Buronga Peaking Power Plant Project

Cultural Heritage Assessment

February 2008

A Report to URS Australia for
International Power Australia

Navin Officer

heritage consultants Pty Ltd

acn: 092 901 605

Number 4
Kingston Warehouse
71 Leichhardt St.
Kingston ACT 2604

ph 02 6282 9415
fx 02 6282 9416

EXECUTIVE SUMMARY

International Power (Australia) Pty Ltd (IPRA) proposes to develop a distillate fired peaking power plant at Buronga, approximately 10km northeast of Mildura, south western NSW.

The facility will occupy an area of approximately 200m x 200m on the northern side of Arumpo Road and immediately abutting the existing TransGrid 220kV Switching Station.

The proposed Buronga Peaking Power Plant would comprise the following key elements:

- Three gas turbine enclosures (incorporating air inlet, gas turbine, generator) and three associated exhaust stacks ;
- Control room, switch room, workshop and auxiliary system structures;
- Fuel and water receiving facilities and storage tanks;
- Three electricity step-up transformers and associated equipment for connection to the existing high voltage transmission system at the TransGrid switching station; and
- Associated infrastructure such as site access roads, perimeter fencing, drainage and the like.

An indigenous and non-indigenous cultural heritage assessment was conducted of the Buronga Peaking Power Plant study area. The assessment included consultation with the Barkindji Elders, database and literature review and field survey of the study area.

No Aboriginal sites or areas of cultural significance were identified within the survey area.

No European sites were identified within the survey area.

It is recommended that:

- No further Aboriginal archaeological assessment is required for the Buronga Peaking Power Plant development proposal.
- No further European heritage assessment is required for the Buronga Peaking Power Plant development proposal.
- If, in the course of construction activity, objects suspected of being Aboriginal in origin are discovered, work should stop and the DECC archaeologist at Buronga notified.
- If, in the course of construction activity, European objects suspected of being older than 50 years are discovered, work should stop and the NSW Heritage Office notified.

~ o0o ~

TABLE OF CONTENTS

1. INTRODUCTION

International Power (Australia) Pty Ltd (IPRA) proposes to develop a distillate fired peaking power plant at Buronga, approximately 10 km northeast of Mildura in the Murray-Darling Basin in south-western NSW (**Figure 1.1**). The facility will occupy an area of approximately 200m x 200m (four hectares) adjacent to the existing TransGrid 220kV Switching Station, situated on the northern side of Arumpo Road (**Figure 1.2**).

The Buronga Peaking Power Plant would comprise open cycle gas turbine units and, subject to final plant selection, have a nominal capacity of up to 150MW with the electricity generated being fed into the existing high voltage transmission system at the adjacent TransGrid switching station.

The proposed plant would comprise the following key components:

- Distillate-fired gas turbine facility including ancillary equipment and process control systems;
- Step up transformers with an electrical switchyard for feeding power output to the existing adjacent 220kV transmission line
- Administration, control and electrical building, ablutions and workshop facilities;
- A water treatment facility and water storage tanks
- Storage tanks for distillate; and
- Associated infrastructure, fencing and site roads.

The environmental assessment is being prepared in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A) which provides processes for the assessment of development applications which are considered to be a "Major project" as declared by a State Environmental Planning Policy (SEPP), or by order of the Minister in the Government Gazette.

This report details the indigenous and non-indigenous cultural heritage assessment of the Buronga Peaking Power Plant study area. The assessment included consultation with the Barkindji Elders, database and literature review and field survey of the study area.

The report was commissioned by URS Australia Pty Ltd.

1.1 Report Outline

This report:

- Describes the environmental setting of the study area;
- Describes the methodology employed in the cultural heritage assessment;
- Provides an overview of indigenous and non-indigenous heritage relevant to the study area;
- Provides the results of the data review and field survey conducted in the context of the Peaking Power Plant study;
- Provides an assessment of the potential impact of the proposed development on the Aboriginal and historic archaeological resource; and
- Provides recommendations for impact mitigation management where necessary.

Figure 1.1 Location of the Buronga Peaking Power Plant Study Area
(*Mildura 1:50,000 topographic map)*

