000 years ago (Gill, 1973).

B4.1.1 Ethno-Historic Context

Aboriginal people of the Barkindji language group occupied the Lower Darling region at the time of first contact with Europeans (Sturt, 1982 [1833]; 1984 [1844-6]; Mitchell, 1839; Eyre, 1985 [1842]; Krefft, 1865). This language group comprised people who spoke the sub-dialects Barindji, Barkindji, Danggali, Maraura and Wiljakali (Allen, 1974; Tindale, 1974; Hardy, 1976; Hercus, 1982, 1993). These tribes shared similar language and kinship systems, notably the division of members into matrilineal moieties (two-part social classification) known as Mukwara (Wedge-tailed Eagle) and Kilpara (Raven) (Tindale, 1974; Hercus, 1982, 1993; Blows, 1995).

At the time of European contact the Barkindji were hunter-fisher-gatherers and appear to have had a semi-sedentary lifestyle. Early accounts from the 1850s by the German naturalist Gerard Krefft (1865) suggest that the Barkindji lived along the Lower Darling and Murray Rivers during the warmest months of the year, with people moving away from the rivers into the dunefields to collect food after winter rains.

Aspects of the initial interaction between Europeans and Barkindji led to violent conflict. Aborigines were shot, poisoned and displaced from their land by pastoral settlers and, in retaliation, sheep and shepherds were speared. For example, the pioneer cemetery at Greenvale, some 30 km east of the Snapper Mine, contains the grave of John McLean, who died from spear wounds in 1849. Within a decade of the first contact many of the Barkindji were living adjacent to pastoral homesteads, often working as shepherds or engaged in other labouring activities (Lans *et al.*, 1988; Withers, 1989). The family of Harry Nanya was the last of the Barkindji to live a traditional existence in the area, ranging from around Lake Victoria and along the Great Anabranch of the Darling. By 1893 ‘Nanya’s Mob’ had been rounded up and brought into settlement (Hardy, 1976; Withers, 1989).

At the turn of the nineteenth century many Barkindji resided on the Darling River near Pooncarie, particularly on “Mallara” Station held by Charles Barritt. A grant of 640 acres of land was set aside on “Mallara” and “Tarcoola” Stations for an Aboriginal mission reserve in 1911 (Hardy, 1976; Lans *et al*., 1988). About 20 people were in continual residence at the mission until 1933, when it was closed and most of the families moved to Menindee. Those Aboriginal families with strong ties to the Pooncarie Mission are the Bugmys, Clarkes, Johnsons, Harrises, Hunts, Mitchells, Mortons, Quayles, O’Donnells, Websters and Whymans (Lans *et al*., 1988; Witter, 2001).

Some aspects of the way of life noted at the time of first contact persisted until the early part of the twentieth century. Alice Bugmy, a Barkindji woman who, as a teenager in the 1930s, lived with her family on the Pooncarie Aboriginal Mission reserve recounted the following story:

> [The family] *would wait until they saw big black storm clouds building up in the west. Her father would then hitch up the wagonette and they would head out across the plains to the clay pans before the rains hit. Once there they would camp, using the water* [that] *had collected in the clay pans, and gather the wild food* [that] *had responded to the rains. When the water dried up, they would return to the river.* Account of Alice Bugmy recorded in Witter (2001).

B4.1.2 Prehistoric Context

Accounts of Aboriginal landuse of the Lower Darling during the late nineteenth and early twentieth centuries provide an insight into possible settlement patterns in the prehistoric period. Allen (1974), using these historical ethnographies and the archaeological record, invoked a subsistence model for the region based on the relationship between occupation of the riverine corridors and dunefields. Large populations of people congregated at the rivers during spring and summer and whenever the systems were high. Following seasonal rains smaller, mobile bands dispersed over the plains exploiting ephemeral resources (Allen, 1974).

The material record of this occupation is preserved in the archaeological sites of the Lower Darling region, most of which date to the period since the last Ice Age (after around 18,000 years ago) (Hope, 1981; Balme and Hope, 1990; Balme, 1995). All that remains at many of these sites are flakes of stone debris from the making and resharpening of stone tools. These were made both at Aboriginal open habitation areas (camp sites) or special activity areas such as stone knapping sites. As well as being the sites of manufacture and maintenance of stone implements, open habitation areas usually contain evidence of domestic and other activities such as cooking and food preparation. Campfires or oven hearths are common, marked by calcrete, baked clay, ferricrete, sandstone and silcrete heat retaining stones or hearthstones and charcoal. Organic remains consist of burnt animal bones, Emu and aquatic bird eggshell and freshwater mussel shell.

B4.2 Types of Aboriginal Cultural Heritage Sites in the Region

The types of Aboriginal cultural heritage sites previously recorded in the Lower Darling region are described below.

B4.2.1 Stone Artefact Scatters

Scatters of stone artefacts exposed at the ground surface are one of the most commonly occurring types of archaeological site in the region (Hope, 1982). The remains of fire hearths may also be associated with the artefacts. In rare instances, sites that were used over a long period of time may accumulate sediments and become stratified. That is, there may be several layers of occupation buried one on top of another.

Stone artefact scatters are almost invariably located near permanent or semi-permanent water sources. Local topography is also important in that stone artefact scatters tend to occur on level, well-drained ground elevated above the local water source. In the Lower Darling region they are commonly located on river terraces and along creek-lines and also around the margins of lakes, swamps and claypans.

B4.2.2 Hearths

Hearths consist of lumps of burnt clay or stone cobble hearthstones. Sometimes ash and charcoal are preserved. Other materials found in hearths include animal bone, freshwater mussel shell, Emu eggshell and stone artefacts. Hearths probably represent the remains of cooking ovens, similar to those described in ethnographic accounts by Major Thomas Mitchell (1839) (see also Coutts *et al*., 1979). These were lined with baked clay nodules and stone cobbles, possibly to retain heat. Hearths may be isolated or occur in clusters and may be associated with stone artefact scatters or middens. They are often located in dune swales, particularly on claypans, near soaks and on floodplain terraces.

B4.2.3 Freshwater Shell Middens

Shell middens are deposits of shell and other food remains accumulated by Aboriginal people as food refuse. In inland NSW these middens typically comprise shells of the freshwater Lacustrine Mussel (*Velesunio ambiguus*) or the freshwater Riverine Mussel (*Alathyria jacksoni*). Freshwater middens are most frequently found as thin layers or small patches of shell and often contain stone or bone artefacts and evidence of cooking. Such sites are relatively common along the Darling River and its associated lakes and tributaries.

B4.2.4 Earth Mounds

Earth mounds may have been used by Aboriginal people as cooking ovens or as campsites. They are common along the Murray River and in the Western District of Victoria. Originally they appear to have ranged from 3 to 35 m in diameter and from 0.5 to 2 m in height. Today, however, they may be difficult to recognize because of the effects of ploughing, grazing and burrowing rabbits. Earth oven material, stone artefacts, food refuse and the remains of hut foundations have been exposed in excavated earth mounds.

B4.2.5 Stone Quarries

Quarries are locations where Aboriginal people obtained raw material for their stone tools or ochre for their art and decoration. Materials commonly used for making flaked stone tools include chert, silcrete, quartz and quartzite. Stone sources are not common in south-western NSW. Silcrete outcrops are the most abundant and have been noted at a number of locations in the Lower Darling region, particularly at topographic low points of the landscape such as abandoned lakebeds and playa floors (e.g. Hope, 1998; Witter, 2001; Cupper 2003a, 2003b). Chert is found exposed in cliffs incised by the Murray River in South Australia. Most other stone in the Lower Darling region was probably sourced via long-distance trade links with the Olary and Barrier Ranges and the south-eastern Australian Highlands.

B4.2.6 Modified Trees

Slabs of bark were cut from trees by Aboriginal people and used for a variety of purposes including roofing shelters and constructing canoes, shields and containers. Scars also resulted from the cutting of toeholds for climbing trees to obtain honey or to capture animals such as possums. In the Lower Darling region river red gums and black box are the most commonly scarred species. The classification of modified trees as natural, European or Aboriginal is often problematic. However, if the scar is Aboriginal the tree must now be more than ~150 years old.

B4.2.7 Stone Arrangements, Ceremonial Grounds and Natural Sacred Sites

Stone arrangements range from cairns or piles of rock to more elaborate arrangements such as stone circles or standing slabs of rock held upright by stones around the base. Some stone arrangements were used in ceremonial activities whilst others may represent sacred or totemic sites. Other sites associated with the spiritual aspects of Aboriginal life are those now called ‘ceremonial and dreaming sites’. These are often natural features such as rock outcrops, waterholes or trees, which may be associated with initiation ceremonies or the activities of ancestral creators.

B4.2.8 Burials

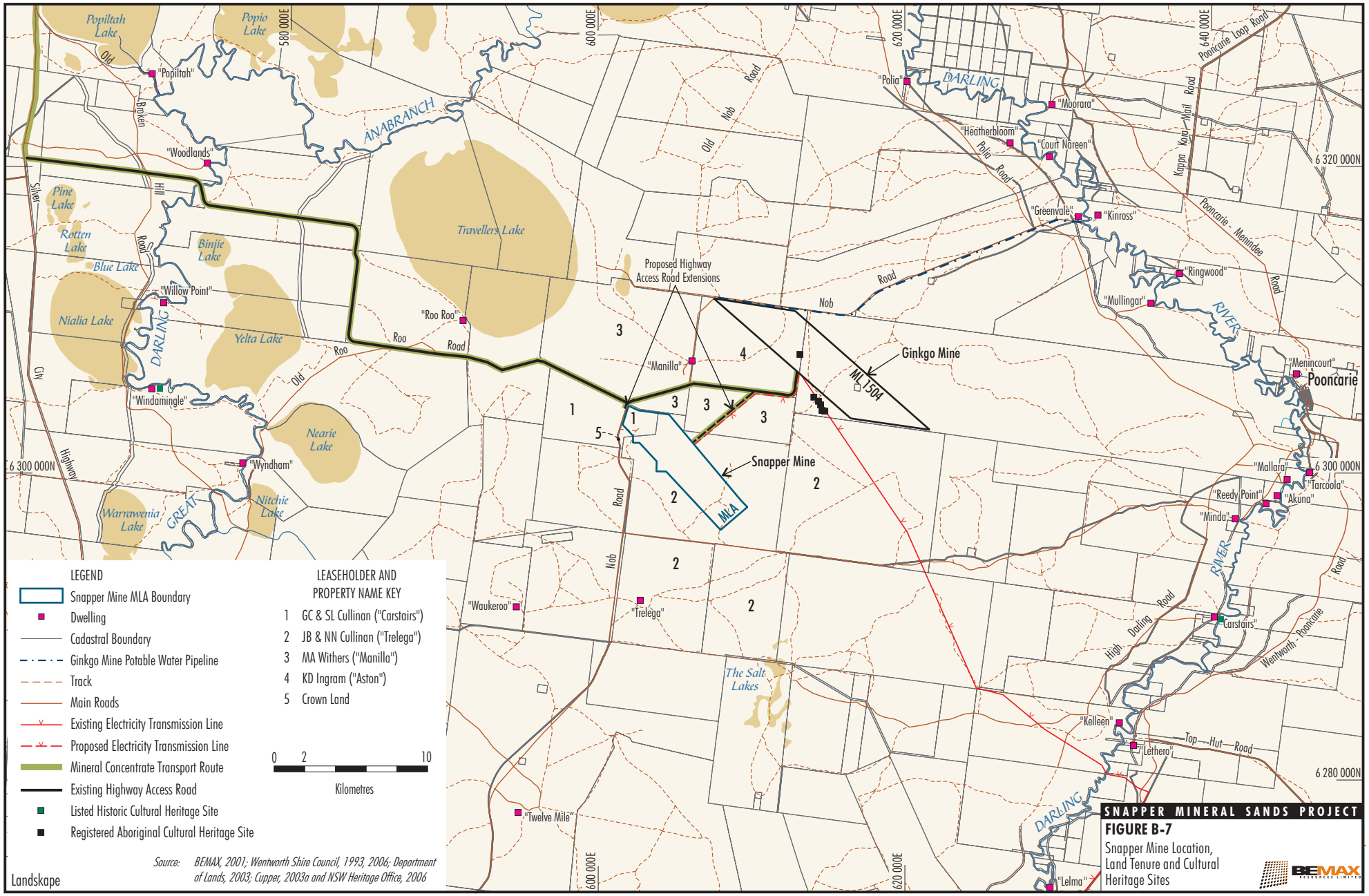
Aboriginal burial grounds may consist of a single interment or a suite of burials. Burials tend to be in areas of sandy soil that were easy to dig and above floodwaters. Burials are frequently located in source-bordering sand dunes, sand ridges, lunettes and levees along watercourses (Hope, 1993). Knowledge of Aboriginal burial grounds is best sought from local Aboriginal communities.

B4.3 Previously Recorded Aboriginal Cultural Heritage Sites in the Study Area

According to the DEC Aboriginal Heritage Information Management System (AHIMS) site database, there are five registered Aboriginal archaeological sites within approximately 10 km of the Snapper Mine (Table B-1), shown on Figure B-7. These sites are isolated finds of silcrete stone artefacts (DEC site numbers 39-3-0054 — 0058) recorded by Cupper (2003a) during a cultural heritage assessment of an ETL route servicing the Ginkgo Mine. The closest of these isolated finds are about 8 km north-east of the Snapper Mine MLA.

Table B-1. Previously Identified Aboriginal Archaeological Sites Near the Snapper Mine

DEC Site Number	Type	Location GDA mE	Location GDA mN
39-3-0043	Isolated find of a stone artefact	613171	6307728
39-3-0054	Isolated find of stone artefacts	614620	6304110
39-3-0055	Isolated find of a stone artefact	614070	6304970
39-3-0056	Isolated find of stone artefacts	614380	6304690
39-3-0057	Isolated find of stone artefacts	614520	6304460
39-3-0058	Isolated find of stone artefacts	614790	6304070



LEGEND

- Snapper Mine MLA Boundary
- Dwelling
- Cadastral Boundary
- Ginkgo Mine Potable Water Pipeline
- Track
- Main Roads
- Existing Electricity Transmission Line
- Proposed Electricity Transmission Line
- Mineral Concentrate Transport Route
- Existing Highway Access Road
- Listed Historic Cultural Heritage Site
- Registered Aboriginal Cultural Heritage Site

LEASEHOLDER AND PROPERTY NAME KEY

1 GC & SL Cullinan ("Carstairs")
2 JB & NN Cullinan ("Trelega")
3 MA Withers ("Manilla")
4 KD Ingram ("Aston")
5 Crown Land

0 2 10
Kilometres

Source: BEMAX, 2001; Wentworth Shire Council, 1993, 2006; Department of Lands, 2003; Cupper, 2003a and NSW Heritage Office, 2006

Landskape

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FIGURE B-7

Snapper Mine Location, Land Tenure and Cultural Heritage Sites

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The closest known Aboriginal archaeological site to the Snapper Mine, HAR or ETL extensions is an isolated find of a stone artefact (DEC site number 39-3-0043) recorded by Witter (2001) approximately 1 km north of where the extension to the ETL and HAR would connect to the existing Ginkgo Mine ETL substation (Table B-1), shown on Figure B-7. No Aboriginal archaeological sites are known to occur near the HAR extension linking the Snapper Mine to the existing HAR in the north-western end of the MLA.

B4.4 Historical Cultural Heritage Context

The explorer Captain Charles Sturt was the first European to visit south-western NSW, passing the junction of the Lower Darling River with the Murray River during his 1829-1831 expedition of the Murrumbidgee and Murray Rivers (Sturt, 1982 [1833]). Within seven years of Sturt's expedition, the route along the Murray was used to drive cattle overland from the colony of NSW to Adelaide. Joseph Hawdon and Charles Bonney were the first of the so-called 'overlanders', fording cattle across the Lower Darling River in 1838 (Kain, 1991).

They were closely followed by other overland expeditions led by Sturt and Edward John Eyre. Overlanders driving mobs of cattle to the colony of South Australia soon became a regular occurrence in the region. The junction of the Murray and Darling Rivers was an important stopover location for these overland cattle drives and became known as Hawdon's Ford.

Pastoralists brought sheep to the region soon after Eyre's 1844 exploration of the Lower Darling River to Menindee led to reports of land suitable for grazing. By the 1860s much of the Lower Darling and Murray River frontage had been occupied by pastoral squatters (Tulloch, 1984; Lans *et al*., 1988; Withers, 1989). The initial squatter runs and later pastoral leases stretched from the main rivers into the unwatered dune country of the riverine hinterlands. Settlement was concentrated on the river margins to take advantage of their secure water supplies and the emerging trade routes established by the stream-driven paddleboats. It was only with installation of windmill water pumps after the 1880s that sheep could be grazed any distance away from the rivers (Withers, 1989).

The Snapper Mine area is located on four pastoral leases ("Trelega", "Carstairs", "Manilla" and "Aston"). Land tenure of the Snapper Mine area is summarised in Table B-2 and shown on Figure B-7.

Table B-2. Land Tenure Summary of the Snapper Mine Area

Lot/DP	Leaseholder	Property Name
1929/763907	J.B. and N.N. Cullinan	Trelega
1927/763905	G.C. and S.L. Cullinan	Carstairs
1925/763903	M.A. Withers	Manilla
1924/763902	K.D. Ingram	Aston

Source: Galloways (2006); Department of Lands (2003).

These were originally part of the large Avoca pastoral holding, which was centred on the Darling River further south. Avoca was formed in 1870 by Daniel Henry Cudmore with his father Daniel Michael Paul Cudmore, who had purchased part of the Fletcher family runs (Borrow, 1945). George and Dougal Fletcher were amongst the first European settlers to take up squatting runs along the Darling River, moving to the region in 1846 from their holdings on the Murrumbidgee River (Withers, 1989).

Daniel Cudmore Jnr introduced many technological advances to the pastoral industry of the Lower Darling (Withers, 1989). He was instrumental in channel cutting and blockbank construction works that modified the flow regime of the Great Anabranch of the Darling, making water storages and erecting fences. Cudmore used pumps to irrigate lucerne and other fodder crops and 120,000 sheep were shorn at Avoca in 1888 with his new Wolseley shearing machines. Cudmore served as an honorary magistrate and sheriff of the county and chairman of the Wentworth district council and agricultural society and built St John's Church in Wentworth (Borrow, 1945).

A policy of closer settlement was pursued in the Lower Darling region with the passing of the *Western Lands Act* in 1901. Some sections of the old pastoral holding of Avoca were resumed and subdivided into smaller Western Lands perpetual lease holdings in 1903 and 1904 (NSW Department of Lands, 1912).

Malcolm and Florence Miller were granted the 17,999-acre Lot 1929/DP 763907 lease, which they incorporated with several leases with Darling River frontage to form "Akuna" Station (NSW Department of Lands, 1912; Lans *et al*., 1988). Lot 1929/DP 763907 is now part of "Trelega" Station and is held by Jason and Natarsha Cullinan.

Thomas Wakefield was granted the 5,875-acre Lot 1927/DP763905 lease, which he ran from "Minda" Station on the Darling River (NSW Department of Lands, 1912; Lans *et al*., 1988). Thomas Wakefield later transferred Lot 1927/DP763905 to his son Benjamin Wakefield, who incorporated it into "Carstairs" Station. Benjamin Wakefield's son Gordon Wakefield sold "Carstairs" to Colin Cullinan. Colin Cullinan's son and daughter-in-law, Gary and Stacy Cullinan, now run the property.

B4.5 Types of Historical Cultural Heritage Sites in the Region

The types of historical heritage sites that occur in the Lower Darling region include:

B4.5.1 Pastoral Sites

Historical heritage sites in the Lower Darling region mostly relate to the arrival of European graziers and associated industries during the nineteenth and early twentieth centuries. Old homesteads and associated structures such as work sheds, shearing sheds and labourer's quarters are examples of historical heritage sites that may be encountered. Less conspicuous sites include survey markers, particularly those blazed on eucalypt trees, which are also of historical interest.

B4.5.2 Transport Sites

Small bridges made from river red gum timber or calcrete cobbles may occur in the region. Shipping sites along the Murray and Darling Rivers comprise the wrecks of old paddle steamers and barges, historic wharves and jetties, ferry and punt landings, shipbuilding yards, customhouses and locks and weirs. Historic mileage markers and navigation markers may also be encountered.

B4.5.3 Water Regulation and Irrigation Sites

Historical features constructed to divert or alter the flow of water include blockbanks and weirs. Stone, concrete, earth, steel and timber are amongst the construction materials used to erect dams. Irrigation infrastructure includes steam-driven pumping machinery and irrigation pipes.

B4.6 Historical Cultural Heritage Sites in the Study Area

The NSW State Heritage Inventory contains items listed by the Heritage Council under the *Heritage Act, 1977*. The *Wentworth Local Environmental Plan* (Wentworth LEP) also lists historical heritage sites within the Wentworth Shire, the local government area in which the study area is located.

The historical heritage site closest to the Snapper Mine previously registered on the NSW Heritage database is "Windamingle" Homestead (State Heritage Inventory Database Number 18283, Wentworth Shire Council Heritage Item Number 99) (Table B-3), shown on Figure B-7. This structure is located on the bank of the Great Anabranch of the Darling River on "Windamingle" Station approximately 33 km west of the study area (NSW Heritage Office, 2006). The dwelling was constructed of dropped native pine slabs in 1913 and is the only complete surviving example of this type of pioneer architecture in the region (Wentworth Shire Council, 2006).

"Carstairs" Homestead (associated with the "Carstairs" pastoral lease on which the study area is located) is listed as a heritage item in the Wentworth Shire Heritage Study (Wentworth Shire Council Heritage Item Number 103; Hassell Planning Consultants, 1989; Wentworth Shire Council, 1993, 2006). Constructed of local sandstone in 1910, "Carstairs" Homestead is located adjacent to the Darling River approximately 30 km east of the development (Table B-3, Figure B-7).

Table B-3. Historical Cultural Heritage Sites Near the Snapper Mine

NSW State Heritage Inventory Number	Wentworth LEP Heritage Item Number	Description	Location GDA (mE)	Location GDA (mN)
18283	99	Windamingle Homestead	570501	6305513
N/A	103	Carstairs Homestead	640517	6290543

B5 Archaeological Investigation

In accordance with the *Standards for Archaeological Practice in Aboriginal Heritage Management* (NPWS, 1997) and the *NSW Heritage Manual* (NSW Heritage Office, 1996), an archaeological design and survey methodology was prepared as a key component of the cultural heritage field assessment. Details of the archaeological design and survey methodology are presented in the following sections.

B5.1 Overview of Previous Archaeological Investigations

The Aboriginal archaeology of the Lower Darling region is known generally from a number of studies, but very little systematic archaeological research has been undertaken in the dunefields and sandplains west of the Darling. Archaeological surveys of developments in these areas are limited to those conducted by McIntyre (1981), Clark (1983), Witter (2001) and Cupper (2003b, 2004).

Other areas in south-western NSW that have been archaeologically surveyed include the Darling River and its associated lakes (Hope, 1981; Balme and Hope, 1990; Craib, 1992; Martin *et al.*, 1994; Balme, 1995; Marshall and Smith, 1998; Pardoe and Martin, 2002; Pardoe, 2003), Murray River and Lake Victoria (Bonhomme, 1993; Hope, 1998) and the Willandra Lakes (see Johnston and Clark, 1998). Regional studies and syntheses of the archaeological record of south-western NSW include those of Allen (1974), Hope (1982) and Bonhomme Craib and Associates (1999, 2001).

Witter (2001) and Cupper (2003a) have previously surveyed the Ginkgo Mine and ancillary infrastructure routes. Witter (2001) identified 34 sites within the Ginkgo Mine Mining Lease (ML 1504) area, of which the majority were isolated finds of stone artefacts or heat retainers from hearths (75%, n=27). There were eight stone artefact scatters, some containing hearths, and a stone quarry and stone artefact scatter site complex. Cupper (2003a) located 13 Aboriginal archaeological sites within dunefields and sandplains traversed by the HAR and ETL to the Ginkgo Mine. Ten of these sites were isolated finds of stone artefacts, with two hearth sites and a stone artefact scatter with hearths also recorded.

B5.2 Cultural Heritage Site Predictive Model

Previous archaeological studies indicate that dunefields and sandplains of the Lower Darling have a low density of cultural heritage places. Occupation sites are almost invariably located at small ephemeral water sources such as swamps and claypans (McIntyre, 1981; Clark, 1983; Witter, 2001; Cupper, 2003a). The most frequently recorded Aboriginal sites in the dunefields and sandplains are stone artefact scatters and hearths (DEC AHIMS site database). Isolated finds of stone artefacts and hearthstones are also represented in the archaeological record. Other Aboriginal cultural heritage site types previously identified in the Lower Darling region are shell middens, stone quarries, ceremonial and dreaming sites, trees scarred by Aboriginal people, burials, earth mounds and stone arrangements (DEC AHIMS site database).

Based on these observations of archaeological site types and their distribution and landscape setting, the following predictive model of site types and locations within the Snapper Mine area was developed prior to the survey:

- **Stone artefact scatters**, **hearth** sites and **isolated finds of stone artefacts or hearthstones** have the potential to occur within the Snapper Mine and ancillary infrastructure work areas. The density of these types of sites was predicted to be low, given the absence of nearby permanent sources of water. Open occupation sites are typically found within 500 m of water sources, so such sites are most likely to be encountered on level ground adjacent to ephemeral swamps and claypans that intermittently retain surface water following rain.
- **Stone quarry** sites have the potential to occur in the study area, as a silcrete stone source has already been recorded at the nearby Ginkgo Mine (Witter, 2001). Silcrete outcrops noted elsewhere in the Lower Darling region often occur at topographic low points in the landscape such as abandoned lake beds and playa floors (e.g. Hope, 1998; Cupper, 2003a, 2003b).
- **Scars made by Aboriginal people** have the potential to occur on the black box trees that exist in a small depression in the north-west of the Snapper Mine MLA area. River red gum trees, the other taxa typically scarred by Aboriginal people in the region, are absent in the study area.
- The chance of encountering **shell middens** was predicted to be low, as they are usually found near permanent water sources, as are **burial** sites. Source-bordering dunes adjacent to rivers and lakes are the landforms most likely to contain human skeletal remains.

- Although **stone arrangements** have been recorded in the Lower Darling region, they are not common and were considered unlikely to be encountered in the study area. Stone arrangements tend to occur on level ground, often on elevated landforms such as floodplain terraces.

Any historical heritage sites in the work areas were anticipated to most likely relate to early pastoral activities of the last half of the nineteenth century or the first half of the twentieth century. Site types that have the potential to occur include discarded farm machinery and blazed survey marks. It was considered unlikely that any historical heritage structures such as dwellings would occur in the study area.

B5.3 Field Methodology

B5.3.1 Logistics

Fieldwork was undertaken from 16 to 27 October 2006 by archaeologist Matt Cupper with the assistance of the following Aboriginal community representatives: Russell Andrews; Joshua Harris; Noel Johnson; Frank Kirby; Ray Lawson; Rodney Lawson; Justin Riley; David Smith; Clinton Squire; Desmond Webster; and Jeffrey Webster. These Aboriginal community representatives were involved on a rotational basis, such that each day the fieldwork team comprised the Project Archaeologist and three Aboriginal community representatives.

B5.3.2 Survey Methods

Two sampling methods were used to archaeologically survey the Snapper Mine MLA area. The ancillary infrastructure corridors were surveyed by linear transects.

Area surveys

The predictive model suggested that Aboriginal cultural heritage sites were most likely to occur in the study area near landforms that intermittently retain surface water after rain such as small swamps and claypan depressions. Three ephemeral water sources were identified from aerial photography, geomorphic and topographic maps. Areas within ~ 500 to 1,000 m of these features were intensively inspected by the archaeologist and Aboriginal representatives walking across them in a series of closely spaced transects (Figure B-8). Transects approximately 25 m apart were distributed evenly over these areas (areas 1, 6, 34; Figure B-9).

Figure B-8. Survey Team Members Inspecting the Study Area for Cultural Heritage Sites

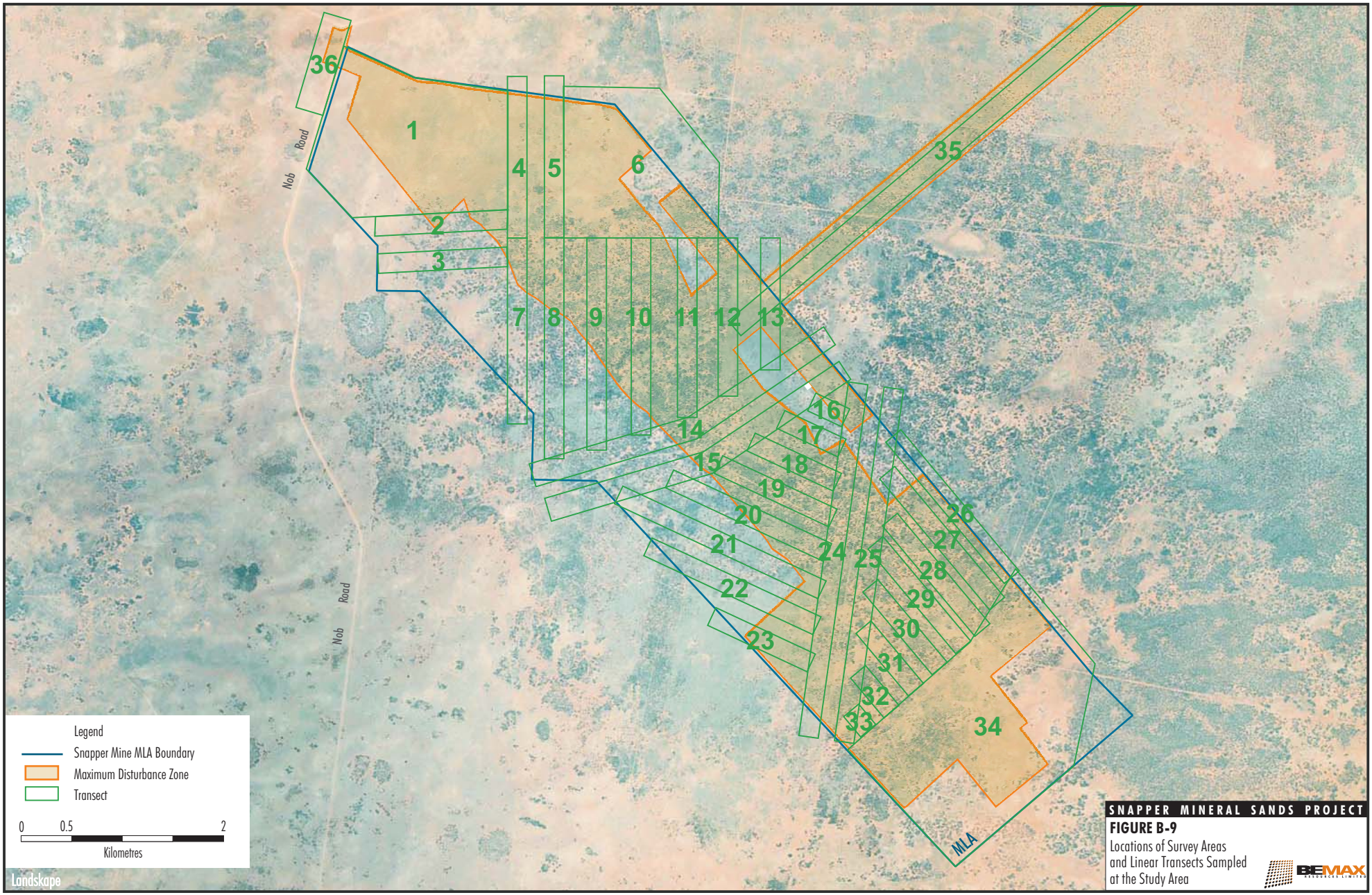

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FIGURE B-9

Locations of Survey Areas and Linear Transects Sampled at the Study Area

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Linear transects

The other sampling strategy adopted was to survey linear transects across the dunefields and sandplains of the entire study area. The Snapper Mine MLA area is bisected by a number of tracks and exploration drill lines, which were utilized by the survey team to provide vehicular access. Transects of approximately 200 m width were sampled parallel or perpendicular to the vehicle tracks. Team members spaced 50 m apart walked along the transects, examined the ground surface for archaeological traces such as stone artefacts, hearths and heathstones. Due to the openness of the landscape it was possible to identify likely site locations from at least 25 m and deviate from the transects to make closer inspections.

The extensions to the HAR and ETL were surveyed using similar linear transects whereby the team members walked abreast along the length of the corridors. The archaeologist and Aboriginal representatives were spaced 25 m apart for these surveys.

The locations of survey samples are shown in Figure B-9.

B5.3.3 Access to Survey Areas and Weather Conditions

Access was available to all of the development areas. Weather conditions during the survey were fine.

B5.4 Site Definition and Recording

For this investigation Aboriginal archaeological sites were defined as a concentration of stone artefacts and/or heat retainers. Stone artefacts that were not part of a concentration were recorded as isolated finds. When a site was located the following variables were recorded:

- *Site designation*: sites were designated Snapper (SN) followed by a numeric identifier.
- *Site type*: site types recorded were stone artefact scatters, hearths, stone quarries and isolated finds of stone artefacts.
- *Grid reference*: this information was obtained using a Garmin handheld Global Positioning System and confirmed using the Cuthero 7331 1:100,000 orthophoto map.
- *Environmental setting*: this describes the site's environmental context including such factors as landform, slope, vegetation and local hydrology.
- *Aspect*: direction at which the site faces. Aspect is often thought to be a key determinant of site location.
- *Site size*: refers to the dimensions over which artefacts are visible.
- *Visibility*: a measurement of the conditions of ground surface visibility in the survey area. Ground surface visibility conditions affect whether sites are detected and whether their full extent has been recorded.
- *Site contents*: this is a description of the artefacts at the site. With stone artefact scatters the features recorded included raw material, artefact type, artefact dimensions, presence of retouch or use wear and any general comments considered relevant. It is important to realise that these artefact descriptions are only preliminary descriptions, as more detailed recording is considered to be more appropriate if a mitigation phase is undertaken for the Snapper Mine.
- *Site condition*: describes the condition of the site in terms of factors which may have disturbed it or which may have the potential to disturb.
- *Management considerations*: this details the potential threat to the site specifically in terms of the planned development. In addition, specific ameliorative measures are recommended if warranted.

B5.5 Survey Coverage Data

B5.5.1 Conditions of Visibility

Conditions of ground surface visibility affects how many sites are located. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between different environments, then this in would be reflected in the numbers of sites reported for each area. The area with the best visibility may be reported as having the most sites (because they are visible on the ground) while another area with less visibility but perhaps more sites would be reported as having very little occupation. It is important therefore to consider the nature of ground surface visibility as part of any archaeological investigation.

Conditions of ground surface visibility were typically at least 40% (Table B-4, Figure B-10). These excellent conditions of visibility were mainly due to the fact that grass and herbaceous plant growth was sparse and the ground surface was widely exposed by erosion by stock traffic, scalding and wind deflation.

Table B-4. Visibility Conditions at the Study Area

Survey Unit	Landforms	Vegetation	Exposures	Visibility (%)	Survey Method
1 (MLA)	Sandplain, dune	Grasses, Belah, Mallee, Bluebush	Scalds, animal tracks, vehicle tracks, gullies	40-60	Pedestrian
2 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee, grassland	Scalds, animal tracks, vehicle tracks	50-70	Pedestrian
3 (MLA)	Sandplain, dune	Belah, Bluebush, grassland	Scalds, animal tracks, vehicle tracks	50-70	Pedestrian
4 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
5 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
6 (MLA)	Sandplain, dune, depression	Belah, Bluebush, Black Box, grassland	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
7 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee	Scalds, animal tracks, vehicle tracks	50-70	Pedestrian
8 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee	Scalds, animal tracks, vehicle tracks	50-70	Pedestrian
9 (MLA)	Sandplain, dune	Belah, Bluebush, Mallee	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
10 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
11 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
12 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
13 (MLA)	Sandplain, dune	Bluebush, Belah, Rosewood, Wilga	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
14 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
15 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
16 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
17 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
18 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
19 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
20 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
21 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian

Table B-4. Visibility Conditions at the Study Area (Continued)

Survey Unit	Landforms	Vegetation	Exposures	Visibility (%)	Survey Method
22 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
23 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
24 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
25 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
26 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
27 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
28 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks, gullies	50-70	Pedestrian
29 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks, gullies	50-70	Pedestrian
30 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks, gullies	40-60	Pedestrian
31 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
32 (MLA)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
33 (MLA	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
34 (MLA)	Sandplain, dune, depression	Belah, Mallee, Bluebush	Scalds, animal tracks, vehicle tracks, gullies	50-70	Pedestrian
35 (ETL)	Sandplain, dune	Belah, Rosewood, Wilga, Bluebush	Scalds, animal tracks, vehicle tracks	40-60	Pedestrian
36 (HAR)	Sandplain, dune	Hopbush, Bluebush, grassland	Scalds, animal tracks, vehicle tracks	60-70	Pedestrian

Figure B-10. Belah Low-Open Woodland Community within the Study Area Showing the Typically High Levels of Ground Surface Visibility

B5.5.2 Coverage analysis

Coverage analysis is a useful measurement to allow cultural resource managers to assess surveys from adjacent areas and it also allows some meaningful calculation of the actual sample size surveyed. The *actual* or *effective* area surveyed by a study depends on the conditions of ground surface visibility. Conditions of surface visibility are affected by vegetation cover, geomorphic processes such as sedimentation and erosion rates and the abundance of natural rock that may obscure the remains of cultural activities (Table B-5).