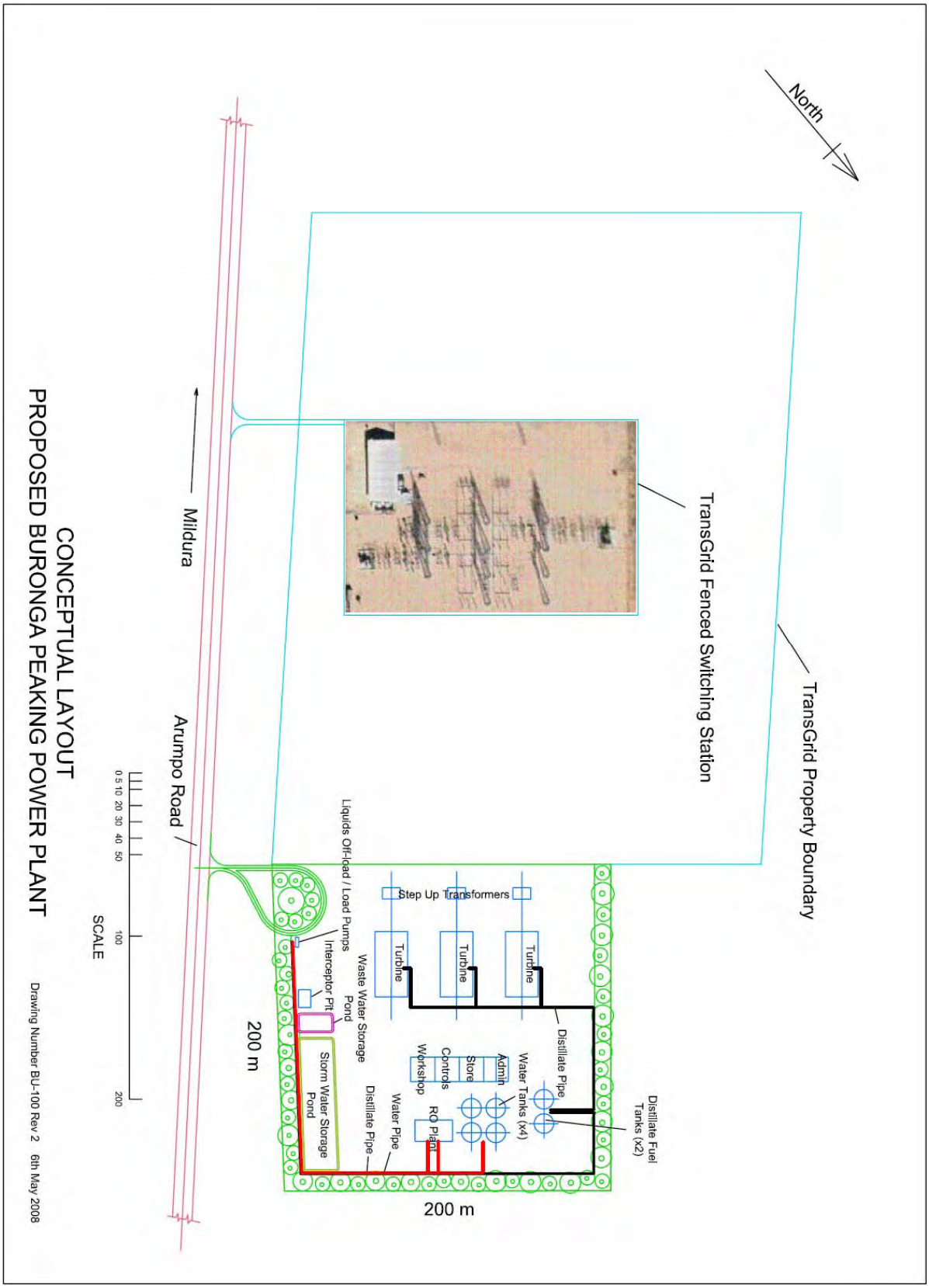

Figure 1.2 Plan of the proposed Buronga Peaking Power Plant
(Plan supplied by URS Australia).

2. ABORIGINAL PARTICIPATION

The Buronga study area falls within the boundaries of the Dareton Local Aboriginal Land Council (DLALC) and Barkindji Elders community group.

Attempts to contact the Dareton LALC by phone were unsuccessful. The consultants were subsequently advised by Mr Harvey Johnston, Department of Environment and Climate Change archaeologist based at Buronga, that the Land Council may not currently be operational. He advised that contact should be made with the Barkindji Elders group.

Ms Evelyn Crawford of the Barkindji Elders Aboriginal community group was contacted prior to the conduct of fieldwork. The nature and purpose of the assessment were discussed and a representative was invited to participate in the field survey for the project. Subsequently, Mr Ray Lawson represented the interests of the Barkindji Elders in the project and participated in the field survey. The field results and potential management strategies were discussed with Ray Lawson during and at the conclusion of the field survey.

Mr Lawson indicated verbally that the proposed development area did not have any particular cultural significance and he did not have any concerns regarding the development or the study area.

A *Record of Aboriginal Participation* is provided in **Appendix 1**.

This report includes a recommendation for a copy of this report to be provided to the Barkindji Elders during the public exhibition period of the draft Environmental Assessment with an invitation to comment on its findings. copies of this report were forwarded to Evelyn Crawford in December 2007 and February 2008. A copy of the covering letter is provided in Appendix 2.

A public notice was placed in the *Sunraysia Daily* newspaper in November 2007 asking for expressions of interest in the Buronga Peaking Power Plant project. No responses were received in relation to the public notice.

ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Navin Officer Heritage Consultants Pty Ltd has been commissioned by URS on behalf of International Power (Australia) Pty Ltd, to undertake a cultural heritage assessment of a proposed peaking power plant facility at Buronga.

The area subject to investigation consists of approximately 4ha, located approximately 10km northeast of Buronga. The proposed site is located adjacent to the existing TransGrid 220kV Switching Station, situated on the northern side of Arumpo Road.

The investigation, conducted with the participation of a representative from the Barkindji Elders, is directed at assessing the potential impact of the proposed development on Aboriginal cultural heritage values.

Aboriginal groups and individuals with an interest in this assessment are invited to express their interest by contacting Navin Officer at the address below.

The Secretary
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street
Kingston ACT 2604

The closing date for expressions of interest is 4pm 14 December 2007.

3. STUDY METHODOLOGY

3.1 Literature and Database Review

A range of documentation was reviewed in assessing archaeological and historical knowledge for the Buronga Peaking Power Plant study area and its surrounds. This literature and data review was used to determine if known Aboriginal and historical sites were located within the area under investigation, to facilitate site prediction on the basis of known regional and local site patterns, and to place the area within an archaeological and heritage management context. The review of documentary sources included heritage registers and schedules, local histories and archaeological reports.

Aboriginal literature sources included the Aboriginal Heritage Information Management System (AHIMS) maintained by the NSW Department of Environment and Climate Change (DECC) and associated files and catalogue of archaeological reports. Sources of historical information included regional and local histories.

Searches were undertaken of the following statutory heritage registers and schedules:

- Statutory Listings
  - Aboriginal Heritage Information Management System (AHIMS) (NSW DECC);
  - World Heritage List;
  - The National Heritage List (Australian Heritage Council);
  - The Commonwealth Heritage List (Australian Heritage Council);
  - The State Heritage Register (NSW Heritage Office); and
  - Heritage Schedule 1 from the Wentworth Shire Council Local Environmental Plan 1993.