Table B-5. Effective Coverage of the Study Area

Survey Unit	Dimensions (m)	Area (10^3 m^2)	Visibility (%)	Coverage		Effective Coverage		Sites
				(10^3 m^2)	(% area)	(10^3 m^2)	(%)	
1 (MLA)	1,500 x 1,500	2,250	40-60	720	32	432	19	2
2 (MLA)	1,200 x 200	240	50-70	38	16	23	10	-
3 (MLA)	1,200 x 200	240	50-70	38	16	23	10	1
4 (MLA)	2,000 x 200	400	40-60	64	16	38	10	-
5 (MLA)	2,000 x 200	400	40-60	64	16	38	10	2
6 (MLA)	1,500 x 1,300	1,950	40-60	624	32	374	19	2
7 (MLA)	1,600 x 200	320	50-70	51	16	31	10	-
8 (MLA)	1,600 x 200	320	50-70	51	16	31	10	-
9 (MLA)	2,200 x 200	440	40-60	70	16	42	10	-
10 (MLA)	2,200 x 200	440	40-60	70	16	42	10	-
11 (MLA)	2,200 x 200	440	40-60	70	16	42	10	-
12 (MLA)	2,200 x 200	440	40-60	70	16	42	10	-
13 (MLA)	2,200 x 200	440	40-60	70	16	42	10	-
14 (MLA)	3,400 x 200	680	40-60	109	16	65	10	-
15 (MLA)	3,400 x 200	680	40-60	109	16	65	10	-
16 (MLA)	400 x 200	80	40-60	13	16	8	10	-
17 (MLA)	600 x 200	120	40-60	19	16	12	10	-
18 (MLA)	800 x 200	160	40-60	26	16	15	10	-
19 (MLA)	1,000 x 200	200	40-60	32	16	19	10	-
20 (MLA)	1,000 x 200	200	40-60	32	16	19	10	-
21 (MLA)	1,000 x 200	200	40-60	32	16	19	10	-
22 (MLA)	1,000 x 200	200	40-60	32	16	19	10	-
23 (MLA)	500 x 200	100	40-60	16	16	10	10	-
24 (MLA)	3,500 x 200	700	40-60	112	16	67	10	-
25 (MLA)	3,500 x 200	700	40-60	112	16	67	10	1
26 (MLA)	1,700 x 200	340	40-60	51	16	31	10	-
27 (MLA)	1,500 x 200	300	40-60	48	16	29	10	-
28 (MLA)	1,300 x 200	260	50-70	42	16	25	10	-
29 (MLA)	1,100 x 200	220	50-70	35	16	21	10	-
30 (MLA)	800 x 200	160	40-60	26	16	15	10	-
31 (MLA)	600 x 200	120	40-60	19	16	12	10	-
32 (MLA)	400 x 200	80	40-60	13	16	8	10	-
33 (MLA)	200 x 200	40	40-60	6	16	4	10	-
34 (MLA)	2,500 x 1,500	3,750	50-70	1,200	32	720	19	15
35 (ETL)	10,000 x 100	1,000	40-60	240	24	144	14	-
36 (HAR)	1,000 x 100	1,00	60-70	24	24	14	14	-
Total		**18,690**	**-**	**4,350**	**21.6**	**2,610**	**13.0**	**23**

Approximately 22% of the surface area of the Snapper Mine MLA area and ETL and HAR corridors was inspected on foot, with an effective coverage of 13% (Table B-5). This is considered to be a relatively high coverage and was a result of the generally intensive nature of the survey and the excellent conditions of surface visibility.

B5.6 Survey Results

B5.6.1 Aboriginal Heritage Sites

Twenty-two Aboriginal archaeological sites (SN01—22) (Figures B-11, B-12) were identified within the study area during the survey. These sites are:

- SN01, SN11 – quarried silicified and ferruginized sandstone cobbles with associated silcrete artefacts located in sandplains at the southern end of the Snapper Mine MLA area.
- SN02 – scatter of silcrete, chert and quartz artefacts with two associated *in situ* hearths of baked clay heat retainers adjacent to a small ephemeral depression at the northern end of the Snapper Mine MLA area.
- SN03, SN05 – isolated finds of a silcrete scraper and fragment of a quartzite pestle/hammerstone at the northern end of the Snapper Mine MLA area.
- SN04, SN06 – scattered baked clay heat retainers from eroded hearths at the northern end of the Snapper Mine MLA area.
- SN07 – scatter of silcrete and quartz artefacts with associated scattered calcrete hearthstones at the northern end of the Snapper Mine MLA area.
- SN08, SN10, SN12, SN13, SN14, SN15, SN17, SN18, SN19, SN21 - scatters of silcrete artefacts at the southern end of the Snapper Mine MLA area.
- SN09, SN16 - isolated finds of silcrete artefacts at the southern end of the Snapper Mine MLA area.
- SN20, SN22 – quarried silcrete outcrops with associated scatters of silcrete artefacts at the southern end of the Snapper Mine MLA area.

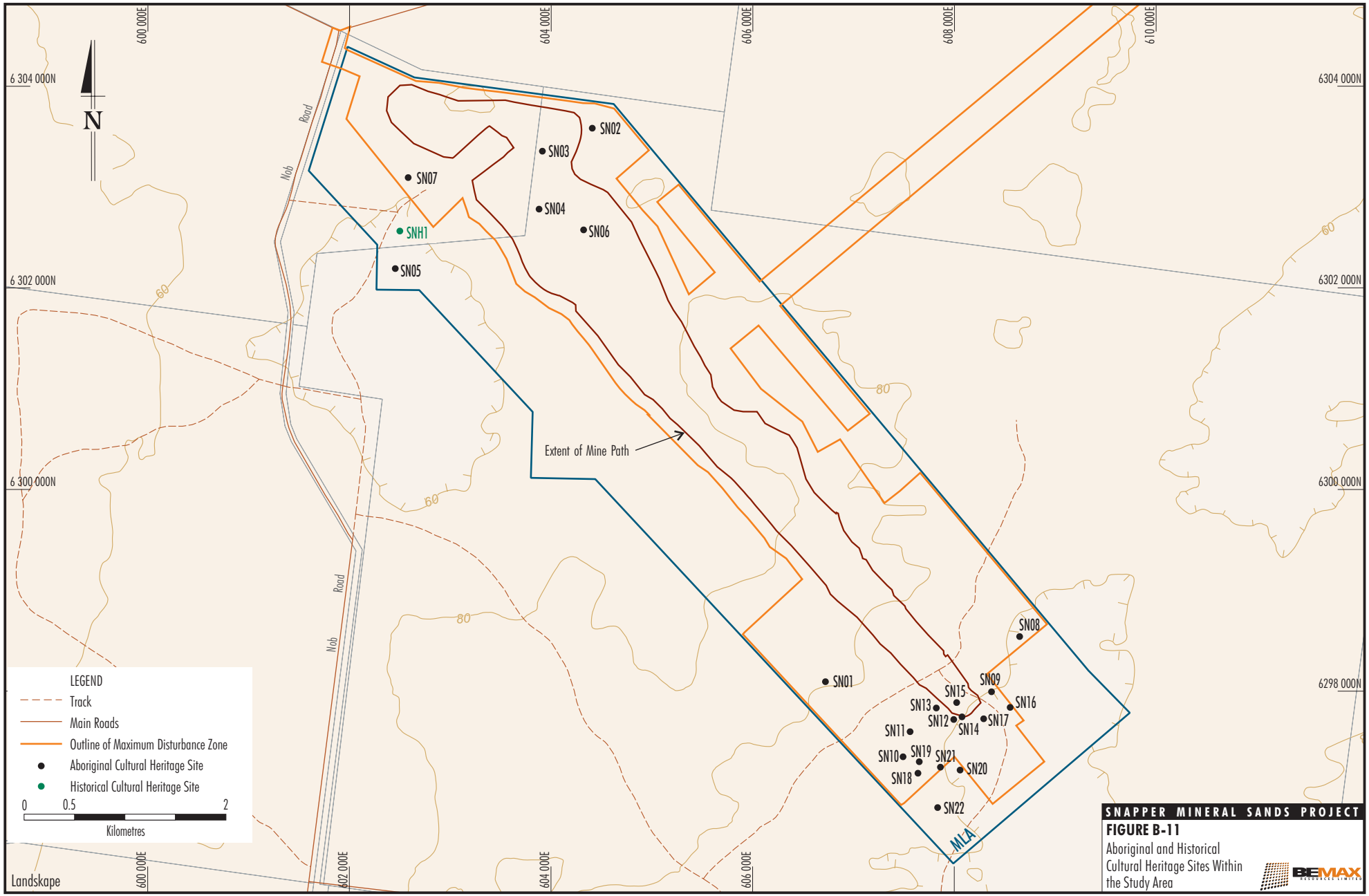
A summary of these sites is presented in Table B-6. A more detailed description of the sites is included in Attachment BF.

B5.6.2 Historical Heritage Site

One historical heritage site (SNH1) is located in the Snapper Mine MLA area (Figures B-11, B-12). This is “Kertne Nob” outstation and stockyard ruin.

The historical ruin of “Kertne Nob” outstation is located within Lot 1927/DP763905 of “Carstairs” Station adjacent to an earthen tank. The historic heritage site consists of a ~100 x 100 m area that once contained timber stockyards and a nearby area where station workers have camped. Physical remains of these activities include a timber frame that would have supported a canvas tent and scattered domestic refuse including glass bottles, broken bottle glass, burnt animal bone and food cans. All that remains of the stockyards are the timber bases of the posts and wrought iron braces and heavy gauge wire originally used to fix the rails.

Table B-7 contains a summary of the historical heritage site. Attachment BG provides a more detailed description of the site.



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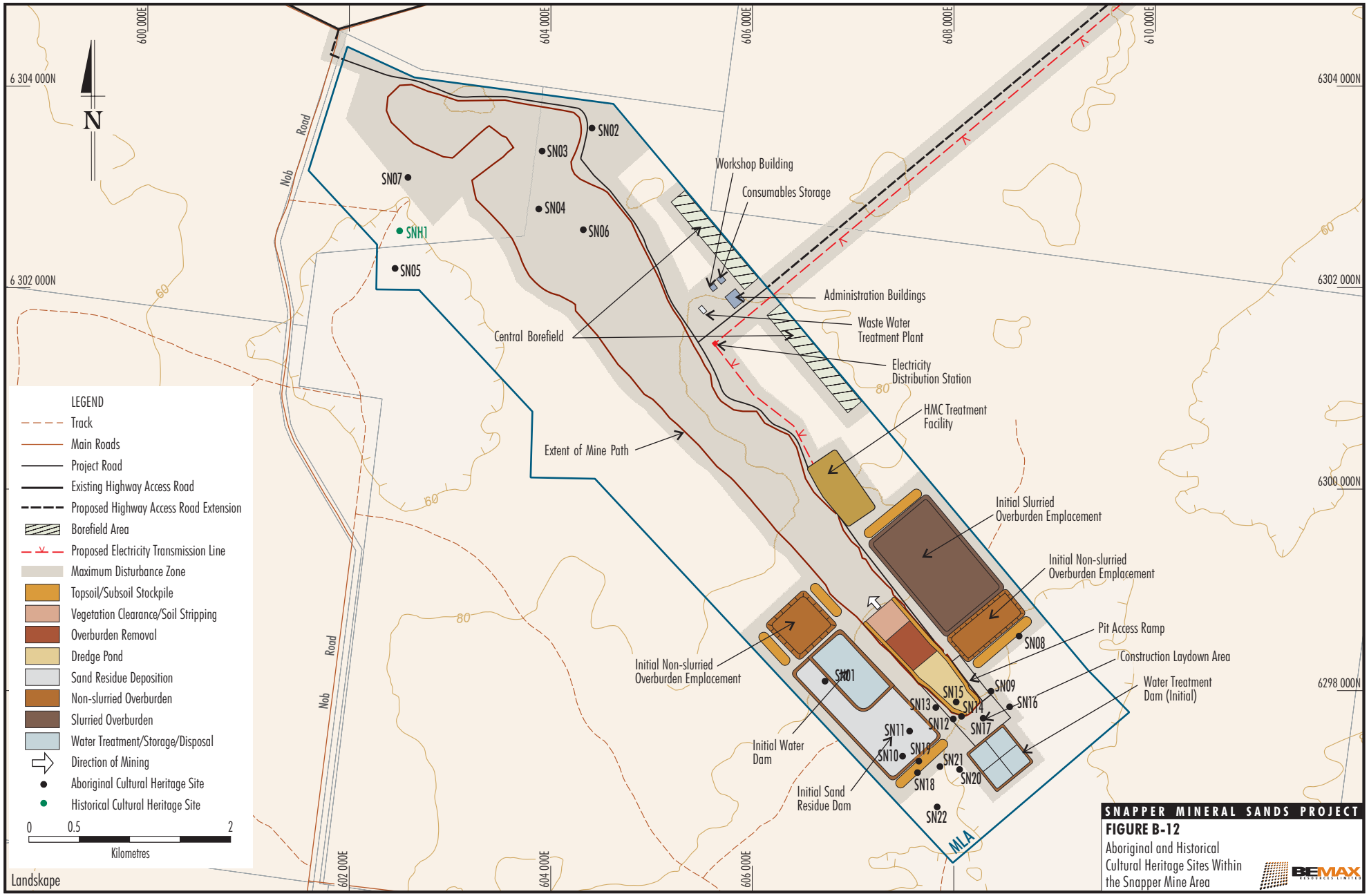

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Table B-6. Summary Data of the Aboriginal Archaeological Sites in the Study Area

Site Name	Type	Location GDA (mE)	Location GDA (mN)	Site Dimensions (m)	Landform	Contents
SN01	Stone quarry, stone artefact scatter	606719	6298095	150 x 150	Sandplain	1,000s silicified and ferruginized sandstone cobbles, 50 silcrete artefacts
SN02	Stone artefact scatter, hearth	604405	6303587	20 x 20	Sandplain	8 silcrete, 2 chert, 1 quartz artefacts, 2 *in situ* baked clay heat retainer hearths
SN03	Stone artefact	603910	6303359	na	Sandplain	1 silcrete stone artefact
SN04	Hearth	603877	6302784	2 x 2	Sandplain	Scattered baked clay heat retainers
SN05	Stone artefact	602450	6302194	na	Sandplain	1 quartzite stone artefact
SN06	Hearth	604319	6302578	10 x 10	Sandplain	Scattered baked clay heat retainers
SN07	Stone artefact scatter, hearth	602578	6303097	10 x 10	Sandplain	1 silcrete, 1 quartz artefacts, scattered calcrete hearthstones
SN08	Stone artefact scatter	608646	6298543	25 x 25	Sandplain	14 silcrete artefacts
SN09	Stone artefacts	608367	6297995	10 x 10	Sandplain	2 silcrete artefacts
SN10	Stone artefact scatter	607489	6297350	100 x 100	Sandplain	9 silcrete artefacts
SN11	Stone quarry, stone artefact scatter	607559	6297599	300 x 300	Sandplain	1,000s silicified and ferruginized sandstone cobbles, 24 silcrete artefacts
SN12	Stone artefact scatter	607992	6297720	75 x 75	Sandplain	15 silcrete artefacts
SN13	Stone artefact scatter	607819	6297834	50 x 50	Sandplain	7 silcrete artefacts
SN14	Stone artefact scatter	608074	6297746	100 x 100	Sandplain	45 silcrete artefacts
SN15	Stone artefact scatter	608021	6297888	100 x 100	Sandplain	12 silcrete artefacts
SN16	Stone artefacts	608552	6297840	50 x 50	Sandplain	3 silcrete artefacts
SN17	Stone artefact scatter	608289	6297727	100 x100	Sandplain	7 silcrete artefacts
SN18	Stone artefact scatter	607637	6297187	100 x 100	Sandplain	87 silcrete artefacts
SN19	Stone artefact scatter	607650	6297301	100 x 100	Sandplain	69 silcrete artefacts
SN20	Stone quarry, stone artefact scatter	608055	6297218	200 x 200	Sandplain	Silcrete outcrops, 1,000s silcrete cobbles, 92 silcrete artefacts
SN21	Stone artefact scatter	607860	6297247	200 x 200	Sandplain	38 silcrete artifacts
SN22	Stone quarry, stone artefact scatter	607833	6296849	400 x 400	Sandplain	Silcrete outcrops, 1,000s silcrete cobbles, 500+ silcrete artefacts

Table B7. Summary Data of the Historical Heritage Site in the Study Area

Site name	Location GDA (mE)	Location GDA (mN)	Description
Kertne Nob outstation and stockyard ruin (SNH1)	602500	6302569	Un-sawn timber bases of stockyard posts, un-sawn timber tent frame, scattered glass bottles and broken bottle glass, burnt animal bones, steel and iron refuse including vacuum oil drums, food cans and wrought fencing components.

B6 Cultural Heritage Values

B6.1 Aboriginal Cultural Heritage Significance

The significance of Aboriginal archaeological sites such as those found during this study are usually assessed in terms of their importance to archaeologists (i.e. their scientific or research significance), their importance to contemporary Aboriginal people and their importance to the general public. Once the significance of a site has been assessed it can be ranked against others and specific recommendations formulated. Criteria for assessing scientific significance are set out below. The values used in this assessment have been the subject of some discussion in the archaeological literature and the information provided is drawn from a number of sources (e.g. Bowdler, 1983).

A summary of the archaeological significance assessments of the sites is presented in Table B-8.

Table B-8. Assessments of Significance of the Aboriginal Archaeological Sites

Site Name	Type	Scientific Significance				Aboriginal Significance	Educational Significance	Summary Significance
		Integrity	Structure	Contents	Rarity			
SN01	Stone quarry, stone artefact scatter	Moderate	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN02	Stone artefact scatter, hearth	Moderate	Moderate	Moderate	Low	Low	Low	Low–moderate (Local/regional)
SN03	Stone artefact	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN04	Hearth	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN05	Stone artefact	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN06	Hearth	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN07	Stone artefact scatter, hearth	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN08	Stone artefact scatter	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN09	Stone artefacts	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN10	Stone artefact scatter	Moderate	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN11	Stone quarry, stone artefact scatter	Moderate	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN12	Stone artefact scatter	Low	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN13	Stone artefact scatter	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN14	Stone artefact scatter	Low	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN15	Stone artefact scatter	Low	Moderate	Low	Low	Low	Low	Low–moderate (Local/regional)
SN16	Stone artefacts	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN17	Stone artefact scatter	Low	Low	Low	Low	Low	Low	Low (Local/regional)
SN18	Stone artefact scatter	Moderate	Moderate	Moderate	Low	Low	Low	Low–moderate (Local/regional)
SN19	Stone artefact scatter	Moderate	Moderate	Moderate	Low	Low	Low	Low–moderate (Local/regional)
SN20	Stone quarry, stone artefact scatter	Moderate	High	Moderate	Moderate	Moderate	Low	Moderate-high (Local/regional)
SN21	Stone artefact scatter	Low	Moderate	Low	Low	Low	Low	Low-Moderate (Local/regional)
SN22	Stone quarry, stone artefact scatter	Moderate	High	Moderate	Moderate	Moderate	Low	Moderate-high (Local/regional)

B6.1.1 Scientific Significance

A number of criteria are used to assess the scientific significance of a site. These include the integrity of a site, its structure and contents. All of these criteria combine to give a site its value as a research tool for archaeologists. In addition to the above criteria a site may also be of scientific significance because of its representativeness or rarity. It is a basic tenet of archaeology that any site which is not represented elsewhere is of great value because archaeologists are concerned with preserving a representative sample of all site types for future generations.

Site Integrity

Site integrity refers to its state of preservation or condition. A site can be disturbed through a number of factors including natural erosional processes, destructive landuse practices or repeated use of a site in the past by both humans and animals.

low	highly disturbed or poorly preserved with little research potential.
moderate	some disturbance but remaining cultural material allows for some research potential.
high	little or no disturbance to site, good preservation and considerable research potential.

In terms of site integrity the sites located during this survey would rate moderate to low. This assessment is based on the degree of disturbance noted during the investigation. Most of the scatters of stone artefacts and hearths have been disturbed by repeated traffic of hoofed animals such as domestic sheep and feral goats, coupled with erosion by wind and water.

Site Structure

Site structure refers to the physical dimensions of a site (i.e. its area and depth or stratification). A large site or a site with stratified deposits usually has more research potential than a small site or surface scatter. In some instances, however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal.

low	small surface scatters with no stratified deposit.
moderate	medium to large surface scatters with or without stratification.
high	large *in situ* surface scatters, any site with stratified deposit.