3.2 Fieldwork

Fieldwork was conducted by three people over one day on 16th August 2007. Fieldwork involved a comprehensive archaeological survey of the proposed Peaking Power Plant development area and immediate surrounds.

All survey was conducted on foot and involved walking across the study area examining areas of visibility and micro-topographic features. All areas of significant ground surface visibility were surveyed. An assessment of landscape disturbance and archaeological sensitivity/potential was made for the subject area.

3.3 Project Personnel

Fieldwork was conducted by archaeologists Matthew Barber and Tom Taverner, and Ray Lawson of the Barkindji Elders. This report was prepared by Matthew Barber and Rebecca Yit.

4. ENVIRONMENTAL CONTEXT

4.1 General

The broad floodplain of the Murray River forms part of the Murray-Darling Basin. This alluvial surface was formed as a result of a major period of deposition which occurred over the last 60 million years. During this period the sea covered the Murray-Darling Basin and the climate was characterised by high levels of rainfall (Bonhomme Craib & Associates 1999). The retreat of the ancient sea resulted in a series of north-south trending ridges representing the abandoned shorelines, sea bed, beaches and dunes (Hope 1999). Between 50,000 to 25,000 BP (Before Present), increased runoff with reduced evaporation resulted in high groundwater levels and full lakes (Bonhomme Craib & Associates 1999). Subsequently the abandoned basin was filled by the freshwater Lake Bungunnia (Hope 1999). Approximately 25,000 BP as the climate became more arid the lakes shrank and became shallow and saline. These lakebed deposits were reworked and divided into a series of rivers and channels which began forming lunettes associated with the lakes and sand dune ridges (Hope 1999; Bonhomme Craib & Associates 1999).

Subsequently, a deposition of younger alluvium occurred and older alluvium surfaces were dissected by the ancestors of the present rivers. The channels of this phase are known as ancestral rivers. The continuing fluvial deposition built up the floodplain sediments and the drainage system that had previously emptied into the ancient sea developed into the Murray River and its tributaries (Hope 1999). The Murray River was subsequently diverted into two streams, the present Murray River and the Darling River. The only signs of the prior streams phase in the area today are aeolian sand ridges, which rise up to 10 m above the floodplain, and the prior stream watercourses which have become aquifers.

Today the Murray-Darling Basin is characterised by a relatively flat, low-lying landscape with shallow aeolian deposits overlying the clay sediments of the fluvial and marine periods (Hope 1999).

The complex geomorphology of the area provides important evidence of the influence of climatic and tectonic changes in the region during the Quaternary. The palaeo channels of the area are important in the study of the mechanics of fluvial deposition. Studies of ancestral rivers and lakes in the regions have demonstrated how rivers have adjusted to different flow regimes in the past.

Certain hydrological features distinguish the Buronga-Gol Gol area within the Murray-Darling Basin. Pleistocene formed lakes now no longer active within the study area include Lake Gol Gol and Gol Gol Swamp (Bonhomme Craib & Associates 1999). These former lakes are associated directly with the Murray River and are characterised by lunettes on their eastern fringes. Consisting of crescent-shaped clay and or sand basins they provide for an environment suited for the preservation of archaeological deposits.

The vegetation of the study area is characterised by the Grey Box (*Eucalyptus microcarpa*) and Yellow Box (*Eucalyptus melliadora*) open forest/woodland, which is found on sand ridges. White cypress pine and buloke (*Casuarina luehmanni*) may also be present.

Other vegetation units of the region include the River Red Gum (*Eucalyptus camaldulensis*) open forest/woodland occurring in areas frequently flooded, Black Box (*Eucalyptus largiflorens*) open forest/woodland occurring on drier sites on the outer margins of the forests and swamp communities dominated by rushes and reeds.

The woodland forests and swamps of the area provide a variety of habitats for native fauna. Mammal species include large numbers of eastern grey kangaroos, small terrestrial mammals such as yellow footed antechinus, echidnas and bandicoots as well as marsupial carnivores and native rodents. The wide range of small native species has been replaced by introduced feral animals (Hope 1999).

The Murray-Darling Basin region has been the scene of various European cultural land use activities which have utilised natural resources, leaving reminders of the activities as elements in the landscape and as a modified landscape. Since European settlement in the Murray-Darling Basin the vegetation has been extensively cleared and these effects on the land have dramatically impacted on plant and animal species causing loss and greatly reduced distributions and populations.

4.2 The Study Area

The site of the proposed Peaking Power Plant is located immediately northeast of and adjacent to an existing TransGrid high voltage switching station and is situated approximately 2.5 km northeast from the edge of Lake Gol Gol. The proposed development lies approximately nine kilometres north of the Murray River.

The existing TransGrid switching station and its immediate surrounds are located on mostly flat, low-lying ground, cleared of most vegetation with scattered box and Casuarina woodland. The site has been levelled and the switching station then constructed on imported crushed rock base, providing a platform elevated above the surrounding ground. Part of the ground outside the existing 220kV Switching Station has been disturbed through levelling, and shallow drainage channels have been excavated away from the switching station.

The four hectare area of the proposed peaking plant is characterised by a small sand dune on the western side and a higher, more substantial dune on the eastern side. They are irregular in shape and follow an approximate northeast – southwest alignment. The dunes are separated by a shallow swale or depression, which may hold water after heavy rains.

The area has not been heavily disturbed apart from a small dam that has been excavated in the southwestern corner and some active rabbit warrens within the study area.

The vegetation regime within the study area is determined by the terrain. Mallee is found on the crest and upper slopes of the dunes. Box trees are found on the slopes, overlapping with the Mallee. Within the swale, Bulah (*Casuarina pauper*) is the dominant tree species.

5. ABORIGINAL CONTEXT

5.1 Tribal Boundaries and Ethnohistory

Tribal boundaries within Australia are based largely on linguistic evidence and it is probable that boundaries, clan estates and band ranges were fluid and varied over time. Consequently 'tribal boundaries' as delineated today must be regarded as approximations only, and relative to the period of, or immediately before, European contact. Social interaction across these language boundaries appears to have been a common occurrence.

A reconstruction of clan boundaries based on Tindale (1974) indicates that the Buronga area fell within the area of custodial interest of the *Kureinji* people.

The *Kureinji* people occupied a stretch of territory located in what is now known as the Murray-Darling Basin. According to Tindale (1974) *Kureinji* land stretched from Euston on the northern bank of the Murray River west to Wentworth. Their lifestyle was based on hunting, fishing and collecting food. However, being river people, most of their time was occupied by fishing, with the majority of food being provided from the network of rivers, lagoons, creeks and lakes. The annual floods that occur in the region provide regular replenishment of such food sources.

The original territory was both rich and abundant in natural food sources. It was a broad based economy which was capable of producing a wide range and variety of food. It is thought that the first European to have contact with the *Kureinji* was Charles Lockhart who mentioned the tribe in his accounts in this area (Tindale 1974:196).

Five Aboriginal groups currently live in the Wentworth Shire of the Murray-Darling Basin. These groups consist of the Maraura of the Lower Darling to Lake Victoria, the Paakantji (Barkindji) of the Darling River, the Barindji to the east and including the Willandra lakes, the Kureinji to the east of the Maraura and south of the Barindji, and the Danggali in the northwest part of the Shire (Hassel Planning Consultants 1989). The tribes originally spoke closely related dialects of a wide family language Pama Ngungan. Evidence of these languages still exists and studies have revealed close linguistic relationships between adjacent tribes (Hassel Planning Consultants 1989).

The Murray-Darling Basin was regarded as one of the most heavily populated regions in Australia prior to European colonisation. The land along the Murray was owned by tribal groups whose territories were relatively small though densely populated (Hope 1999). By comparison with other areas, the Murray-Darling Basin was capable of carrying a much higher population density than the less fertile and more arid regions in Australia. Evidence to support this, such as the abundance of mounds (camping and cooking places), the fish trap systems and middens (build up of shell fish), indicates that the Murray-Darling Basin which includes the *Kureinji* territory was intensively utilised by tribal groups.

The arrival of Europeans had a destructive impact on traditional groups such as the *Kureinji*. The population was greatly reduced within the first generation of European settlement (Buchan 2000). By 1877, the remaining *Kureinji* population and other tribal groups from neighbouring areas had been removed to the various missions along the Murray.

5.2 Regional Overview

The study area is located within the Murray Darling Basin. Aboriginal people have occupied this part of Australia for over 40,000 years, with early occupation focused on the resources of freshwater lakes, and rivers and their floodplains. This occupation also occurred along various river channels that pre-date the present Murray-Darling river system (Murray-Darling Basin Ministerial Council [MDBMC] 1987:353).

Archaeological evidence indicates that with the drying up of the lakes around 25,000 years BP in response to changes in climatic conditions, Aboriginal people remained near major rivers. However, by 4,000 years BP there is evidence of a major increase in site numbers and more intensive occupation of more marginal environmental regions (MDBMC 1987:354).

Professional archaeological investigation began in the mid 1980s after Buchan brought attention to the numbers of significant sites within the Buronga and Gol Gol areas. Buchan (1974) assessed a shell midden adjacent to a lagoon approximately 2.5 km from the Murray River. Prior to this, archaeological work conducted within the Murray Darling Basin region was research-oriented and superficial (Bonhomme Craib & Associates 1999).

Broader-area sporadic archaeological investigations undertaken for cultural heritage management have been conducted in the region since the 1990s. These studies include an indigenous heritage assessment for a proposed bentonite mine development (Appleton 1997), a cultural heritage assessment and subsequent archaeological salvage for a sand extraction project (Edmonds 1997), and a survey of the Gol Gol sewerage treatment works development (Lance 1993).

In 1990 the National Parks & Wildlife Service (NPWS) conducted a series of workshops aimed at attempting to develop a predictive model of Aboriginal site location for western NSW (Johnston and Witter 1996, Bonhomme Craib & Associates 1999). The workshops resulted in Johnston and Witters' (1996) final report on the *Cultural Resources Database for the Murray Stage III* providing a guide for determining site locations, using an approach termed 'archaeographic systems'. Western NSW was divided into seven regions defined by its geomorphology, soils and vegetation and the associated site controlling factors identified. The Lower Darling Region was analysed in detail and as a result twelve 'archaeographic systems' were established with their subsequent site location rules.

The NPWS archaeological project was followed by a cultural heritage study for the Murray Darling Water Management Action Plan (MDWMAP) conducted by Bonhomme Craib & Associates 1999. The broader MDWMAP incorporated areas identified within the NPWS project and assessed the existing and potential impacts of irrigation and water use industries on the Murray Darling cultural heritage (Bonhomme Craib & Associates 1999). The aims of the 1999 study were three-fold: to provide additional site information on the current heritage databases, to identify and determine the significance of sites and cultural heritage areas; and to develop a predictive model for cultural heritage assessment.

Gaffey (1991) conducted an archaeological survey for a 30 km optical fibre cable between Mildura and Wentworth, traversing floodplain and sand dunes adjacent to the Murray River. A single isolated artefact was identified during the course of the survey and four areas of archaeological sensitivity, incorporating previously identified midden sites (*Dareton Midden* and *Tuckers Creek 2 Midden),* were located along the cable route.