The isolated finds rate low according to the site structure criterion. The scattered heat retaining stones from hearths also lack stratification. Site SN02 has two *in situ* hearths that may have stratified materials. Most of the stone artefact scatters are medium in size and have a moderate site structure. Stone quarries SN20 and SN22 have large associated scatters of stone artefacts and *in situ* silcrete outcrops and rate highly. The surfaces of all these sites are degrading and most artefacts form a lag deposit on deflated surfaces.

Site Contents

Site contents refers to the range and type of occupation debris found in a site. Generally, sites that contain a large and varied amount of organic and non-organic material are considered to have greater research potential than those sites with small, uniform artefacts.

low	small amount and low diversity of cultural material.
moderate	medium amount and diversity of cultural material.
high	large and diverse amount of cultural material.

The original cultural materials of the sites recorded during the survey have been exposed to weathering. Although typically only stone artefacts and heat retainers remain, charcoal may be preserved in the intact hearths at site SN02. Stone artefacts are overwhelmingly composed of locally derived silcrete, although five quartz, chert and quartzite artefacts were also recorded (sites SN02, SN05, SN07). Formal tool types are not prevalent, but include scrapers and groundstone implements. Unmodified flakes and cores dominate the stone artefact assemblages. Artefact density at these sites is typically relatively low.

Most of the stone artefact scatters and stone quarries rate moderate by the site contents criterion. The isolated finds of stone artefacts (SN03, SN05) and scattered heat retaining stones (SN04, SN06) from hearths rate low.

Site Representativeness and Rarity

Representativeness or rarity refers to how often a particular site type occurs in an area and requires some knowledge of the background archaeology of the area in which the study is being undertaken. Sites that are representative of the local and regional archaeological record may have value for that reason and if a site is rare or unique in some way then it is *ipso facto* significant (Bowdler, 1983).

low	many of the same site type occurring in a single area or region.
moderate	site type occurs elsewhere but not in great quantity or with good preservation.
high	site type is rare or unique.

On the basis of the results of previous archaeological investigations (e.g. Bonhomme Craib and Associates, 1999; Witter, 2001; Cupper, 2003a) and information held on the DEC AHIMS Site Register it is clear that stone artefact scatters, hearths and isolated finds of stone artefacts are widespread in the region. These types of archaeological sites located during this study are therefore not unique and are well represented outside the study area. Silcrete outcrops exploited for stone artefact manufacture are not common in the region, so sites SN20 and SN22 rate moderate.

B6.1.2 Aboriginal Significance

The significance of a site is not restricted to its scientific or research value. The views of Aboriginal people on the significance of archaeological sites are also important. Their perceptions usually stem from traditional, cultural and educational beliefs although most local Aboriginal communities also value the scientific information that archaeological sites may be able to provide.

Archaeological sites provide connections to the past for the present Aboriginal community and for future generations. Aboriginal cultural heritage sites such as those identified during this survey can also provide information about past lifestyles and strengthen the links between Aboriginal people and the land.

The level of significance attributed to individual sites may vary according to a number of factors including the nature and integrity of the heritage items and the landscape in which the site is located. The views of the Aboriginal representatives involved in the field survey and community field inspections and discussion forums are considered to be indicative of Aboriginal community attitudes.

Generally, the Aboriginal community view all archaeological sites as significant because they preserve a record of how and where people lived in the past. Such cultural heritage sites also stand as testimony to the continuation of Aboriginal culture and association with the land. However, the Aboriginal community representatives involved in this assessment did not have high spiritual, traditional, historical or contemporary associations with the archaeological sites identified in the study area.

The stone quarry and associated stone artefact scatter sites SN20 and SN22 were the highest regarded cultural heritage sites in the study area. The Aboriginal community representatives valued these sites in particular because the silcrete outcrops were a source of raw materials to past Aboriginal occupants of the study area in a landscape where such lithic sources are not abundant.

B6.1.3 Educational Significance

The value of archaeological sites to the general public is generally assessed by their potential to educate the public about the Aboriginal past. The sites rank low by this criterion. They are isolated and unlikely to attract particular interest in Aboriginal heritage.

B6.2 Historical Cultural Heritage Significance

The criteria used to assess the significance of historical heritage places and items are similar to those used to evaluate Aboriginal archaeological sites. This includes assessing their scientific, social and aesthetic values (Pearson and Sullivan, 1995). However, in addition to these criteria, historical cultural heritage sites are also assessed in the context of their importance in the course of history, or their association with important people or events in history.

A summary of the significance assessments of the historical heritage site is presented in Table B-9.

Table B-9. Assessment of Significance of the Historical Heritage Site

Site name	Significance					
	Historical	Historical association	Social	Aesthetic	Scientific	Summary
Kertne Nob outstation and stockyard ruin	Low (Local/regional)	Low (Local/regional)	Moderate (Local/regional)	Low (Local/regional)	Low-moderate (Local/regional)	Low-moderate (Local/regional)

B6.2.1 Historical Significance

Historical Significance

The historical significance of a cultural heritage site is defined as its level of importance in the course or pattern of the local, regional, state or national cultural history.

"Kertne Nob" outstation and stockyard ruin ranks low by this criterion. Even at a local level, the historical value of the site does not rate highly.

Historical Association Significance

The historical association significance criterion is based on the degree of association of the site with the life or works of a person, or group of persons, of importance in local, regional, state or national cultural history.

The "Kertne Nob" outstation and stockyard ruin has low local significance according to the historical association criterion. The present landholder of "Carstairs" Station advised that the Wakefield family might have established the outstation and stockyard sometime after the 1920s to aid in pastoral management because Lot 1927/DP763905 was some distance from the main "Carstairs" homestead (G. Cullinan, pers. comm., 22 October 2006).

B6.2.2 Aesthetic Significance

This significance criterion assesses the relative importance of a cultural heritage site in demonstrating aesthetic characteristics and/or creative or technical achievement at a local, regional, state or national level.

"Kertne Nob" outstation and stockyard ruin has negligible aesthetic value because it is a very subdued feature in the landscape.

B6.2.3 Social Significance

The social significance of a site is based on whether it has a strong or special association with a particular community or cultural group at a local, regional, state or national level for social, cultural or spiritual reasons.

"Kertne Nob" outstation and stockyard ruin has moderate local social significance as an example of the interaction of pastoral and domestic life associated with a period of closer settlement in the early twentieth century.

B6.2.4 Scientific Significance

Technical/Research Significance

The technical/research significance criterion involves assessing the potential of a cultural heritage site to yield information that would contribute to an understanding of local, regional, state or national cultural history.

"Kertne Nob" outstation and stockyard ruin has moderate technical and research significance. In particular, an analysis of the refuse heaps at the site may offer some insight into domestic and pastoral activities at a remote outstation during the early to mid-twentieth century.

Rarity and Representativeness

This assessment item is based on whether a site possesses uncommon, rare or endangered aspects of cultural history. The representativeness of a cultural heritage site is assessed on its relative importance in demonstrating the principal characteristics of a class of local, regional, state or national cultural places or cultural environments.

"Kertne Nob" outstation and stockyard ruin is an example of a relatively abundant site type. There are better preserved and more original examples of rural outstations in the region.

B6.3 Aboriginal Cultural Landscape

Scientific information collected from the Aboriginal archaeological sites identified during this assessment, combined with social and cultural information provided by contemporary Aboriginal people and the ethno-historical record, allows interpretation of the Aboriginal cultural landscape of the study area, provided in the following sections.

B6.3.1 Summary of the Archaeological Record

The material culture of past Aboriginal occupants of the study area consists of small, non-stratified open habitation sites and larger exploited stone sources. Archaeological resources at the open occupation areas comprise stone artefact assemblages and hearths. The artefact assemblages are predominantly composed of small numbers of silcrete waste flakes, cores and nuclear tools and amorphous material. This archaeology is largely restricted to the margins of small ephemeral water sources.

Silcrete outcrops have been quarried for stone to manufacture lithic artefacts at several locations in the study area. These sites contain a greater abundance of archaeological materials and are larger than the open habitation sites but the assemblages are relatively undistinguished, lacking formal stone tools, imported stone material, organic remains or hearths.

B6.3.2 Aboriginal Settlement Patterns

The location of freshwater sources would have been the main controlling factor of Aboriginal occupation of the study area. Humans carry out most of their activities close to freshwater, rarely straying far from reliable water sources (see Gould, 1969, 1980; Allen, 1974; Jochim, 1976; Veth, 1987; Smith, 1989; Mitchell, 1990; McNiven, 1998). They also prefer larger or more persistent water sources to smaller, ephemeral water bodies. As well as the obvious abundance of aquatic molluscs, fish and birds at large, permanent water sources, mammals such as macropods that were hunted for protein and skins are also limited by water availability.

All of the Aboriginal archaeological sites identified during the survey were within 500 to 1,000 m of areas that are likely to retain surface water for some days (or perhaps weeks) after heavy rainfall events. Peak occupation of the dunefields and sandplains is likely to have corresponded to when these transient supplies were available. Water could also be procured all year round in the dunefields and sandplains from the roots of some tall shrubs that grow in the study area such as Dumosa Mallee (*Eucalyptus dumosa*) or Silver Needlewood (*Hakea leucoptera*), or carried using skin bags (Hardy, 1969, 1976; Coutts, 1977; Gott, 1998), but such activities necessitated the expenditure of substantial time and energy and were probably not favoured.

B6.3.3 Aboriginal Subsistence Strategies

Hunter-fisher-gatherers obtain the resources necessary for life by foraging and collecting subsistence strategies. Foragers gather food as it is encountered, regularly moving between resource zones and rarely storing food (Binford, 1980, 1989). Collectors, alternatively, adopt a logistical strategy for procuring resources. They often rely on stores of food and may maintain base camps, with smaller groups dispersing to collect resources. Foraging and collecting are two end-members of a subsistence continuum, with most hunter-fisher-gatherer societies engaging in a combination of both strategies (Yellen, 1977; Binford, 1980, 1989; Renfrew and Bahn, 1991).

Sites occupied by hunter-fisher-gatherer people may reflect these strategies (Binford, 1980; Foley, 1981). For example, base camps were generally occupied for long periods of the year and were used for a range of domestic and industrial activities. Alternatively, base camps may have been intensively used for part of the year, acting as congregative focal points. Temporary field camps were dispersive sites, created when groups charged with carrying out a specific task journeyed beyond the daily foraging radius.

The frequency of site occupation can sometimes be determined from their contents and structure. Residential base campsites, occupied over relatively long periods of time, tend to have a more complex structure than short-term campsites. Base camps may contain evidence of a wide variety of activities associated with daily habitation. Short-term sites were probably only occupied for a specific reason, such as to collect a particular resource. These usually display evidence of being occupied only once or twice, and are often smaller, with fewer and less diverse archaeological remains.

It is probable that the Aborigines who occupied the study area were hunter-fisher-gatherers employing both foraging and collecting subsistence strategies. These people would have dispersed from the riverine corridors of the Darling and Great Anabranch of the Darling River to exploit ephemeral resources of the backcountry during favourable climatic conditions, as invoked in the subsistence model of Allen (1974). Only a small area was investigated in a heterogeneous landscape, but it is probable that the archaeological record reflects the occupation of the dunefields and sandplains by small, mobile bands.

The archaeology of the study area probably derives both from temporary habitation sites used by small groups during the period of winter dispersal and temporary field camps used by small groups engaging in specific tasks such as procuring lithic resources. This is because the dunefields and sandplains seasonally supported food plants and animals and also contained mineral outcrops exploited for utilitarian purposes.

Plant resources in the study area that could have been harvested by winter foragers include seeds and fruits from Nitrebush (*Nitraria billardieri*) and Saltbush (*Atriplex* spp.) (Coutts, 1977; Latz, 1995; Gott, 1998). If inundated by surface water, several of the closed-drainage depressions could have become havens for birds such as wading species, which may have been hunted. Ephemeral water sources would have also attracted macropods.

The most obvious specialized task in the study area is the exploitation of silcrete that outcrops at several locations. These outcrops are probably part of the Karoonda Surface, a pedogenic weathering profile that has developed at the top of the Pliocene Loxton-Parilla Sands (Brown and Stephenson, 1991). The silcrete is a massive type, with the outcrops consisting of pillowy or lobate lenses, with a botryoidal morphology on their exposed surfaces. The outcrops are approximately level with the present land surface, with fractured cobbles and boulders protruding along the lengths of the lenses. The silcrete ranges in colour from white-grey to burnt red and purple, with yellowish-buff colours predominating.

Debris from block reduction is diagnostic of the silcrete having been exploited as a lithic source. Several stone artefact assemblages found adjacent to the sone quarries probably represent work areas where further reduction took place. The silcrete is of a relatively coarse-grained type and in places is more akin to silicified sandstone or ironstone. This stone is brittle and would have been difficult to work into sharp edges, partly explaining the relative coarseness of the stone artefact assemblages. This has been noted elsewhere in south-western NSW; for example, Allen (1990, 1998) has used the abundance of silcrete from nearby outcrops to explain the apparent lack of formal or refined artefacts in assemblages from the Willandra Lakes.

The paucity of formal implement types, sparse evidence of use-wear and retouch, predominance of only one lithic material (locally-derived silcrete), along with the lack of clear evidence of domestic archaeological components such as hearths, suggest that Aboriginal people only visited the stone quarries and associated stone artefact scatter sites for brief periods.

B6.3.4 Synthesis

Aboriginal people probably occupied the study area following the stabilization of the regional dunefields after the end of the last Ice Age some 18,000 years ago. Most of the Aboriginal archaeological record of the study area is probably terminal Pleistocene (18,000 to 11,500 years ago) and Holocene (past 11,500 years) in age. The lack of reliable sources of water in the sandplains and dunefields would have made the study area unattractive for prolonged or regular habitation.

Small, non-stratified stone artefact scatters with occasional hearths probably represent temporary occupation sites. Small, mobile groups periodically journeying into the backcountry from the rivers and lakes to forage for food resources may have occupied these camps for brief durations. Aboriginal people may have exploited silcrete quarries in the study area during planned collection trips, because stone sources are not widespread in the Lower Darling region. There is no clear evidence of habitation such as hearths at the stone source sites.

Foraging and collecting subsistence strategies are somewhat artificial divisions, and these tactics undoubtedly overlapped. The people primarily tasked with collecting stone resources are likely to have also engaged in domestic activities. Foragers probably exploited the stone outcrops.

B7 Potential Impacts of the Snapper Mine on Cultural Heritage

The potential impacts of the Snapper Mine on the Aboriginal and historical cultural heritage of the Snapper Mine area include both direct and indirect impacts. Potential negative direct impacts include those resulting from mining and associated activities and include the destruction of sites via the removal of the soil and substrate. The potential for indirect impacts would occur at some sites that are proximal to the Snapper Mine disturbance area and could include physical affects (e.g. dust deposition) or aesthetic affects.

A discussion of Snapper Mine impacts can best be discussed by separating the cultural heritage sites according to the potential for direct and indirect impact. This has been done by recognising two main zones:

- the Snapper Mine disturbance area (i.e. the maximum disturbance zone, as described in Section B1.1) where direct impacts are associated with the dredge pond and related infrastructure, including the HAR and ETL corridors; and
- outside the Snapper Mine disturbance area, where cultural heritage sites may potentially be subject to indirect impacts due to proximity.

B7.1 Potential Direct and Indirect Impacts on Cultural Heritage Values

The mining operation would disturb the current land surface and the archaeological material associated with the affected landforms (including archaeological material that may occur in the soil profile that has not been identified during the site survey) and substrate and landscape context.

These impacts on archaeological values fall into three categories:

- the loss of information which could otherwise be gained by conducting research today;
- the loss of the archaeological resource for future research using methods and addressing questions not available today; and
- the permanent loss of the physical record.

These impacts can be mitigated to various degrees, depending on the nature and significance of the site. Where sites are of low significance, their destruction may have little consequence. This could be due to the lack of useful information that could be gained from research, or the availability of many equivalent and alternative sites for study.

Sites with greater significance may be the subject of archaeological investigation prior to their disturbance. This allows for the salvage of information, and the recovery of a sample of artefactual materials according to current methods and research priorities. Sites and site groupings that are common elsewhere may not require the same degree of salvage attention as those which are rare, of high significance, and subject to active deterioration.

In areas where the Snapper Mine works do not involve significant earthmoving, (e.g. construction of fencing) impacts may be limited to minor surface disturbance, limited disturbance of the associated substrates or landforms and no significant alteration of the landscape context.

Salvage investigations can provide for the discovery of new knowledge about the Aboriginal occupation of an area. Despite the loss of physical evidence involved, the information gained can in turn aid the interpretation and better management of the remaining archaeological resource.

Potential indirect impacts to archaeological sites could include the following:

- deposition of dust generated by mining;
- accidental disturbance by peripheral activities; and
- inappropriate visitation.

B7.2 Cultural Heritage Potentially Impacted by the Snapper Mine

Table B-10 presents summaries of the different cultural heritage significance categories relative to the two zones of potential Snapper Mine impact.

Table B-10. Significance Categories in Relation to the Two Zones of Potential Impact

Significance Rating	Sites Within the Maximum Disturbance Zone (SN01, SN02, SN03, SN04, SN06, SN07, SN08, SN09, SN10, SN11, SN12, SN13, SN14, SN15, SN16, SN17, SN18, SN19, SN21)		Sites Outside the Maximum Disturbance Zone (SN05, SN20, SN22, SNH1)		Total	
	No.	%	No.	%	No.	%
Low	9	47	1	25	9	39
Low to moderate	10	53	1	25	12	52
Moderate to high	0	0	2	50	2	9
Total	19	100	4	100	23	100
% of all sites	**86**		**14**		**100**	

B7.2.1 Cultural Heritage Within the Snapper Mine Disturbance Area

Nineteen cultural heritage sites (86% of all cultural heritage sites) identified during the survey are located within the Snapper Mine disturbance area and would be subject to direct disturbance during the life of the Snapper Mine.

Ten cultural heritage sites of low to moderate significance occur within the Snapper Mine disturbance area. These sites include stone artefact scatters (SN10, SN12, SN14, SN15, SN18, SN19, SN21), stone quarries with associated stone artefact scatters (SN01, SN11) and a stone artefact scatter with associated hearths (SN02). Nine cultural heritage sites of low significance occur within the Snapper Mine disturbance area, including stone artefact scatters (SN08, SN13, SN17), isolated finds of stone artefacts (SN03, SN09, SN16), scattered baked clay heat retainer hearths (SN04, SN06) and a stone artefact scatter with associated scattered hearthstones (SN07).

B7.2.2 Cultural Heritage Outside the Snapper Mine Disturbance Area

Four cultural heritage sites (14% of all cultural heritage sites) occur outside the Snapper Mine disturbance area. Two cultural heritage sites are of moderate to high significance, one is of low to moderate significance, and one is of low significance. The moderately to highly rated sites are stone quarries with associated stone artefact scatters (SN20, SN22). Historical heritage site SNH1 is of low to moderate significance. The site of low significance is an isolated find of a stone artefact (SN05). None of these cultural heritage sites would be subject to direct impacts but would be subject to potential indirect impacts in the absence of an effective programme of proactive management.

Cultural heritage sites that occur outside the Snapper Mine disturbance area have a potential risk of indirect impacts from dust deposition, peripheral activities and inappropriate visitation. The nature and extent of this risk varies with site type and distance from the Snapper Mine disturbance area. For example, inappropriate visitation and its effects may potentially impact sites outside the Snapper Mine disturbance area. Sites within the line of sight from staff areas are most likely to be at risk from these forms of impact.

Careful management of the potential risks posed by indirect impacts can be effectively mitigated through effective management (Section B8).