In 1993, Lance conducted an archaeological survey for the sewerage treatment development adjacent to the Gol Gol Sewerage Treatment facility, north of Buronga. Forty-six sites were identified during the survey. The sites occurred on the eastern edge of Lake Gol Gol in association with sandy lunette sediments. The sites consisted of forty one scarred trees, and four hearths and associated artefact scatters. A single disturbed burial was also identified on the sand dunes adjacent to the lake.

Archaeological salvage of midden site *Bowen Park 1* was undertaken by Edmonds (1997) for a sand extraction project at Monak on the Murray River, nine kilometres east of Gol Gol. The site consisted of four small exposures of freshwater mussel shell, three isolated artefacts, and burnt clay fragments indicative of a hearth. Radiocarbon dating of the shell material revealed dates ranging between 19,670 BP+1030/-910 to 20,420 BP+1130/-990 (Edmonds 1997).

Appleton (1997) conducted an archaeological survey of 729 ha on Arumpo Station for the expansion of the bentonite mine, 80 km northeast of Mildura. A large low-density artefact scatter was identified in a Gilgai depression during the survey.

Figure 5.1 General locations of previously recorded Aboriginal sites (red circles) in the vicinity of Buronga Peaking Power Plant study area (as shown in blue) *(Mildura 1:50,000 topographic map)*.

5.3 Previously Recorded Sites

Three Aboriginal sites (#46-3-6, #46-3-79 and #46-3-80) including one scarred tree and two burials have been previously recorded in the general vicinity of but outside of the Buronga Peaking Power Plant study area. Site locations are shown in **Figure 5.1**.

Scarred Trees #46-3-06

AMG: 614371.624298 AGD54 (converted from imperial grid reference)

This site was described by the Mildura and District Anthropology Group in 1969 as, 'between 80 and 100 trees with 'frames' or 'glyphs' out in their bark, piles of fireclay, chippings etc are to be found very close to – though not actually in sight of – the site'. An additional comment on the site card states 'snakes and other emblems carved on River Red Gums around [the] lake-trees likely to be destroyed by falling creek levels'.

The grove of scarred trees is situated approximately 2.5 km southeast of the Buronga Peaking Power Plant study area.

Burials #46-3-79 & #46-3-80

AMG: 617750 6217600 AGD54 (converted from imperial grid reference)

These sites were recorded by Littleton in 1993 and mark the location of reburied skeletal material, previously identified on Gol Gol Swamp. The original locations of the skeletons are not known.

5.4 Predictive Aboriginal Archaeology Statement

Aboriginal sites that may occur within the Buronga Peaking Power Plant study area include:

- Artefact scatters occurring in open contexts with or without hearths;
- Scarred trees;
- Burials occurring within sand bodies.

Areas of archaeological sensitivity within the study area include:

- Aeolian dune systems which have been proven to contain burials and occupation sites.

6. HISTORICAL CONTEXT

6.1 Historical Overview

The European history of the Murray Darling Basin has been well documented in numerous books, reports and articles. A summary history only is provided here, with particular reference to information relevant to the study area.

6.1.1 The Explorers

Initial European travel through the study area first began during the late 1820s and 1830s, following the uncharted Murray and Darling Rivers in an effort to discover the inland sea. On an expedition to trace the Murrumbidgee River, Sturt entered the Murray River, subsequently naming it and marking the Darling River junction (Hassell Planning Consultants 1989). In 1836 Surveyor General Thomas Livingston Mitchell set out on a similar course to Sturt, naming and recording Gol Gol Creek using the Aboriginal meaning 'Meeting Place' (Voullaire 1982).

Overlanders droving cattle from New South Wales to Adelaide, along the Murray River route established the river junction campsite known as Hawdon's Ford. This settlement was later referred to as the "Darling Junction". During 1844, Edward John Eyre undertook exploration of the Lower Darling from Laidley's Ponds (Menindee) to the Darling Junction, marking the beginnings of initial settlement along the Murray River by squatters.

6.1.2 Settlement Period

In the period 1846 to 1860 squatters claimed the river frontages establishing settlements and sheep stations along the river margin. Aboriginal territories were disregarded and the Aboriginal people pushed to the fringes of the settlements and onto the few missions established in the Murray-Darling Basin. By 1860 improvements in transport including steam navigation, encouraged the growth of settlement along the river and at points of supply exchange along the river, specifically for the procurement of timber.

During this period the landscape underwent large-scale modification as squatters moved north of the river corridor to increase their land holdings. Land clearing practices and damming of water resources for stock resulted in severe landscape degradation.

The settlement of Wentworth west of the river junction had become a major port of exchange, existing as a business centre to the Murray River trade. In 1865, a survey was initiated to determine a site for the river township of Gol Gol, notified in the Government Gazette of 1866 (Voullaire 1982).

The 1863-64 wet season saw the beginning of major expansion in the region with pastoral holdings increasing their land tenure. By 1869 the principle stations in the Murray-Darling Basin region included Moorna, Mallee Cliffs, Para, Taracoola, Mallara, Moorara, Polia, Cuthero and Tapio (Hassell Planning Consultants 1989).

The great flood of 1870 caused isolation and the disintegration of many small settlements along the river. This boosted the popularity of the township of Wentworth which underwent major economic expansion and the town was proclaimed a municipality in 1879 (Hassell Planning consultants 1989).

In March 1871 sales began of allotments at Gol Gol however it was not until a decade later that allotments in the village were occupied (Voullaire 1982). The suburban boundaries were notified in the Government gazette on the 29th March, 1885. An area set aside for a wharf on the banks of the river at Gol Gol was notified on 12th September, 1891.

In the 1880s the township of Gol Gol is recorded as consisting of six resident families, one hotel, a store, a stone building residence, a cemetery with three graves and a log hut (Hassell Planning Consultants 1989).