B7.3 Flexibility of the Snapper Mine Design

The dredge pond would be an open excavation that advances along the orebody. The extent of the mine path would be constrained by the location of the orebody. The area around the mine path may allow some flexibility whereby areas could be partitioned off for protection to prevent indirect disturbance.

The locations of the infrastructure such as the initial overburden emplacements, initial water and sand residue dams, initial water treatment dam, HMC treatment facility, borefields, workshop and administration buildings are currently within their optimum design locations, offering limited opportunity to avoid cultural heritage sites within these locations.

The HAR and ETL corridors are preferred routes, which have been established in consultation with landholders and with regard to practical infrastructure extension/sharing with the Ginkgo Mine. There may be some flexibility in the design of these routes to allow minor deviations to avoid potential impacts, should any cultural heritage sites be identified along the disturbance corridors during detailed design and/or construction.

B8 Management Strategies for Cultural Heritage

This section presents proposed strategies for the management of cultural heritage values within the Snapper Mine area that may be subject to direct or indirect impacts by the Snapper Mine.

B8.1 General Recommendations

B8.1.1 Aboriginal Cultural Heritage Management Plan

Given that works associated with the Snapper Mine would occur across an approximate 16 year period, it is proposed to implement the various management programmes progressively. The optimal means of co-ordinating and implementing the proposed management strategies is to integrate them into a single programme and document in the form of the Aboriginal Cultural Heritage Management Plan (ACHMP) (similar to the Barkandji Heritage Management Plan already implemented for the Ginkgo Mine). The ACHMP would cover all actions and requirements to be conducted at the Snapper Mine. The ACHMP would remain active for the life of the Snapper Mine and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities. The ACHMP should be developed in consultation with the local Aboriginal community and the DEC.

B8.1.2 Role of the Local Aboriginal Community

BEMAX is committed to involving the local Aboriginal community as an integral participant in the management of Aboriginal cultural heritage values in the Snapper Mine area. The strategies outlined in this report have been developed in parallel with the views of community representatives and the ACHMP would be drafted in consultation with the local Aboriginal community.

The conduct of actions involving the recording, salvage, monitoring, and curation (or replacement) of recovered materials, would occur with the invited participation of local Aboriginal community representatives.

Consideration would also be given to providing employment opportunities to local Aboriginal community members and their organisations.

B8.1.3 Site Management and Cultural Awareness Training

The effective application of the ACHMP and its strategies is dependent on an appreciation of its content and function by on-site staff and employees.

It is proposed to provide training to all on-site personnel regarding the ACHMP strategies and constraints relevant to their employment tasks.

B8.2 Management of Cultural Heritage Within the Snapper Mine Disturbance Area

The locations of mine components that would disturb cultural heritage sites are not flexible (e.g. dredge pond) or relatively inflexible (e.g. infrastructure areas). Engineering constraints mean that these mine components cannot be relocated away from the cultural heritage sites to avoid disturbance. Additionally, any such relocations would not remove threats to the sites from indirect disturbance.

This assessment has concluded that sites SN01—04, SN06—19, SN21 are not of high scientific significance and they do not have high social or cultural values (see section B6.1). Representatives of the local Aboriginal community visited the cultural heritage sites, where options for their management were discussed. Based on the results of these discussions with representatives of the local Aboriginal community, it is recommended that where cultural heritage materials are within the zones of anticipated direct impact from the development, BEMAX should engage a suitably qualified archaeologist and representatives of the local Aboriginal community to record and collect a representative sample of scientifically and culturally significant items from the sites. These items should be properly curated and stored in the ‘Keeping Place’ at BEMAX’s Ginkgo Mine, and replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Examination of the artefacts and their contexts should form an integral part of the recording programme in order to better understand and interpret local and regional patterns of past Aboriginal settlement and resource use. In particular, this could involve investigating lithic technologies and reduction strategies adopted at the Aboriginal cultural heritage sites. *In situ* hearths (i.e. hearths at SN02) should be excavated by a suitably qualified archaeologist and representatives of the local Aboriginal community and dated by radiocarbon and/or luminescence techniques to determine their age. These strategies of information collection would complement the salvage programme.

B8.3 Management of Cultural Heritage Outside the Snapper Mine Disturbance Area

Stone quarries with associated stone artefact scatters SN20 and SN22 would not be directly impacted by the Snapper Mine. However, because these cultural heritage sites are proximal to the Snapper Mine disturbance area, they may be susceptible to indirect impacts caused by dust deposition, peripheral activities and inappropriate visitation. Moreover, the sites are of moderate to high scientific and cultural significance and their protection from disturbance by indirect impacts such as inappropriate visitation would strategically offset the salvage of cultural heritage materials from nearby, less significant sites. Therefore, it is recommended that BEMAX erect temporary barriers around sites SN20 and SN22 and monitor their maintenance during the life of the Snapper Mine and its rehabilitation. BEMAX should also engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers.

BEMAX should similarly avoid disturbing cultural heritage sites SN05 and SNH1 that are located within the Snapper Mine MLA area but outside the disturbance area. If future works occur near these sites, temporary protective barriers should be erected around them to avoid inadvertent disturbance.

B8.4 Site Specific Management Recommendations

Proposed site specific management strategies are detailed in Table B-11 for each of the Aboriginal and historical cultural heritage sites identified during the field survey.

For further management details refer to Attachments BF and BG.

Table B-11. Proposed Site Specific Management Strategies for the Cultural Heritage Sites

Site name	Type	Summary Significance	Potential impacts	Proposed Management Measures
SN01, SN11	Stone quarry, stone artefact scatter	Low-moderate	Direct	Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC. Lithic technologies and reduction strategies adopted at the stone quarry sites and the relationship of these sites to other sites within the disturbance area should be investigated.
SN02	Stone artefact scatter, hearth	Low-moderate	Direct	Stone artefacts and heat retainers should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts and heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC. Hearths should be excavated by an archaeologist and representatives of the local Aboriginal community. Radiocarbon and/or luminescence dating should be used to determine the ages of the hearths.

Table B-11. Proposed Site Specific Management Strategies for the Cultural Heritage Sites (Continued)

Site name	Type	Summary Significance	Potential impacts	Proposed Management Measures
SN03	Stone artefact	Low	Direct	The stone artefact should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefact should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
SN04, SN06	Hearth	Low	Direct	The heat retainers should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
SN05	Stone artefact	Low	Indirect	Avoid disturbing the site, possibly by erecting a temporary protective barrier around it.
SN07	Stone artefact scatter, hearth	Low	Direct	Stone artefacts and heat retainers should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts and heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
SN08,SN13, SN17	Stone artefact scatter	Low	Direct	Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
SN09, SN16	Stone artefacts	Low	Direct	Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
SN10,SN12, SN14, SN15, SN18, SN19, SN21	Stone artefact scatter	Low and Low-moderate	Direct/ indirect	Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Table B-11. Proposed Site Specific Management Strategies for the Cultural Heritage Sites (Continued)

Site name	Type	Summary Significance	Potential impacts	Proposed Management Measures
SN20, SN22	Stone quarry, stone artefact scatter	Moderate-high	Indirect	Temporary protective barriers should be erected around the sites. BEMAX should engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers and monitoring of their maintenance.
SNH1	Kertne Nob outstation and stockyard ruin	Low-moderate	Indirect	Avoid disturbing the site, possibly by erecting a temporary protective barrier around it.

B8.5 Summary Recommendations

Based on the results of this investigation and consultation with representatives of the local Aboriginal community, it is recommended that:

- BEMAX co-ordinate and implement the proposed management strategies by integrating them into a single programme and document in the form of the ACHMP (similar to the Barkandji Heritage Management Plan already implemented for the Ginkgo Mine). The ACHMP would cover all actions and requirements to be conducted at the Snapper Mine. The ACHMP would remain active for the life of the Snapper Mine and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities. The ACHMP should be developed in consultation with the local Aboriginal community and the DEC.
- BEMAX continues to consult with the relevant local Aboriginal community members in matters pertaining to development of the Snapper Mine. The conduct of actions involving the recording, collection, curation and replacement of recovered materials, would occur with the invited participation of local Aboriginal community representatives. Consideration would also be given to providing employment opportunities to local Aboriginal community members and their organisations.
- BEMAX provide training to all on-site personnel regarding the ACHMP strategies and constraints relevant to their employment tasks.
- If human skeletal remains are encountered during the course of the development all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroners Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, BEMAX should contact the DEC zone archaeologist (tel: 03 5021 8914) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be devised with the involvement of the local Aboriginal community.
- Where cultural heritage materials are within the zones of anticipated direct impact from the development, BEMAX should engage a suitably qualified archaeologist and representatives of the local Aboriginal community to record and collect a representative sample of scientifically and culturally significant items from the sites. These items should be properly curated and stored in the ‘Keeping Place’ at BEMAX’s Ginkgo Mine, and replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.
- BEMAX should engage an archaeologist to investigate the lithic technologies and reduction strategies adopted at the Aboriginal cultural heritage sites within the Snapper Mine disturbance area and analyse and describe their local and regional contexts.
- *In situ* hearths (i.e. hearths from SN02) should be excavated by a suitably qualified archaeologist and representatives of the local Aboriginal community and dated by radiocarbon and/or luminescence techniques to determine their age.
- BEMAX should erect temporary barriers around sites SN20 and SN22 and monitor their maintenance during the life of the Snapper Mine and its rehabilitation. BEMAX should engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers.
- BEMAX should avoid disturbing cultural heritage sites SN05 and SNH1 that are located within the Snapper Mine MLA area but outside the disturbance area. If future works occur near these sites, temporary protective barriers should be erected around them to avoid inadvertent disturbance.
- BEMAX should implement the site specific management strategies detailed in Table B-11.

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Attachment BA

Public Advertisements

PUBLIC NOTICE

***ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979* (NSW) – PART 3A**

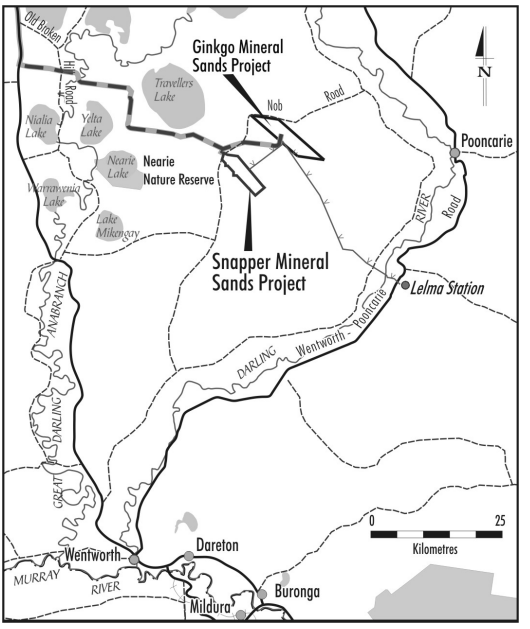
SNAPPER MINERAL SANDS PROJECT

BEMAX Resources Limited (BEMAX) proposes to develop the Snapper Mineral Sands Project (the Snapper Mine), approximately 40 km west of Pooncarie in western NSW. The project will include the Snapper Mine Mining Lease Application area, an electricity transmission line route from the Ginkgo Mine to the Snapper Mine and an extension of the mineral concentrate transport route.

BEMAX intends to undertake a Cultural Heritage Assessment for the proposed Snapper Mine. The Cultural Heritage Assessment would form part of an Environmental Assessment to be assessed under Part 3A of the NSW *Environmental Planning and Assessment Act 1979*. Prior to undertaking the Cultural Heritage Assessment, BEMAX would like to consult with all Aboriginal persons or groups who have knowledge of, or who have a right or interest in, Aboriginal objects, places and/or Aboriginal cultural heritage values within the Snapper Mine area. Any persons or groups who would like to be involved in the consultation process with BEMAX are invited to contact BEMAX by 15 Sep 2006 to register their interest.

Contact details are as follows:

Contact Person: Ray Roberts
Telephone: (03) 5025 0213
Fax: (03) 5025 0217
Email: ray.roberts@mbti.com.au



Attachment BB

Letters Requesting Review and Feedback on Proposed Methodology

BEMAX RESOURCES LIMITED
ABN 60 009 247 858

Brisbane Head Office
PO Box 15164
City East Qld 4002
TEL: (07) 3210 7900
FAX: (07) 3210 7999
www.bemax.com.au

18 September 2006

Barkindji Elders Committee
PO Box 71
Geurie NSW 2831

Attention: Ms Evelyn Crawford

Dear Evelyn

RE: PROPOSED METHODOLOGY FOR THE CULTURAL AND ARCHAEOLOGICAL ASSESSMENT OF THE SNAPPER MINE AREA

BEMAX Resources Limited (BEMAX) proposes to develop the Snapper Mineral Sands Project (the Snapper Mine), located approximately 10 km to the south-west of the existing Ginkgo Mine and approximately 170 km south of Broken Hill in western New South Wales. Please find enclosed for your review, a copy of the Proposed Methodology for the Cultural and Archaeological Assessment of the Snapper Mine area.

Consistent with the Interim Community Consultation Requirements for Applicants (Department of Environment and Conservation, 2004), we provide the proposed methodology for your review and feedback. Your feedback may include the identification of issues or areas of cultural significance that may be used to affect, inform or refine the proposed methodology.

Any feedback with respect to the proposed methodology is to be provided by 5:00pm on 9 October 2006.

Could you please provide any feedback to:

Ray Roberts
Exploration Manager
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Please do not hesitate to contact either myself (03) 5025 0213 or Jason Jones (07) 3871 3144 if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

Broken Hill
134 Pinnacles Road
Broken Hill NSW 2880
PO Box 444
Broken Hill NSW 2880
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FAX: (08) 8080 0888

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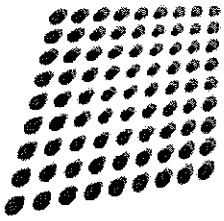
FAX: (08) 9486 4711



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18 September 2006

Mr Mark Sutton
PO Box 469
Wentworth NSW 2468

Attention: Mr Mark Sutton

Dear Mark

RE: PROPOSED METHODOLOGY FOR THE CULTURAL AND ARCHAEOLOGICAL ASSESSMENT OF THE SNAPPER MINE AREA

BEMAX Resources Limited (BEMAX) proposes to develop the Snapper Mineral Sands Project (the Snapper Mine), located approximately 10 km to the south-west of the existing Ginkgo Mine and approximately 170 km south of Broken Hill in western New South Wales. Please find enclosed for your review, a copy of the Proposed Methodology for the Cultural and Archaeological Assessment of the Snapper Mine area.

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Yours sincerely

RAY ROBERTS
Exploration Manager

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18 September 2006

Mr Wayne Webster
131 Morgan Lane
Broken Hill NSW 2880

Attention: Mr Wayne Webster

Dear Wayne

RE: PROPOSED METHODOLOGY FOR THE CULTURAL AND ARCHAEOLOGICAL ASSESSMENT OF THE SNAPPER MINE AREA

BEMAX Resources Limited (BEMAX) proposes to develop the Snapper Mineral Sands Project (the Snapper Mine), located approximately 10 km to the south-west of the existing Ginkgo Mine and approximately 170 km south of Broken Hill in western New South Wales. Please find enclosed for your review, a copy of the Proposed Methodology for the Cultural and Archaeological Assessment of the Snapper Mine area.

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Could you please provide any feedback to:

Ray Roberts
Exploration Manager
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Please do not hesitate to contact either myself (03) 5025 0213 or Jason Jones (07) 3871 3144 if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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Attachment BC

Records of Aboriginal Field Survey Participation

Record of Aboriginal Representative Participation

Project Name: **Snapper Mine Project EA** (Cultural Heritage Assessment)

Aboriginal Organisation: Bertrandji Elder Comm | ABN: NA | Contact Person: Ray Lawson | Phone: 0421458325

Client Name and Address: *Make all invoices out to:* Joe Bannister, BEMAX Resources Limited, Level 14, 133 Mary Street, Brisbane QLD 4000

But send them via: Peter Cribb, Resource Strategies, PO Box 1842, Milton QLD 4064 Phone: 07 3871 3144

Archaeologist(s): Dr Matt Cupper, Landskape, PO Box 246, Merbein VIC 3505 Phone: 0408 006 690

Name of Representative	Date	Type of participation	Start time	Finish time
NOEL JOHNSON	23:10:06	CULT. HERIT. FIELD SURVEY	07:00	17:30
FRANK KIRBY	23:10:06	"	"	"
DAVID SMITH	23:10:06	"	"	"
NOEL JOHNSON	24:10:06	"	07:30	16:45
FRANK KIRBY	24:10:06	"	"	"
DAVID SMITH	24:10:06	"	"	"
NOEL JOHNSON	25:10:06	"	07:30	14:00
FRANK KIRBY	25:10:06	"	"	"
DAVID SMITH	25:10:06	"	"	"

Issues raised: Identified 15 cultural heritage sites (SNC8-SNC22). Artefacts from several of these are within disturbance areas of the proposed mine and may need to be collected.

Signed *(archaeologist)* ..... *(Aboriginal representative)* ..... Date 25:10:06

..... *(Aboriginal representative)* ..... Date 25:10:06

..... *(Aboriginal representative)* ..... Date 25:10:06

Record of Aboriginal Representative Participation

Project Name: **Snapper Mine Project EA** (Cultural Heritage Assessment)

Aboriginal Organisation: Webster Fam. ABN: n/a Contact Person: Wayne Webster Phone: 0880879617

Client Name and Address: *Make all invoices out to*: Joe Bannister, BEMAX Resources Limited, Level 14, 133 Mary Street, Brisbane QLD 4000

But send them via: Peter Cribb, Resource Strategies, PO Box 1842, Milton QLD 4064 Phone: 07 3871 3144

Archaeologist(s): Dr Matt Cupper, Landskape, PO Box 246, Merbein VIC 3505 Phone: 0408 006 690

Name of Representative	Date	Type of participation	Start time	Finish time
WAYNE WEBSTER	15:11:06	Cultural heritage field assessment	10:00	14:00
JOHANNE CARR	15:11:06		10:00	14:00

Issues raised: COLLECTION OF ABORIGINAL OBJECTS FROM CULTURAL HERITAGE SITES SN01, SN24, SN29, SN21 DEEMED TO BE APPROPRIATE MANAGEMENT STRATEGY

Signed *(archaeologist)* ..... *(Aboriginal representative)* ..... Date 15:11:06

..... *(Aboriginal representative)* Johanne Carr Date 15:11:06

..... *(Aboriginal representative)* ..... Date .....

Record of Aboriginal Representative Participation

Project Name: **Snapper Mine Project EA** (Cultural Heritage Assessment)

Aboriginal Organisation: BARKINJI ELDERS ABN: NA Contact Person: RAY LAWSON Phone: 0421 458 325

Client Name and Address: *Make all invoices out to*: Joe Bannister, BEMAX Resources Limited, Level 14, 133 Mary Street, Brisbane QLD 4000

But send them via: Peter Cribb, Resource Strategies, PO Box 1842, Milton QLD 4064 Phone: 07 3871 3144

Archaeologist(s): Dr Matt Cupper, Landskape, PO Box 246, Merbein VIC 3505 Phone: 0408 006 690

Name of Representative	Date	Type of participation	Start time	Finish time
RAY LAWSON	26:10:06	ARCH. FIELD SURVEY	07:00	17:15
RUSSELL ANDREWS	"	"	"	"
JUSTIN RILEY	"	"	"	"
RAY LAWSON	27:10:06	"	07:15	12:30
RUSSELL ANDREWS	"	"	"	"
JUSTIN RILEY	"	"	"	"

Issues raised: Inspected Aboriginal cultural heritage sites SN08-22, SN08-21 may require artefacts to be collected or infrastructure modified to avoid disturbance from proposed development.

Signed *(archaeologist)* ..... *(Aboriginal representative)* Justin Riley Date 29:10:06

(Aboriginal representative) Russell Andrews Date 27:10:06

(Aboriginal representative) ..... Date 27:10:06

Record of Aboriginal Representative Participation

Project Name: **Snapper Mine Project EA** (Cultural Heritage Assessment)

Aboriginal Organisation: Birriah Elders ABN: NA Contact Person: Ray Lawson Phone: 0421 458 325

Client Name and Address: *Make all invoices out to:* Joe Bannister, BEMAX Resources Limited, Level 14, 133 Mary Street, Brisbane QLD 4000

But send them via: Peter Cribb, Resource Strategies, PO Box 1842, Milton QLD 4064 Phone: 07 3871 3144

Archaeologist(s): Dr Matt Cupper, Landskape, PO Box 246, Merbein VIC 3505 Phone: 0408 006 690

Name of Representative	Date	Type of participation	Start time	Finish time
RAY LAWSON	20:10:06	CULTURAL FIELD SURV.	07:00	16:30
RODNEY LAWSON	"	"	"	"
JOSHUA HARRIS	"	"	"	"
RAY LAWSON	21:10:06	"	"	15:00
RODNEY LAWSON	"	"	"	"
JOSHUA HARRIS	"	"	"	"

Issues raised: Identified one Aboriginal cultural heritage site. (SN07)

Signed *(archaeologist)* ..... *(Aboriginal representative)* Ray Lawson Date .....

..... *(Aboriginal representative)* Joshua Harris Date .....

..... *(Aboriginal representative)* Rodney Lawson Date .....

Record of Aboriginal Representative Participation

Project Name: **Snapper Mine Project EA** (Cultural Heritage Assessment)

Aboriginal Organisation: WEBSTER FAMILY ABN: NA Contact Person: WAYNE WEBSTER Phone: 0427823464.3

Client Name and Address: *Make all invoices out to*: Joe Bannister, BEMAX Resources Limited, Level 14, 133 Mary Street, Brisbane QLD 4000

But send them via: Peter Cribb, Resource Strategies, PO Box 1842, Milton QLD 4064 Phone: 07 3871 3144

Archaeologist(s): Dr Matt Cupper, Landskape, PO Box 246, Merbein VIC 3505 Phone: 0408 006 690

Name of Representative	Date	Type of participation	Start time	Finish time
DESMOND WEBSTER	16.10.06	CULT HERIT. FIELD SURVEY	09:00	17:30
JEFFREY WEBSTER	16.10.06	CULT HERIT. FIELD SURVEY	09.00	17:30
CLINTON SQUIRES	16.10.06	CULT HERIT FIELD SURVEY	09.00	17:30
DESMOND WEBSTER	17.10.06	CULT. HERIT FIELD SURVEY	08:00	16:00
JEFFREY WEBSTER	17.10.06	CULT. HERIT. FIELD SURVEY	08:00	16:00
CLINTON SQUIRES	17.10.06	CULT HERIT FIELD SURVEY	08:00	16:00
DESMOND WEBSTER	18.10.06	CULT HERIT FIELD SURVEY	08:00	14:00
JEFFREY WEBSTER	18.10.06	CULT HERIT FIELD SURVEY	08:00	14:00
CLINTON SQUIRES	18.10.06	CULT HERIT FIELD SURVEY	08:00	14:00

Issues raised: Located three Aboriginal artefact scatters and isolated finds of Aboriginal artefacts and the sites and one of the isolated finds may need to be salvaged.

Signed *(archaeologist)* ..... *(Aboriginal representative)* CLINT SQUIRE Date 18.10.06

..... *(Aboriginal representative)* JEFFREY WEBSTER Date 18.10.06

..... *(Aboriginal representative)* ..... Date 18.10.06

Attachment BD

Letters Advising of the Availability of the Draft Report

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BEMAX RESOURCES LIMITED
ABN 60 009 247 858

Brisbane Head Office
PO Box 15164
City East Qld 4002
TEL: (07) 3210 7900
FAX: (07) 3210 7999
www.bemax.com.au

27 November 2006

Mr Wayne Webster
331 Morgan Lane
Broken Hill NSW 2880

Attention: Mr Wayne Webster

Dear Wayne

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

Please find enclosed for comment by the Webster Family, a copy of the draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Please note that comments on the draft CHA will be received up until 8 December 2006. Could you please provide any comments via fax, email or post to:

Ray Roberts
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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27 November 2006

Mr Ray Lawson
PO Box 323
Dareton NSW 2717

Attention: Mr Ray Lawson

Dear Ray

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

Please find enclosed for comment a copy of the draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

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Ray Roberts
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MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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27 November 2006

Mrs Patricia Doyle
PO Box 149
Menindee NSW 2879

Attention: Mrs Patricia Doyle

Dear Patricia

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

The draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project is now available for comment. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Should you wish to receive a copy of the draft CHA, please contact me via telephone, fax, email or post:

Ray Roberts
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please note that comments on the draft CHA will be received up until 8 December 2006.

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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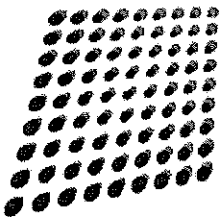

BEMAX
RESOURCES LIMITED
ABN 60 009 247 858

Brisbane Head Office
PO Box 15164
City East Qld 4002
TEL: (07) 3210 7900
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www.bemax.com.au

27 November 2006

Noel Johnson
8 Shannon Street
Wentworth NSW 2648

Attention: Mr Noel Johnson

Dear Noel

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

Please find enclosed for comment a copy of the draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Please note that comments on the draft CHA will be received up until 8 December 2006. Could you please provide any comments via fax, email or post to:

Ray Roberts
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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134 Pinnacles Road
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27 November 2006

Mr Mark Sutton
PO Box 469
Wentworth NSW 2648

Attention: Mr Mark Sutton

Dear Mark

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

The draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project is now available for comment. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Should you wish to receive a copy of the draft CHA, please contact me via telephone, fax, email or post:

Ray Roberts
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please note that comments on the draft CHA will be received up until 8 December 2006.

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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27 November 2006

Mr Les Bennett
PO Box 11
Menindee NSW 2879

Attention: Mr Les Bennett

Dear Les

RE: SNAPPER MINE CULTURAL HERITAGE ASSESSMENT

The draft Cultural Heritage Assessment (CHA) for the Snapper Mineral Sands Project is now available for comment. The CHA will form part of an Environmental Assessment to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979.*

Should you wish to receive a copy of the draft CHA, please contact me via telephone, fax, email or post:

Ray Roberts
BEMAX Resources Limited
PO Box 4032
MILDURA VIC 3502

Ph: 03 5025 0213
Fax: 03 5025 0217

Email: ray.roberts@mbti.com.au

Please note that comments on the draft CHA will be received up until 8 December 2006.

Please do not hesitate to contact me if you have any queries.

Yours sincerely

RAY ROBERTS
Exploration Manager

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TEL: (08) 9212 6000
FAX: (08) 9486 4711

Attachment BE

Formal Responses from Aboriginal Stakeholder Groups

Post Office Box 323
Dareton 2717
Tel: 03 5027 4078

7 December 2006

Dr Matt Cupper
PO Box 246
Merbein 3505

Dear Matt,

Re: Cultural heritage assessment for BEMAX Resources Limited's proposed Snapper Mine and ancillary infrastructure

This letter confirms that we, the Barkindji Elders Noel Johnson, Sheila Kirby and Ray Lawson, were involved in the cultural heritage assessment for BEMAX Resources Limited's proposed Snapper Mine and ancillary infrastructure. This has included providing social and cultural information about the proposed development area and Noel Johnson and Ray Lawson assisting with the archaeological field survey.

We were involved in devising the management strategies for Aboriginal cultural heritage sites in the proposed development area and were provided with draft copies of the cultural heritage assessment report, whose recommendations we endorse. In particular, we support the management proposal to record and collect stone artefacts and hearthstones from the proposed development area, so that they can be curated in an appropriate Keeping Place.

We have no objections to development of the proposed Snapper Mine and ancillary infrastructure proceeding if Aboriginal cultural heritage is managed according to the recommendations of the cultural heritage assessment report.

Yours sincerely,

Noel Johnson | Sheila Kirby | Ray Lawson

13/12/06

WAYNE WEBSTER
331 Morgan Lane
Broken Hill N.S.W
2880
Phone (H) 08 80879617
Mobile 0434 224 643

Dear MATT

I am writing to you in regards to the Skipper Mine Cultural Heritage assessment

I am pleased in which the way the survey was conducted and I am happy with the findings.

I would like to express my thanks to you for contacting me and asking for my opinion, on behalf of the Webster family

I can be contacted on the above Numbers if you have any queries.

Sincerely

WAYNE WEBSTER

Attachment BF

Descriptions of Aboriginal Cultural Heritage Sites

Snapper (SN) 01

Site type: Stone quarry and associated scatter of stone artefacts.

Location: Site is approximately 91 kilometres (km) from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km north (N) of Wentworth. Site is approximately 8 km east (E) of Nob Road and is located 100 metres (m) east (E) of a dismantled internal property fence of “Trelega” Station.

Grid reference: GDA 606719 mE 6298095 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in sandplains with a vegetation cover of Black Bluebush. Belah low-open woodland is marginal to the site.

Aspect: Westerly.

Site size: Artefacts were visible over an area of 150 x 150 m.

Visibility: Site surface visibility was very high (~80%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Many thousands of silicified and ferruginized sandstone cobbles of up to 150 millimetres (mm) diameter are eroding from the present land surface. Most of these are probably too coarse grained to have been used for flaked artefact manufacture by Aboriginal people. 50 silcrete flakes, flaked pieces and cores occur at the site (Table BF-1, Figure BF-1).

Table BF-1. Artefact attributes from Aboriginal archaeological site SN01.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flaked piece	na	na	Cortex	na	41	23	12
Silcrete	Flake	na	Unifacial	na	Regular	43	38	6
Silcrete	Flake	na	Unifacial	na	Expanded	17	11	7
Silcrete	Flake	na	na	na	Expanded	21	13	9
Silcrete	Flaked piece	na	na	Cortex	na	38	33	15
Silcrete	Core	na	Unipolar	Multiple scar	na	69	57	48
Silcrete	Flaked piece	na	na	na	na	41	26	23
Silcrete	Flaked piece	na	na	Cortex	na	29	12	9
Silcrete	Flake	na	Unifacial	na	Elongate	27	22	10
Silcrete	Flaked piece	na	na	na	na	52	32	29
Silcrete	Flake	na	Unifacial	na	Elongate	34	24	11

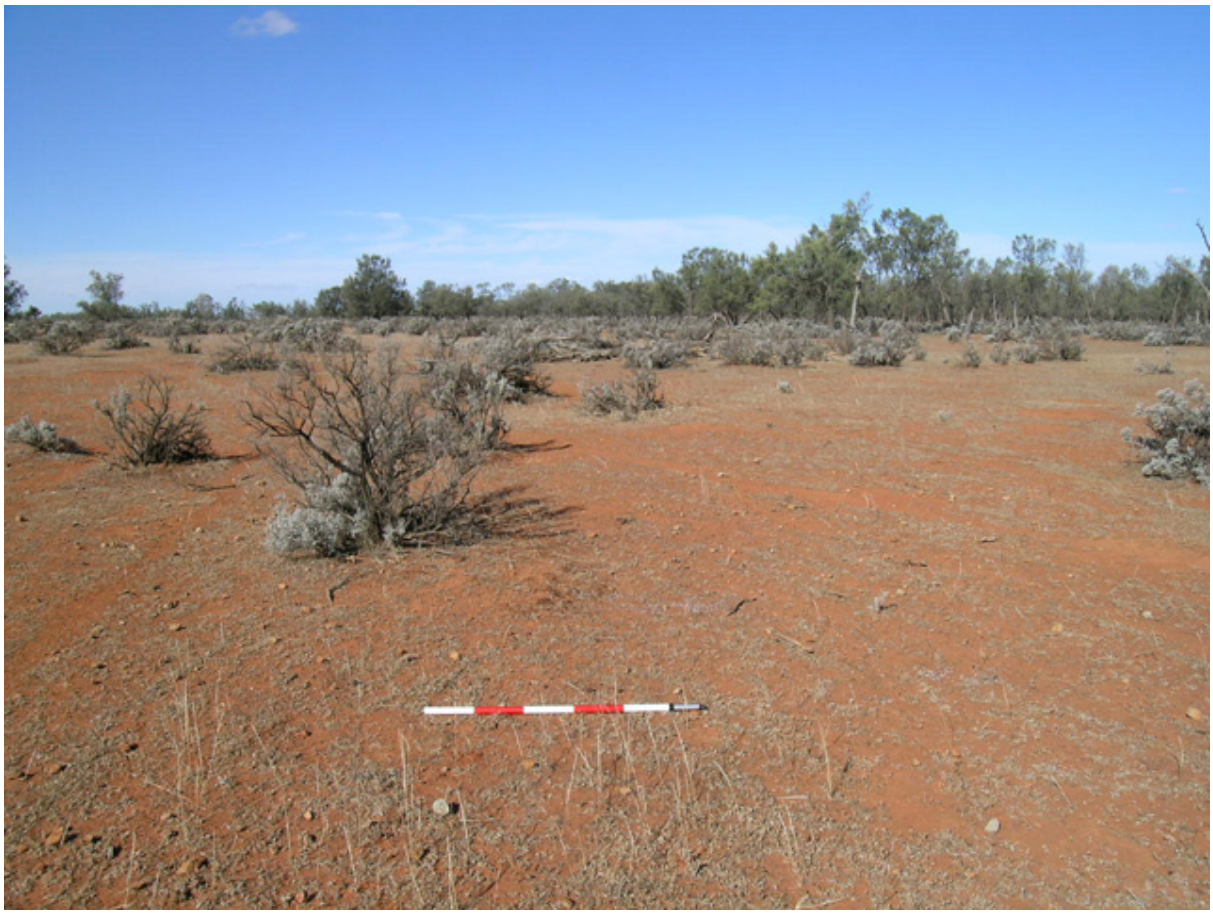

Figure BF-1. Silicified and ferruginized cobbles at Aboriginal archaeological site SN01.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC. Lithic technologies and reduction strategies adopted at the stone quarry site and the relationship of this site to other sites within the disturbance area should be investigated.

Snapper (SN) 02

Site type: Scatter of stone artefacts, hearths.

Location: Site is approximately 97 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 200 m south (S) of Roo Roo Road intersection 93 km N of Wentworth. Site is approximately 4 km E of Nob Road and is located 400 m S of the boundary fence of “Trelega” and “Manilla” Stations.

Grid reference: GDA 604405 mE 6303587 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush. The site is marginal to a small ephemeral depression.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 20 x 20 m.

Visibility: Site surface visibility was very high (~90%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Eight silcrete, 2 chert and 1 quartz artefacts were noted at the site (Table BF-2). The site also contains two *in-situ* hearths of baked clay heat retainers (Figure BF-2).

Table BF-2. Artefact attributes from Aboriginal archaeological site SN02.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	35	31	19
Quartz	Ang fragment	na	na	na	na	19	15	9
Silcrete	Flake	na	Unifacial	na	Expanded	40	29	9
Silcrete	Flake	na	Unifacial	na	Expanded	33	20	7
Silcrete	Flake	na	Unifacial	na	Regular	15	15	4
Silcrete	Flake	na	Unifacial	na	Expanded	19	17	4
Silcrete	Flaked piece	na	na	na	na	42	20	18
Chert	Flake	na	Unifacial	na	Elongate	14	7	4
Chert	Flaked piece	na	na	Cortex	na	39	16	14
Silcrete	Ang fragment	na	na	Cortex	na	22	21	12
Silcrete	Ang fragment	na	na	na	na	23	17	5

Figure BF-2. Baked clay heat retainers of hearths at Aboriginal archaeological site SN02.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed mineral concentrate treatment facility. Stone artefacts and heat retainers should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts and heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC. Hearths should be excavated by an archaeologist and representatives of the local Aboriginal community. Radiocarbon and/or luminescence dating should be used to determine the ages of the hearths.

Snapper (SN) 03

Site type: Isolated find of a stone artefact.

Location: Site is approximately 97 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 200 m S of Roo Roo Road intersection 93 km N of Wentworth. Site is approximately 3.5 km E of Nob Road and is located 800 m S of the boundary fence of “Trelega” and “Manilla” Stations.

Grid reference: GDA 603789 mE 6303182 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush.

Aspect: na.

Site size: na.

Visibility: Site surface visibility was very high (~90%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: One silcrete scraper occurs at the site (Table BF-3).

Table BF-3. Artefact attributes from Aboriginal archaeological site SN03.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Scraper	Stepped 35 mm	Unifacial	na	na	37	19	11

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed dredge pond. The stone artefact should be recorded, collected, curated and stored at the ‘Keeping Place’ at BEMAX’s Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefact should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 04

Site type:	Hearth.
Location:	Site is approximately 97 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 200 m S of Roo Roo Road intersection 93 km N of Wentworth. Site is approximately 3.5 km E of Nob Road and is located 1.2 km S of the boundary fence of “Trelega” and “Manilla” Stations.
Grid reference:	GDA 603756 mE 6302607 mN Cuthero 7331 1:100,000 orthophoto map.
Environmental setting:	The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush.
Aspect:	North-easterly.
Site size:	Artefacts were visible over an area of 2 x 2 m.
Visibility:	Site surface visibility was very high (~90%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.
Site contents:	10 scattered baked clay heat retainers occur at the site.
Site condition:	This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.
Management considerations:	The site is within the disturbance area of the proposed dredge pond. The heat retainers should be recorded, collected, curated and stored at the ‘Keeping Place’ at BEMAX’s Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 05

Site type: Isolated find of a stone artefact.

Location: Site is approximately 93 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 2 km S of Roo Roo Road intersection 91 km N of Wentworth. Site is approximately 1.5 km E of Nob Road and is located 200 m S of the boundary fence of “Trelega” and “Carstairs” Stations.

Grid reference: GDA 602329 mE 6302016 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland.

Aspect: na.

Site size: na.

Visibility: Site surface visibility was very high (~90%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: One broken quartzite pestle or hammerstone occurs at the site (Table BF-4).

Table BF-4. Artefact attributes from Aboriginal archaeological site SN05.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Quartzite	Pestle or hammerstone	na	na	Ground	na	37	23	16

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is west of the disturbance area of the proposed dredge pond. The proponent should avoid disturbing the site, possibly by erecting a temporary protective barrier around it.

Snapper (SN) 06

Site type:	Hearth.
Location:	Site is approximately 95 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 2 km S of Roo Roo Road intersection 91 km N of Wentworth. Site is approximately 3.5 km E of Nob Road and is located 50 m S of track on “Trelega” Station.
Grid reference:	GDA 604198 mE 6302400 mN Cuthero 7331 1:100,000 orthophoto map.
Environmental setting:	The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush.
Aspect:	North-easterly.
Site size:	Artefacts were visible over an area of 10 x 10 m.
Visibility:	Site surface visibility was very high (~90%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.
Site contents:	Four scattered baked clay heat retainers occur at the site.
Site condition:	This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.
Management considerations:	The site is within the disturbance area of the proposed dredge pond. The heat retainers should be recorded, collected, curated and stored at the ‘Keeping Place’ at BEMAX’s Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 07

Site type: Scatter of stone artefacts, hearth.