6.1.3 Irrigation

The early twentieth century saw the beginnings of irrigation with river frontages undergoing major landscape changes. Irrigation channels allowed for the development of horticultural activities such as orchards and vineyards. During this time Gol Gol received its first town water supply by means of a hand operated pump which carried water by pipe to the top of the river bank. As a result of the irrigation works Gol Gol's population continued to increase until around 1917 the township was considered a suburb of the large town of Mildura (Hassell Planning Consultants 1989).

By 1929 irrigation works along the Murray to assist pumping had been completed. During this period road and transport works were improved leading to the establishment of new irrigation settlements such as Dareton (Hassell Planning Consultants 1989). At this time Mildura was gaining importance as a commercial centre and as a result small villages were appearing along the edges of the township and river, including the village of Buronga situated at the Mildura bridge site on the opposite side of the river. Buronga was part of the large Tapio station run, originally formed in the 1840s (Wentworth Shire Council http://www.wentworth.nsw.gov.au/history/towns.php?go=#buronga).

In 1933 the Aboriginal mission at Pooncarie closed and the Aboriginal people were dispersed along the Murray. Many of these people set up humpies and small villages outside Dareton and Buronga (Hassell Planning Consultants 1989).

6.2 Heritage Listed Items

No heritage listed items occur within the vicinity of the Buronga study area.

6.3 Predictive Historical Archaeology Statement

Unrecorded historic sites and features of heritage significance that may occur within the study area include:

- Archaeological sites such as the occupation remains of former dwellings including homesteads, houses and huts, will be distributed in close association with land settlement patterns, and correlated with favourable agricultural lands, trading nodes and transport corridors;

- Transport and access routes such as bridle paths and stock routes of varying forms and ages, may survive as abandoned remnants adjacent to modern transport routes, or as alignments now followed by more modern or upgraded road and track infrastructure;

Old fence lines may occur along road easement boundaries and farmlands.

7. RESULTS

7.1 Aboriginal Sites

No Aboriginal sites or potential archaeological deposits were identified in the study area. The area is generally considered to have low archaeological potential.

7.2 Aboriginal Cultural Values

Barkindji Elders sites officer, Mr Ray Lawson, indicated that the proposed development area did not have any particular cultural significance. Mr Lawson did not have any concerns relating to the proposed development.

7.3 European Sites

No European sites were identified during the field investigations. There is negligible potential for such sites to occur at this location.

7.4 Survey Coverage and Visibility Variables

The effectiveness of archaeological field survey is to a large degree related to the obtrusiveness of the sites being looked for and the incidence and quality of ground surface visibility. Visibility variables were estimated for all areas of comprehensive survey within the study area. These estimates provide a measure with which to gauge the effectiveness of the survey and level of sampling conducted. They can also be used to gauge the number and type of sites that may not have been detected by the survey.

Ground surface visibility is a measure of the bare ground visible to the archaeologist during the survey. There are two main variables used to assess ground surface visibility, the frequency of exposure encountered by the surveyor and the quality of visibility within those exposures. The predominant factors affecting the quality of ground surface visibility within an exposure are the extent of vegetation and ground litter, the depth and origin of exposure, the extent of recent sedimentary deposition, and the level of visual interference from surface gravels.

Two variables of ground surface visibility were estimated during the survey:

- A percentage estimate of the total area of ground inspected which contained useable exposures of bare ground; and

- A percentage estimate of the average levels of ground surface visibility within those exposures. This is a net estimate and accounts for all impacting visual and physical variables including the archaeological potential of the sediment or rock exposed.

The obtrusiveness of different site types is an important factor in assessing the impact of visibility levels. For example, artefacts made from locally occurring rock such as quartz may be more difficult to detect under usual field survey conditions than rock types that are foreign to the area. The impact of natural gravels on artefact detection was taken into account in the visibility variables estimates outlined above.

Table 7.1 summarises estimates for the degree to which separate landforms within the study area were examined and also indicates the exposure incidence and average ground visibility present in each case. A total of 34.5% of the ground area in the study area was inspected during the survey, of which 45.7 % provided useable archaeological exposures.

A graphic approximation of the surface survey coverage achieved within the study area is shown in **Figure 7.1**.

Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was 12.2 % of the total survey area. It should be noted that the survey examined an area more than twice the size of the proposed development area.

The ESC attempts to provide an estimate of the proportion of the total study area that provided a net 100% level of ground surface visibility to archaeological surveyors.

The ESC calculation is defined and required by the DECC and stated to be of use in assessing and cross comparing the adequacy of archaeological surface surveys. The actual utility of the ESC calculation however is challenged by many archaeologists. The limitations of the ESC calculation are emphasised by differences in the subjective assessment of exposure and visibility levels, variations in how survey units are defined and measured, and differences in how and which variables are estimated and combined. In reality, ESC results tend only to be meaningful when compared across surveys conducted by the same surveyors and ESC measurers.

Table 7.1: Survey Coverage Data

Survey division	Survey unit	Landform	Survey mode	Main exposure types	Estimated Survey Unit area (ha)	Proportion of unit surveyed %	Area of unit surveyed (ha)	Exposure incidence %	Average exposure visibility %	Net effective exposure (ha)	Effective survey coverage of survey unit %	Aboriginal Archaeological recordings
Peaking power station	A	low dune	foot	denuded ground	1.5	60	0.9	60	80	0.4320	28.8	nil
	B	swale/depression	foot	denuded ground, rabbit warrens	2.5	40	1	40	80	0.3200	12.8	nil
	C	high dune	foot	denuded ground	3.1	25	0.775	50	80	0.3100	10.0	nil
Swithching Station	D	flat	foot	denuded ground	2.5	20	0.5	30	70	0.1050	4.2	nil
	E	dune	foot	vehicle track	0.08	90	0.072	40	60	0.0173	21.6	nil
	F	flat	foot	denuded ground	0.16	90	0.144	30	30	0.0130	8.1	nil
Total					*9.84*		*3.391*			*1.1972*	*12.2*	