Location: Site is approximately 93 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road 2 km S of Roo Roo Road intersection 91 km N of Wentworth. Site is approximately 1 km E of Nob Road and is located 500 m N of the boundary fence of "Trelega" and "Carstairs" Stations.

Grid reference: GDA 602578 mE 6303097 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush.

Aspect: Southerly.

Site size: Artefacts were visible over an area of 10 x 10 m.

Visibility: Site surface visibility was very high (~70%) due to erosion by scalding, gullying and stock. Off-site visibility was also very high (~60%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: One silcrete and 1 quartz artefact occur at the site (Table BF-5). The site also contains 4 scattered calcrete hearthstones.

Table BF-5. Artefact attributes from Aboriginal archaeological site SN07.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flaked piece	na	na	Cortex	na	60	33	17
Quartz	Ang fragment	na	na	na	na	21	12	8

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed borefield. Stone artefacts and heat retainers should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts and heat retainers should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 08

Site type: Scatter of stone artefacts.

Location: Site is approximately 92 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 9 km E of Nob Road and is located 800 m S of internal property fence of “Trelega” Station.

Grid reference: GDA 608646 mE 6298543 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush. The site is marginal to a small ephemeral depression.

Aspect: North-easterly.

Site size: Artefacts were visible over an area of 25 x 25 m.

Visibility: Site surface visibility was very high (~90%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 14 silcrete artefacts were noted at the site (Table BF-6, Figure BF-3).

Table BF-6. Artefact attributes from Aboriginal archaeological site SN08.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flake	na	na	na	Expanded	23	21	7
Silcrete	Flake	na	na	na	Expanded	15	14	4
Silcrete	Flaked piece	na	na	Cortex	na	35	23	4
Silcrete	Flake	na	Unifacial	na	Elongate	15	9	3
Silcrete	Flaked piece	na	na	na	na	44	37	12
Silcrete	Flaked piece	na	na	na	na	35	30	25
Silcrete	Core	na	Bipolar	Multiple scar	na	56	43	25
Silcrete	Flake	na	Unifacial	na	Expanded	15	14	3
Silcrete	Flaked piece	na	na	Cortex	na	32	25	15
Silcrete	Flake	na	na	na	Regular	7	6	5
Silcrete	Ang fragment	na	na	na	na	24	21	9
Silcrete	Ang fragment	na	na	na	na	32	27	15

Figure BF-3. Silcrete artefacts at Aboriginal archaeological site SN08.

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and vehicular and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial non-slurried overburden emplacement. Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 09

Site type: Isolated find of stone artefacts.

Location: Site is approximately 92 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 9 km E of Nob Road and is located 500 m west (W) of internal property fence of "Trelega" Station.

Grid reference: GDA 608367 mE 6297995 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush. The site is marginal to a small ephemeral depression.

Aspect: Southerly.

Site size: Artefacts were visible over an area of 10 x 10 m.

Visibility: Site surface visibility was very high (~90%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Two silcrete artefacts were noted at the site (Table BF-7).

Table BF-7. Artefact attributes from Aboriginal archaeological site SN09.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	50	40	28
Silcrete	Flaked piece	na	na	na	na	32	22	13

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial access area. Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 10

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 400 m S of internal property fence of "Trelega" Station.

Grid reference: GDA 607489 mE 6297350 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~60%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Nine silcrete artefacts were noted at the site (Table BF-8).

Table BF-8. Artefact attributes from Aboriginal archaeological site SN10.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	62	60	48
Silcrete	Scraper	Stepped 19 mm	Unifacial	na	na	30	21	10
Silcrete	Flake	na	Unifacial	na	Expanded	15	11	4
Silcrete	Flake	na	Unifacial	Cortex	Elongate	37	24	10
Silcrete	Flaked piece	na	na	na	na	39	30	9
Silcrete	Flaked piece	na	na	Cortex	na	37	32	17
Silcrete	Flaked piece	na	na	Cortex	na	37	32	29

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 11

Site type: Stone quarry and associated scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 400 m S of an internal property fence of “Trelega” Station.

Grid reference: GDA 607559 mE 6297599 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 300 x 300 m.

Visibility: Site surface visibility was very high (~60%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Many thousands of silicified and ferruginized sandstone cobbles of up to 150 mm diameter are eroding from the present land surface. Most of these are probably too coarse grained to have been used for flaked artefact manufacture by Aboriginal people. 24 silcrete flakes, flaked pieces and cores occur at the site (Table BF-9, Figure BF-4).

Table BF-9. Artefact attributes from Aboriginal archaeological site SN11.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flaked piece	na	na	Cortex	na	42	31	18
Silcrete	Flake	na	Unifacial	na	Expanded	32	17	6
Silcrete	Core	na	Unipolar	Multiple scar	na	51	37	21
Silcrete	Flaked piece	na	na	Cortex	na	47	33	23
Silcrete	Flaked piece	na	na	Cortex	na	39	37	12
Silcrete	Ang fragment	na	na	Cortex	na	54	16	10

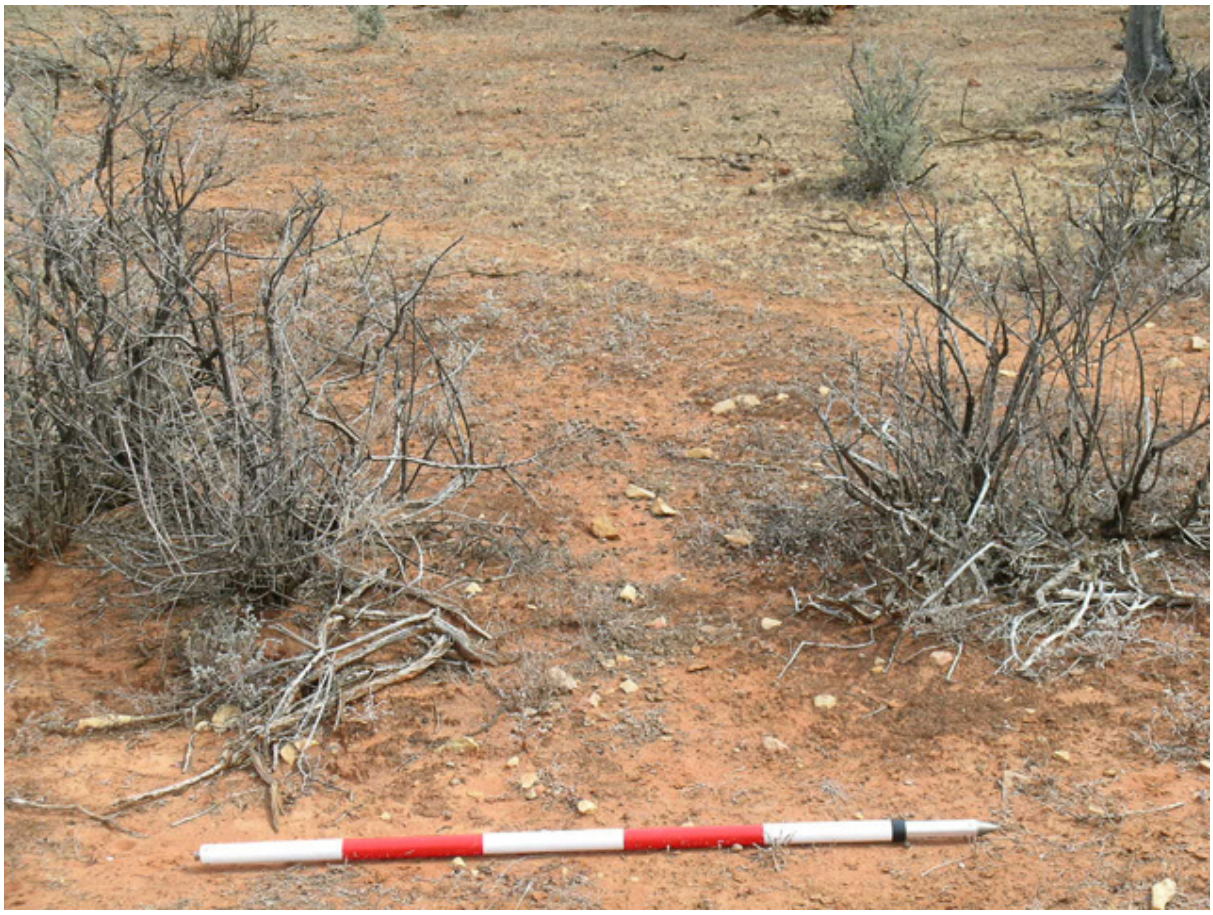

Figure BF-4. Naturally weathered and flaked silcrete at Aboriginal archaeological site SN11.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC. Lithic technologies and reduction strategies adopted at the stone quarry site and the relationship of this site to other sites within the disturbance area should be investigated.

Snapper (SN) 12

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 900 m S of internal property fence of “Trelega” Station.

Grid reference: GDA 607992 mE 6297720 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Belah low-open woodland and an understorey of Black Bluebush. The site is marginal to a small ephemeral depression.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 75 x 75 m.

Visibility: Site surface visibility was very high (~70%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 15 silcrete artefacts were noted at the site (Table BF-10, Figure BF-5).

Table BF-10. Artefact attributes from Aboriginal archaeological site SN12.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flaked piece	na	na	na	na	50	40	12
Silcrete	Ang fragment	na	na	na	na	47	35	24
Silcrete	Flaked piece	na	na	na	na	50	41	10
Silcrete	Flaked piece	na	na	na	na	31	25	12
Silcrete	Flaked piece	na	na	na	na	45	40	22
Silcrete	Flake	na	Unifacial	na	Expanded	34	25	6
Silcrete	Core	na	Unipolar	Multiple scar	na	30	29	28
Silcrete	Scraper	Stepped 22 mm	Unifacial	na	na	33	14	7
Silcrete	Flake	na	Unifacial	na	Expanded	16	12	4

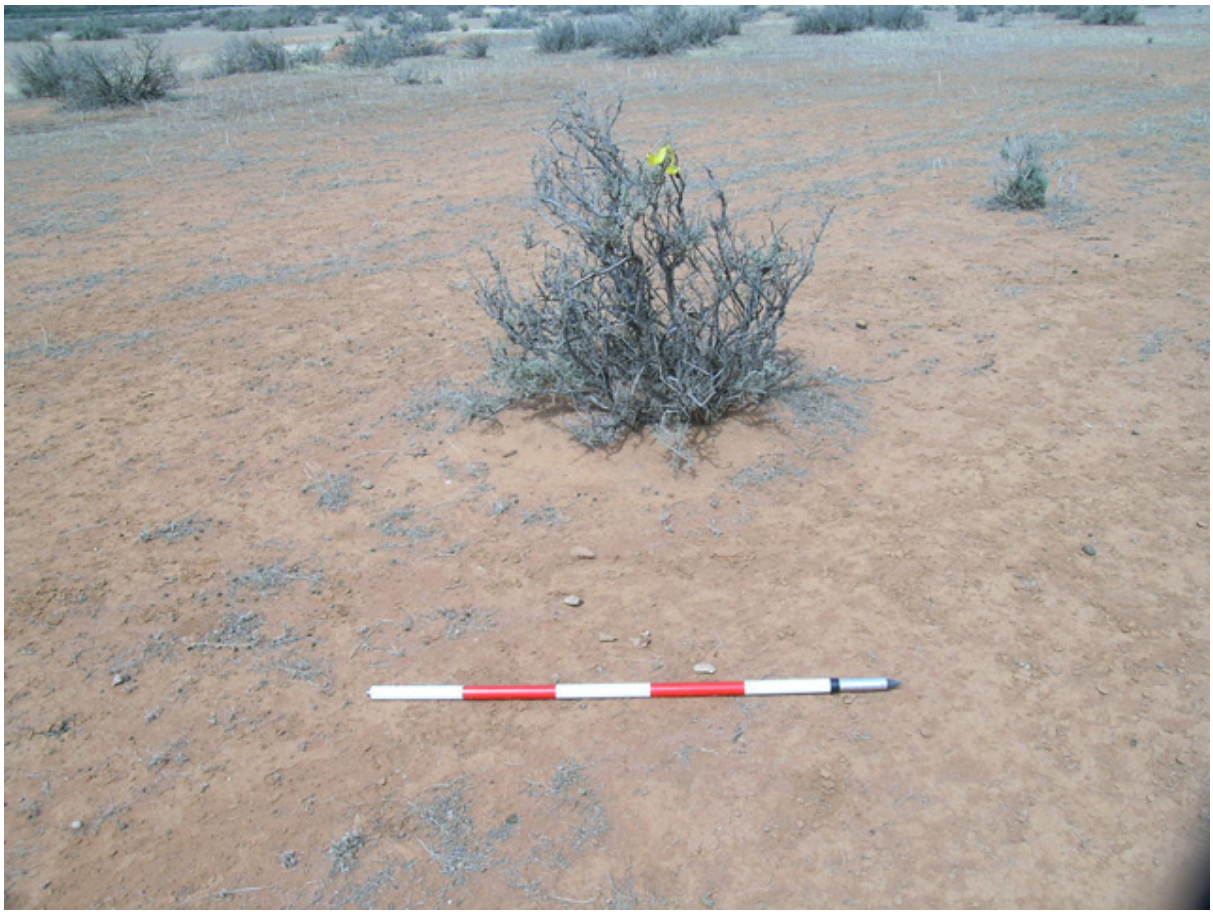

Figure BF-5. Silcrete artefacts at Aboriginal archaeological site SN12.

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial access area. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 13

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 300 m S of internal property fence of "Trelega" Station.

Grid reference: GDA 607819 mE 6297834 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrubland and isolated stands of Rosewood.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 50 x 50 m.

Visibility: Site surface visibility was very high (~70%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Seven silcrete artefacts were noted at the site (Table BF-11).

Table BF-11. Artefact attributes from Aboriginal archaeological site SN13.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flake	na	Unifacial	na	Expanded	32	28	7
Silcrete	Flaked piece	na	na	Cortex	na	59	47	24
Silcrete	Flake	na	Unifacial	Cortex	Regular	43	34	13

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial access area. Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 14

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 900 m S of internal property fence of "Trelega" Station.

Grid reference: GDA 608074 mE 6297746 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrublands. The site is marginal to a small ephemeral depression.

Aspect: Southerly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~60%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 45 silcrete artefacts were noted at the site (Table BF-12, Figure BF-6).

Table BF-12. Artefact attributes from Aboriginal archaeological site SN14.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flake	na	Unifacial	Cortex	Expanded	26	25	7
Silcrete	Flaked piece	na	na	Cortex	na	42	32	16
Silcrete	Flaked piece	na	na	Cortex	na	42	36	10
Silcrete	Ang fragment	na	na	na	na	27	25	14
Silcrete	Flake	na	Unifacial	na	Expanded	34	21	5
Silcrete	Flake	na	Unifacial	na	Expanded	30	27	6
Silcrete	Flake	na	Unifacial	na	Regular	28	15	6

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial access area. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

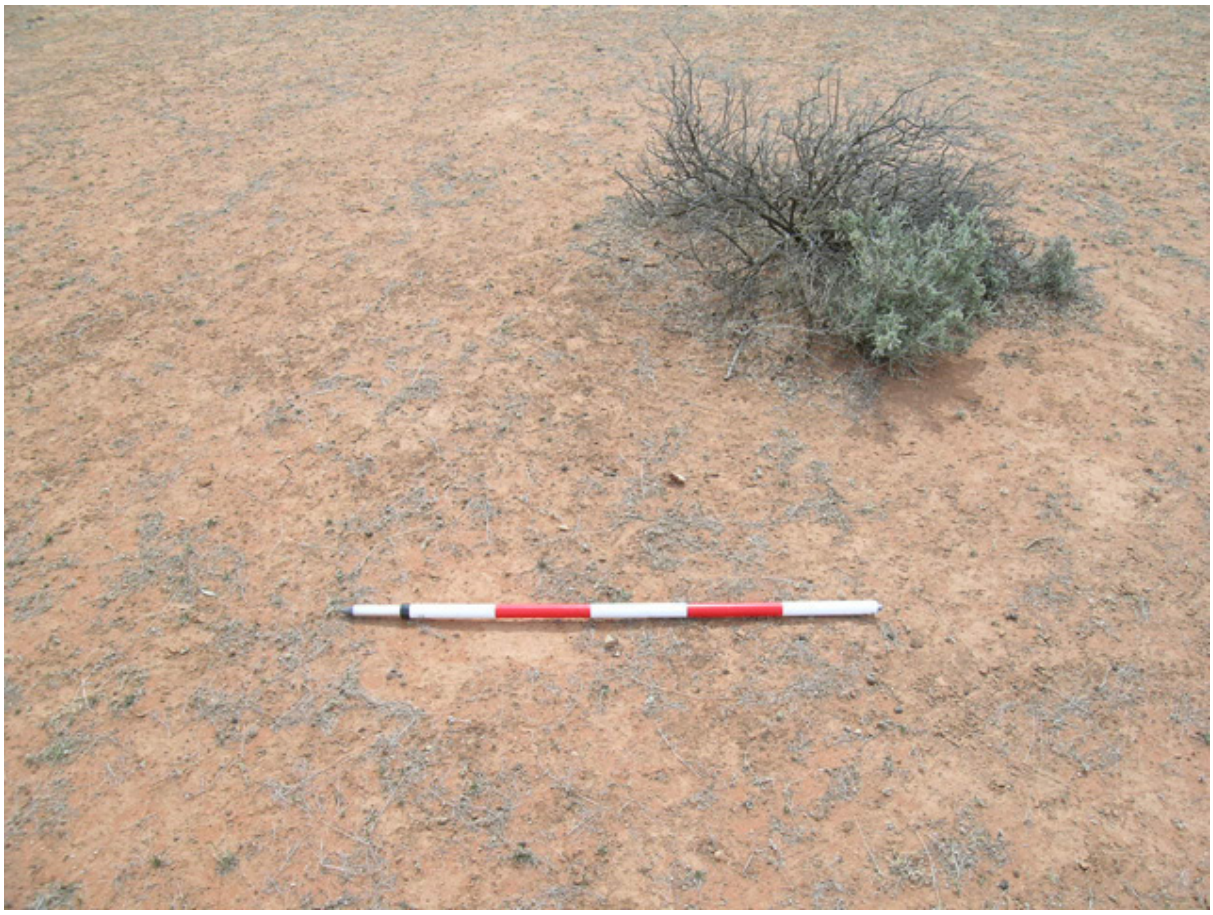

Figure BF-6. Silcrete artefacts at Aboriginal archaeological site SN14.

Snapper (SN) 15

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 500 m S of internal property fence of "Trelega" Station.

Grid reference: GDA 608021 mE 6297888 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrublands. The site is marginal to a small ephemeral depression.

Aspect: Southerly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~60%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 12 silcrete artefacts were noted at the site (Table BF-13).

Table BF-13. Artefact attributes from Aboriginal archaeological site SN15.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flake	na	Unifacial	na	Elongate	27	20	6
Silcrete	Flaked piece	na	na	na	na	49	25	9
Silcrete	Flake	na	Unifacial	na	Elongate	31	27	13
Silcrete	Flake	na	Unifacial	na	Expanded	32	30	9

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial access area. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 16

Site type: Isolated find of stone artefacts.

Location: Site is approximately 92 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 9 km E of Nob Road and is located 1.5 km S of internal property fence of "Trelega" Station.

Grid reference: GDA 608552 mE 6297840 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of grassland. The site is marginal to a small ephemeral depression.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 50 x 50 m.