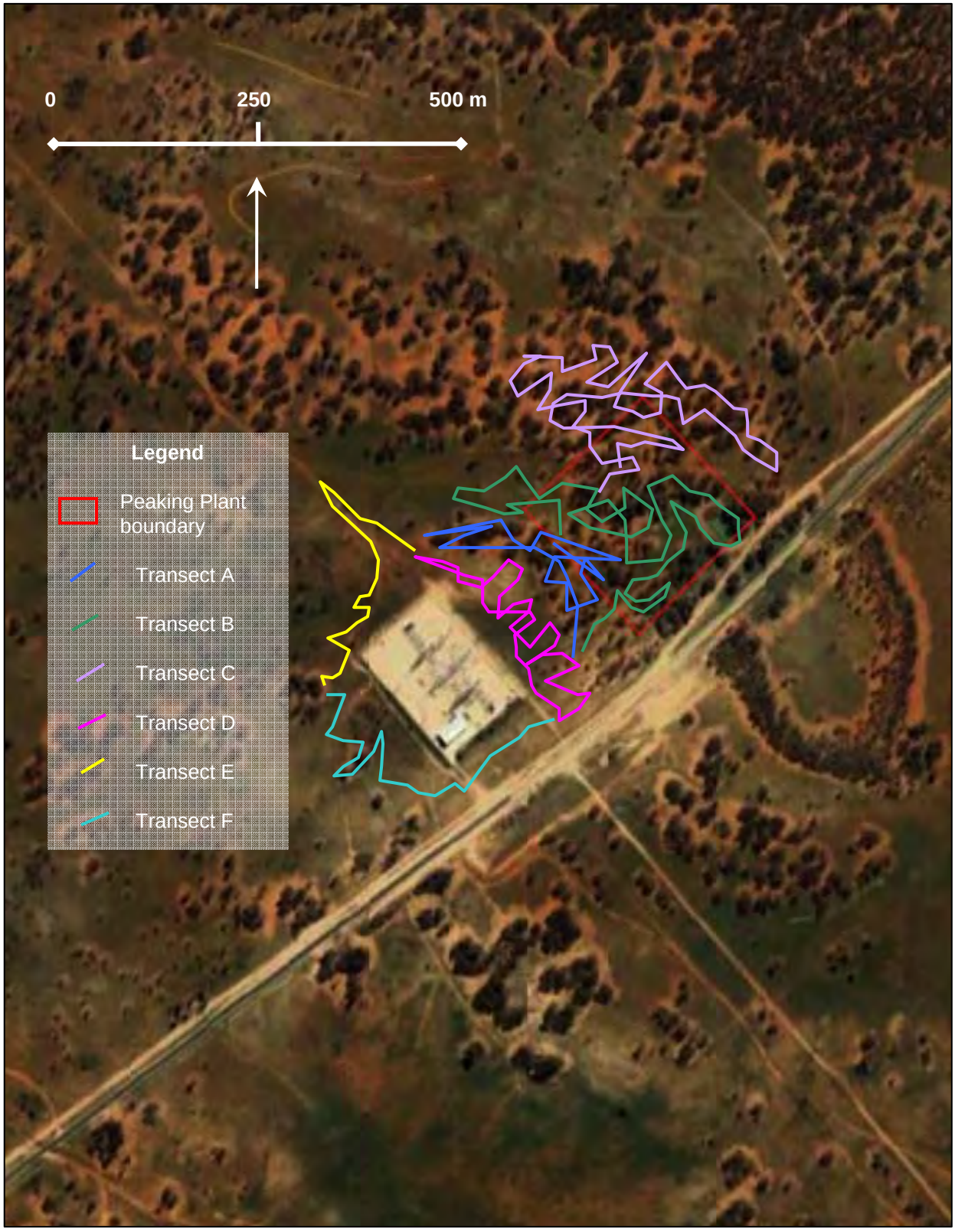

Figure 7.1 A graphic approximation of the surface survey coverage achieved within the study area. *(Base map supplied by URS Australia)*

8. STATUTORY INFORMATION[1]

8.1 Environmental Planning & Assessment Act (1979)

The Environmental Planning & Assessment Act 1979 (EP&A Act) and its regulations, schedules and associated guidelines require that environmental impacts are considered in land use planning and decision making. Environmental impacts include cultural heritage assessment. The Act was recently reformed by the passage of the Environmental Planning and Assessment Amendment (Infrastructure and other Planning Reform) Act in June 2005.

This reform provided a separate streamlined and integrated development assessment and approvals regime for major infrastructure and other projects of significance to the State is defined by Part 3A.

Under the provisions of Part 3A, proponents of major and infrastructure projects must make a project application seeking approval of the Minister. The application is to include a preliminary assessment of the project. Application may be for concept plan approval or full approval. Following input from relevant agencies and council(s), DoP will issue the proponent with requirements for the preparation of an Environmental Assessment and a Statement of Commitments. The Statement of Commitments will include how the project will be managed in an environmentally sustainable manner, and consultation requirements.

Part 3A removes the stop-the-clock provisions and the need for single-issue approvals under eight other Acts, including the *National Parks and Wildlife Act* 1974 and the *Heritage Act* 1977. Environmental planning instruments such as the heritage provisions within LEP and REPs, (other than State environmental planning policies) do not apply to projects approved under Part 3A.

The implication for the Buronga Peaking Power Plant project is that no permits are required for impact to any 'objects' under the *National Parks and Wildlife Act* or 'relics' under the *Heritage Act.*

[1] The following information is provided as a guide only and is accurate to the best knowledge of Navin Officer Heritage Consultants. Readers are advised that this information is subject to confirmation from qualified legal opinion.