Visibility: Site surface visibility was very high (~80%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~80%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Three silcrete artefacts were noted at the site (Table BF-14).

Table BF-14. Artefact attributes from Aboriginal archaeological site SN16.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flake	na	Unifacial	Cortex	Elongate	40	23	12

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed water treatment dam. Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 17

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 1.2 km S of internal property fence of "Trelega" Station.

Grid reference: GDA 608289 mE 6297727 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of grassland. The site is marginal to a small ephemeral depression.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~80%) due to erosion by scalding, deflation, vehicles and stock. Off-site visibility was also very high (~80%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Seven silcrete artefacts were noted at the site (Table BF-15).

Table BF-15. Artefact attributes from Aboriginal archaeological site SN17.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Blade	na	Unifacial	na	Elongate	44	17	9
Silcrete	Flake	na	Unifacial	na	Expanded	25	13	6
Silcrete	Ang fragment	na	na	Cortex	na	26	24	16
Silcrete	Flaked piece	na	na	na	na	45	28	12
Silcrete	Flaked piece	na	na	na	na	34	32	18

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed water treatment dam. Stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The artefacts should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 18

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 1 km S of internal property fence of "Trelega" Station.

Grid reference: GDA 607637 mE 6297187 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrubland. Stands of Belah low-open woodland surround the site.

Aspect: South-easterly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~80%) due to erosion by scalding and stock. Off-site visibility was also very high (~60%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 87 silcrete artefacts were noted at the site (Table BF-16, Figure BF-7).

Table BF-16. Artefact attributes from Aboriginal archaeological site SN18.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	46	21	19
Silcrete	Flake	na	Unifacial	na	Expanded	40	23	9
Silcrete	Ang fragment	na	na	Cortex	na	28	17	11
Silcrete	Flake	na	Unifacial	na	Regular	21	21	7
Silcrete	Ang fragment	na	na	na	na	18	17	6
Silcrete	Ang fragment	na	na	Cortex	na	33	31	12
Silcrete	Ang fragment	na	na	na	na	41	32	23
Silcrete	Flake	na	Unifacial	na	Elongate	21	13	6
Silcrete	Flaked piece	na	na	Cortex	na	29	17	11
Silcrete	Core	na	Unipolar	Multiple scar, cortex	na	47	23	22
Silcrete	Flaked piece	na	na	na	na	32	29	17
Silcrete	Ang fragment	na	na	Cortex	na	52	27	21

Figure BF-7. Silcrete flakes, flaked pieces and angular fragments at Aboriginal archaeological site SN18.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 19

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 900 m S of internal property fence of “Trelega” Station.

Grid reference: GDA 607650 mE 6297301 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrubland. Stands of Belah low-open woodland surround the site.

Aspect: Easterly.

Site size: Artefacts were visible over an area of 100 x 100 m.

Visibility: Site surface visibility was very high (~70%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 69 silcrete artefacts were noted at the site (Table BF-17, Figure BF-8).

Table BF-17. Artefact attributes from Aboriginal archaeological site SN19.

Material	Type	Retouch	Platform type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Flaked piece	na	na	Cortex	na	47	40	20
Silcrete	Flake	na	Unifacial	na	Expanded	18	17	7
Silcrete	Flake	na	Unifacial	na	Regular	29	29	9
Silcrete	Flake	na	Unifacial	na	Regular	17	15	5
Silcrete	Flake	na	Unifacial	na	Expanded	32	19	9
Silcrete	Flake	na	Unifacial	na	Expanded	34	33	11
Silcrete	Flake	na	Unifacial	Cortex	Expanded	51	34	15
Silcrete	Flake	na	Unifacial	na	Elongate	29	19	12

Figure BF-8. Silcrete flakes, flaked pieces and angular fragments at Aboriginal archaeological site SN19.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is within the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 20

Site type: Stone quarry and associated scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 1.5 km S of an internal property fence and 500 m NW of a property access track of “Trelega” Station.

Grid reference: GDA 608055 mE 6297218 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrublands.

Aspect: Easterly.

Site size: Artefacts were visible over an area of 200 x 200 m.

Visibility: Site surface visibility was very high (~80%) due to erosion by scalding, deflation and stock. Off-site visibility was also very high (~60%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Many thousands of silicified sandstone and silcrete cobbles of up to 150 mm diameter are eroding from the present land surface, although many of these are probably too coarse grained to have been used for flaked artefact manufacture by Aboriginal people. The upper surfaces of several buried silcrete boulders or sheets are protruding from beneath the present land surface. These appear to have been flaked in places. 92 silcrete flakes, flaked pieces and cores occur at the site (Table BF-18, Figure BF-9).

Table BF-18. Artefact attributes from Aboriginal archaeological site SN20.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	107	87	82
Silcrete	Flake	na	Unifacial	na	Expanded	43	33	12
Silcrete	Ang fragment	na	na	Cortex	na	49	34	19
Silcrete	Flaked piece	na	na	Cortex	na	43	39	31
Silcrete	Flaked piece	na	na	Cortex	na	33	31	19
Silcrete	Flake	na	Unifacial	na	na	21	18	9
Silcrete	Ang fragment	na	na	Cortex	na	34	22	18
Silcrete	Ang fragment	na	na	Cortex	na	52	43	24
Silcrete	Ang fragment	na	na	Cortex	na	43	12	11
Silcrete	Ang fragment	na	na	na	na	55	33	29
Silcrete	Ang fragment	na	na	na	na	47	38	33

Figure BF-9. Silcrete boulder outcropping at Aboriginal archaeological site SN20.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is south of the disturbance area of the proposed initial sand residue dam. Temporary protective barriers should be erected around the site. BEMAX should engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers and monitoring of their maintenance.

Snapper (SN) 21

Site type: Scatter of stone artefacts.

Location: Site is approximately 91 km from Wentworth via High Darling and Nob Roads. Turn off Nob Road at “Trelega” Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 900 m S of internal property fence of “Trelega” Station.

Grid reference: GDA 607860 mE 6297247 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrubland. Stands of Belah low-open woodland surround the site.

Aspect: Easterly.

Site size: Artefacts were visible over an area of 200 x 200 m.

Visibility: Site surface visibility was very high (~60%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: 38 silcrete artefacts were noted at the site (Table BF-19, Figure BF-10).

Table BF-19. Artefact attributes from Aboriginal archaeological site SN21.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Core	na	Unipolar	Multiple scar	na	54	54	21
Silcrete	Flaked piece	na	na	Cortex	na	31	22	17
Silcrete	Flaked piece	na	na	Cortex	na	38	28	12
Silcrete	Flaked piece	na	na	Cortex	na	48	29	27
Silcrete	Flaked piece	na	na	Cortex	na	48	32	24
Silcrete	Flaked piece	na	na	na	na	43	38	21
Silcrete	Flake	na	Unifacial	na	Expanded	45	35	11
Silcrete	Flaked piece	na	na	Cortex	na	61	43	19

Figure BF-10. Silcrete core at Aboriginal archaeological site SN21.

Site condition: This site is in poor condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is near the disturbance area of the proposed initial sand residue dam. Representative sample of stone artefacts should be recorded, collected, curated and stored at the 'Keeping Place' at BEMAX's Ginkgo Mine by an archaeologist and representatives of the local Aboriginal community. The collected artefacts should be recorded in sufficient detail to allow a description of the lithic technologies and reduction strategies adopted. The regional and local contexts of the artefacts should also be analysed and described. The representative sample should be replaced within rehabilitated areas in consultation with the local Aboriginal community and the DEC.

Snapper (SN) 22

Site type: Stone quarry and associated scatter of stone artefacts.

Location: Site is approximately 91 kilometres (km) from Wentworth via High Darling and Nob Roads. Turn off Nob Road at "Trelega" Station grid 83 km N of Wentworth. Site is approximately 8 km E of Nob Road and is located 1.8 km S of an internal property fence and 500 m north-west (NW) of a property access track of "Trelega" Station.

Grid reference: GDA 607833 (m)E 6296849 mN Cuthero 7331 1:100,000 orthophoto map.

Environmental setting: The site is located in scalded sandplains with a vegetation cover of Black Bluebush low-open shrublands.

Aspect: Easterly.

Site size: Artefacts were visible over an area of 400 x 400 m.

Visibility: Site surface visibility was very high (~70%) due to erosion by scalding and stock. Off-site visibility was also very high (~50%) due to erosion by wind, water and stock and vehicular traffic.

Site contents: Many thousands of silicified sandstone and silcrete cobbles of up to 150 mm diameter are eroding from the present land surface, although many of these are probably too coarse grained to have been used for flaked artefact manufacture by Aboriginal people. The upper surfaces of several buried silcrete boulders or sheets are protruding from beneath the present land surface. These appear to have been flaked in places. At least 500 silcrete flakes, flaked pieces and cores are estimated to occur at the site (Table BF-20, Figure BF-11).

Table BF-20. Artefact attributes from Aboriginal archaeological site SN22.

Material	Type	Retouch	Platform Type	Surface	Shape	L (mm)	W (mm)	T (mm)
Silcrete	Ang fragment	na	na	Cortex	na	53	33	18
Silcrete	Ang fragment	na	na	Cortex	na	48	41	38
Silcrete	Ang fragment	na	na	Cortex	na	39	34	21
Silcrete	Flake	na	Unifacial	Cortex	Regular	15	12	5
Silcrete	Flaked piece	na	na	Cortex	na	41	32	21
Silcrete	Flake	na	Unifacial	na	Elongate	27	21	9
Silcrete	Ang fragment	na	na	Cortex	na	36	24	22
Silcrete	Ang fragment	na	na	Cortex	na	55	43	19
Silcrete	Ang fragment	na	na	Cortex	na	44	41	36
Silcrete	Ang fragment	na	na	na	na	41	36	33
Silcrete	Ang fragment	na	na	Cortex	na	45	22	20

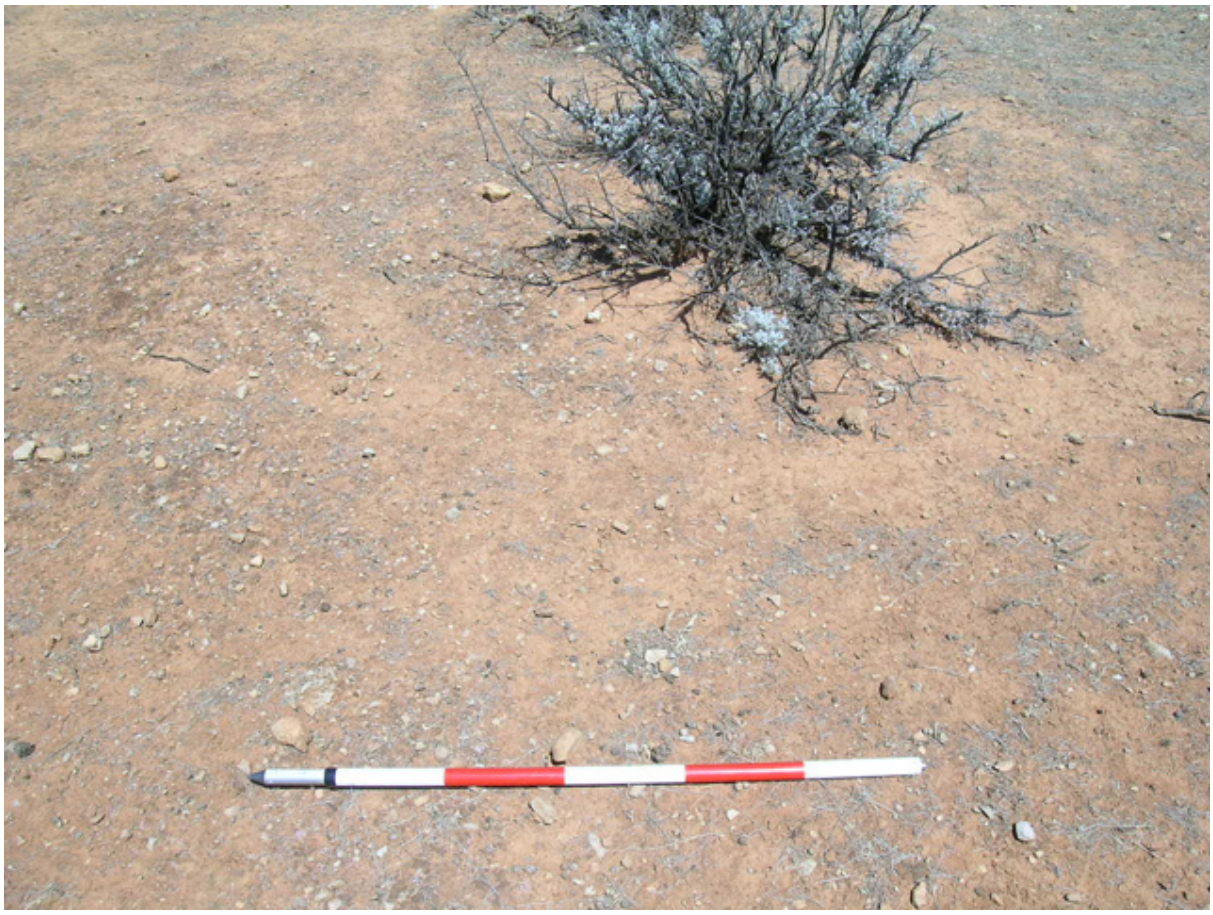

Figure BF-11. Naturally weathered and quarried silcrete at Aboriginal archaeological site SN22.

Site condition: This site is in fair condition having been disturbed by erosion by wind, water and stock traffic.

Management considerations: The site is south of the disturbance area of the proposed initial sand residue dam. Temporary protective barriers should be erected around the site. BEMAX should engage an archaeologist and representatives of the local Aboriginal community to supervise the erection of the barriers and monitoring of their maintenance.

Attachment BG

Description of Historical Cultural Heritage Site

NSW Heritage Office

NSW State Heritage Inventory form

ITEM DETAILS						
Name of Item	Kertne Nob Outstation and Stockyard Ruin					
Other Name/s Former Name/s						
Item type (if known)	Built					
Item group (if known)						
Item category (if known)						
Area, Group, or Collection Name	Snapper Mine					
Street number	Carstairs Station (93 km N of Wentworth)					
Street name	Nob Road					
Suburb/town	Wentworth			**Postcode**	2648	
Local Government Area/s	Wentworth Shire Council					
Property description	Lot 1927, DP 763905					
Location - GDA (if no street address)	**Zone**	54	**Easting**	602500	**Northing**	6302569
Owner	Private					
Current use	Derelict					
Former Use	Stockyards and associated camping area					
Statement of significance	Kertne Nob outstation and stockyard ruin is of low to moderate local heritage significance as an example of an early to mid-twentieth century pastoral and domestic site. The site contains refuse heaps of moderate research potential.					
Level of Significance	State ☐			Local ☑		

THEMES	
National historical themes	*Developing local, regional and national ecomomies* (Australian Heritage Commission Theme 3); Developing Australia's cultural life (Australian Heritage Commission Theme 8)
State historical theme	*Pastoralism; Domestic life*

DESCRIPTION						
Designer	Unknown.					
Builder/ maker	Unknown. Thomas Wakefield was pastoral leaseholder at probable time of construction.					
Physical Description	Kertne Nob outstation and stockyard ruin consists of a ~100 x 100 m area that once contained timber stockyards and a nearby area where station workers have camped. Physical remains of these activities include a timber frame that would have supported a canvas tent and scattered domestic refuse including glass bottles, broken bottle glass, burnt animal bone and food cans. All that remains of the stockyards are the timber bases of the posts and wrought iron braces and heavy gauge wire originally used to fix the rails.					
Physical condition	The site is in poor condition. It has moderate archaeological potential.					
Construction years	**Start year**	~1920s	**Finish year**	~1950s	**Circa**	☑

HISTORY	
Historical notes	The Lot 1927 Western Lands perpetual pastoral lease on which Kertne Nob outstation and stockyard ruin is located was granted to Thomas Wakefield sometime after 1903/4 (NSW Department of Lands 1912, Lans *et al*. 1988). Thomas Wakefield later transferred Lot 1927 to his son Benjamin, who incorporated it into Carstairs Station. Benjamin Wakefield's son Gordon Wakefield sold Carstairs to Colin Cullinan. Colin Cullinan's son and daughter-in-law, Gary and Stacy Cullinan, now run the property. The present landholder of Carstairs Station, Gary Cullinan, thought that the outstation and stockyard may have been established by the Wakefield family sometime after the 1920s to aid in pastoral management because Lot 1927 was some distance from the main Carstairs homestead.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The site is of low significance in the course of the cultural history of NSW. It also has low significance in the local history of the Lower Darling region.
Historical association significance SHR criteria (b)	The Kertne Nob outstation and stockyard ruin has low local significance according to the historical association criterion. The present landholder of Carstairs Station, Gary Cullinan, thought that the outstation and stockyard may have been established by the Wakefield family sometime after the 1920s to aid in pastoral management because Lot 1927 was some distance from the main Carstairs homestead.
Aesthetic significance SHR criteria (c)	Kertne Nob outstation and stockyard ruin has negligible aesthetic value because it is a very subdued feature in the landscape.
Social significance SHR criteria (d)	Kertne Nob outstation and stockyard ruin has moderate local social significance as an example of the interaction of pastoral and domestic life associated with a period of closer settlement in the early 20th century.
Technical/Research significance SHR criteria (e)	Kertne Nob outstation and stockyard ruin has moderate technical and research significance. In particular, an analysis of the refuse heaps at the site may offer some insight into domestic and pastoral activities at a remote outstation during the early to mid-twentieth century.
Rarity SHR criteria (f)	Kertne Nob outstation and stockyard ruin is an example of a relatively abundant site type. There are better preserved and more original examples of rural outstations in the region.
Representativeness SHR criteria (g)	Kertne Nob outstation and stockyard ruin is an example of a relatively abundant site type. There are better preserved and more original examples of rural outstations in the region.

HERITAGE LISTINGS	
Heritage listing/s	

INFORMATION SOURCES Include conservation and/or management plans and other heritage studies.				
Type	**Author/Client**	**Title**	**Year**	**Repository**
Map	NSW Department of Lands	*County of Windeyer cadastral map*	1912	NSW Department of Lands
Literature source	Lans, R., Smith, T., Smith, B.	*The History of Pooncarie and District*	1988	Wentworth Shire Council library, State Library of New South Wales

RECOMMENDATIONS	
Recommendation	The site is under no immediate threat of disturbance or destruction. However, the proponent should avoid disturbing the site, possibly by erecting a temporary protective barrier around it if works are occurring in its vicinity.

SOURCE OF THIS INFORMATION			
Name of study or report	Cultural Heritage Study: Snapper Mineral Sands Project	**Year of study or report**	2006
Item number in study or report	SNH1		
Author of study or report	Cupper, M.L.		
Inspected by	Cupper, M.L.		
NSW Heritage Manual guidelines used?		Yes ☑	No ☐
This form completed by	Cupper, M.L.	**Date**	12 Nov 2006

IMAGES - 1 per page

Please supply images of each elevation, the interior and the setting.

Image caption	Kertne Nob outstation and stockyard ruins – un-sawn timber tent frame				
Image year	2006	**Image by**	Cupper, M.L.	**Image copyright holder**	Cupper, M.L.

IMAGES - 1 per page

Please supply images of each elevation, the interior and the setting.

Image caption	Kertne Nob outstation and stockyard ruins – bottles and bottle grass in domestic refuse heap				
Image year	2006	**Image by**	Cupper, M.L.	**Image copyright holder**	Cupper, M.L.