9. CONCLUSIONS AND RECOMMENDATIONS

The results of the survey of the Buronga Peaking Power Plant study area did not reveal any Aboriginal or European heritage sites. The surface visibility was generally excellent providing ample opportunity to locate heritage items if they were present.

The environmental characteristics of the study area were not conducive for the location of Aboriginal sites. There was no reliable water source present and there were no particular resource zones that would have attracted people to the location. While the survey result of no Aboriginal sites is considered a true indication of the archaeological potential, there is the possibility that undetected archaeological objects occur within the study area. These would most likely be very low densities of stone artefacts, comprising part of a background scatter of artefacts that exists across much of Australia.

However, the potential for Aboriginal artefacts to be present within the study area is not considered sufficient to warrant further archaeological investigations.

The absence of European heritage sites is also considered to be a true reflection of the heritage potential of the study area. It is unlikely that any heritage items occur within the study area.

It is recommended that:

1. No further Aboriginal archaeological assessment is required for the Buronga Peaking Power Plant development proposal.

2. No further European heritage assessment is required for the Buronga Peaking Power Plant development proposal.

3. If, in the course of construction activity, objects suspected of being Aboriginal in origin are discovered, work should stop and the DECC archaeologist at Buronga notified.

4. If, in the course of construction activity, European objects suspected of being older than 50 years are discovered, work should stop and the NSW Heritage Office notified.

5. A copy of this report should be provided to:

   The Secretary
   Barkindji Elders Group
   PO Box 323
   DARETON NSW 2717

   Three copies of this report should be provided to:

   Mr Harvey Johnston
   Archaeologist
   Department of Environment and Climate Change
   PO Box 318
   BURONGA NSW 2739

10. REFERENCES

Appleton, J. 1997 The archaeological Investigation of an area subject of a Mining Lease Application, Arumpo Bentonite Mine, Northeast of Mildura, South Western NSW. Report to Corkery & Co Pty Ltd for Australian Environmental Resources NL.

Bonhomme Craib & Associates Consultants 1999 Cultural Heritage Study For The Murray Darling Water Management Action Plan. Final Report. Prepared for the MDWMAP Steering Committee Buronga, NSW.

Buchan, R. 2000 The Aborigines of New South Wales. National Parks & Wildlife Service, Sydney.

Buchan, R. 1974 Report on an Aboriginal Shell Midden Near Buronga, NSW. Unpublished manuscript.

Edmonds, V. 1997 Bowen Park Aboriginal Shell Midden-Salvage Report. Report to Sunraysia Environmental, Mildura.

Gaffey, P. 1991 Archaeological Study of Mildura-Wentworth Optical Fibre Cable Route. Draft report prepared for Telecom.

Hassell Planning Consultants P/L 1989 The Wentworth Shire Heritage Study. Report prepared for the Council of the Shire of Wentworth.

Hope, J. 1999 'Environment and Heritage In the Murray Basin'. In Stewart, R. (ed) Murray Basin Mineral Sands Conference: Extended Abstracts, April 21-23 1999 Mildura, Victoria Australia. *Australian Institute of Geoscientists Bulletin*, 26:pp.208-211.

Johnston, H. & D. Witter 1996 Cultural Resources Database for the Murray: Summary Report of Stage III, National Parks and Wildlife Service. Report to the Murray Darling Basin Commission.

Lance, A. 1993 An archaeological study of the Buronga-Gol Gol Sewerage Scheme, New South Wales. A report prepare for the Public Works Department, NSW.

Murray-Darling Basin Ministerial Council (MDBMC) 1987 *Murray-Darling Basin Environmental Resources Study.* State Pollution Control Commission, Sydney.

Tindale, N.B. 1974 *Aboriginal Tribes of Australia*, Australian National University Press. Canberra.

Voullaire, K. 1982 *Gol Gol Township & School 1882-1982*. Sunnyland Press, Victoria.

~ o0o ~

APPENDIX 1

RECORD OF ABORIGINAL PARTICIPATION

Record of Aboriginal Representative Participation*

Project Name: BURONGA TURBINE STATION.

Aboriginal Organisation: BARKINDJI ELDERS

Client Name & Address:

Archaeologist name & address: Navin Officer Heritage Consultants Pty Ltd, 4/71 Leichhardt Street, KINGSTON, ACT 2604 (Tel: 02 6282 9415, Fax: 6282 9416)

Name of Representative	Date	Type of Participation	Start time	Finish time
RAY LAWSON	16/8/07	SURVEY	0830	1130
				3:00 HRS

Comments:

Signed ***(archaeologist)***: M. Baker ***(Aboriginal representative)***: Ray Lawson **Date** 16-8-07

(Aboriginal representative): **Date**

(Aboriginal representative): **Date**

(Aboriginal representative): **Date**

* *Please note this form is not an invoice. For payment, please send an invoice from your organisation to the client name and address provided above.*

APPENDIX 2

CORRESPONDENCE TO BARKINDJI ELDERS

Navin Officer
heritage consultants pty ltd
abn: 28 092 901 605

Kerry Navin
Kelvin Officer

Nicola Hayes
Daniel Powell
Lindsay Smith
Rebecca Yit

19 February 2008

Ms Evelyn Crawford
Barkindji Elders Committee
c/- 41 Fitzroy Street
GEURIE NSW 2831

Dear Evelyn,

Re: Buronga Peaking Power Plant

Please find enclosed a copy of the Buronga Peaking Power Plant project cultural heritage assessment for your information and review (we understand that you have been on leave and may not have received the copy we forwarded in December 07).

As discussed, a Barkindji Elders representative participated in the field survey and reported back to you on the survey results. We would appreciate your views on the project (a brief letter or phone call would be fine).

Please call if you require any clarification of any aspect of the report.

Thankyou for interest and participation in this project.

Yours faithfully,

(Ms) Kerry Navin