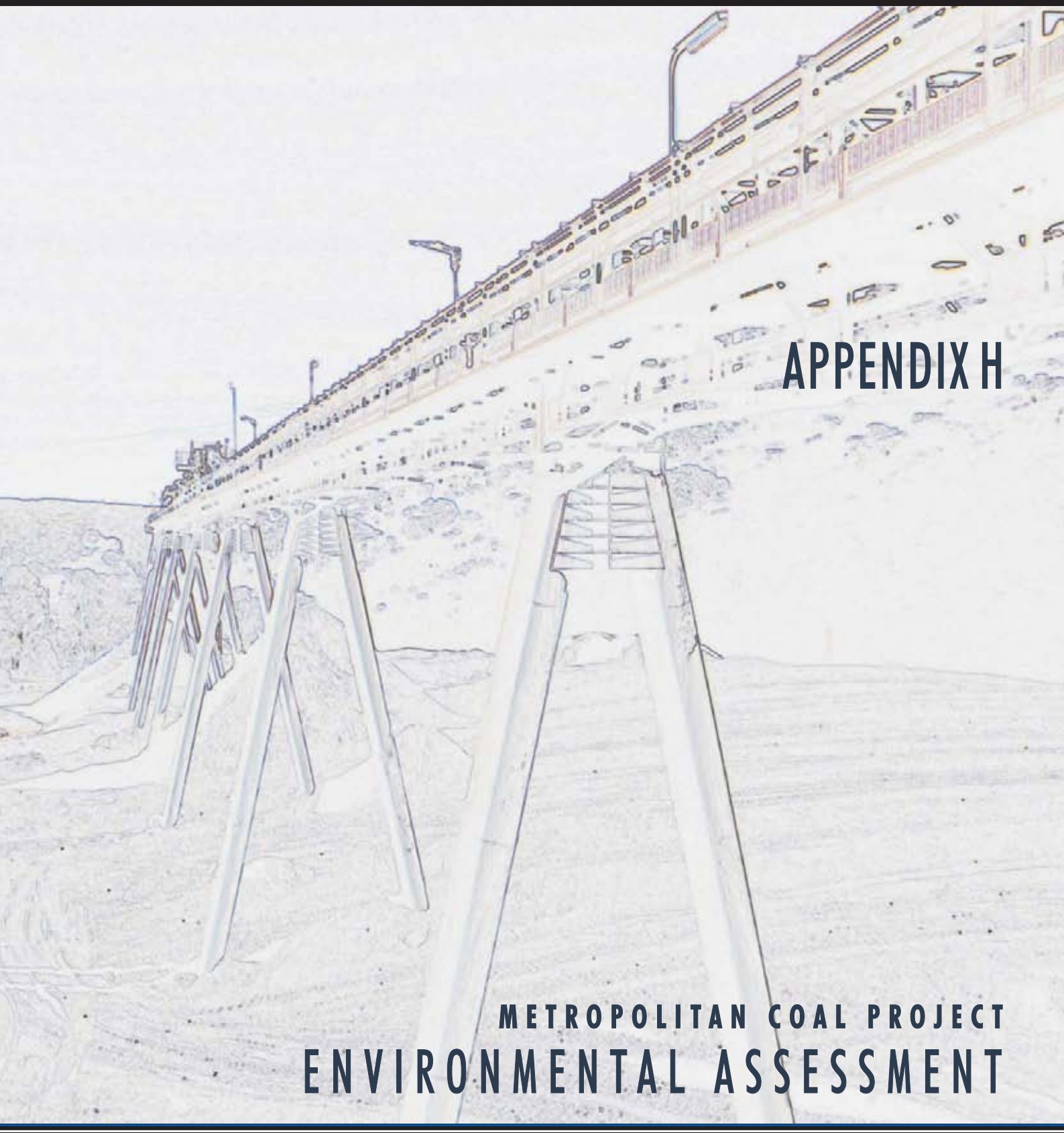

# APPENDIX H

## METROPOLITAN COAL PROJECT

# ENVIRONMENTAL ASSESSMENT

# Aboriginal Cultural Heritage Assessment
# Metropolitan Coal Project
# Metropolitan Colliery, Helensburgh, NSW

July 2008

Prepared for

Helensburgh Coal Pty Ltd

KAYANDEL

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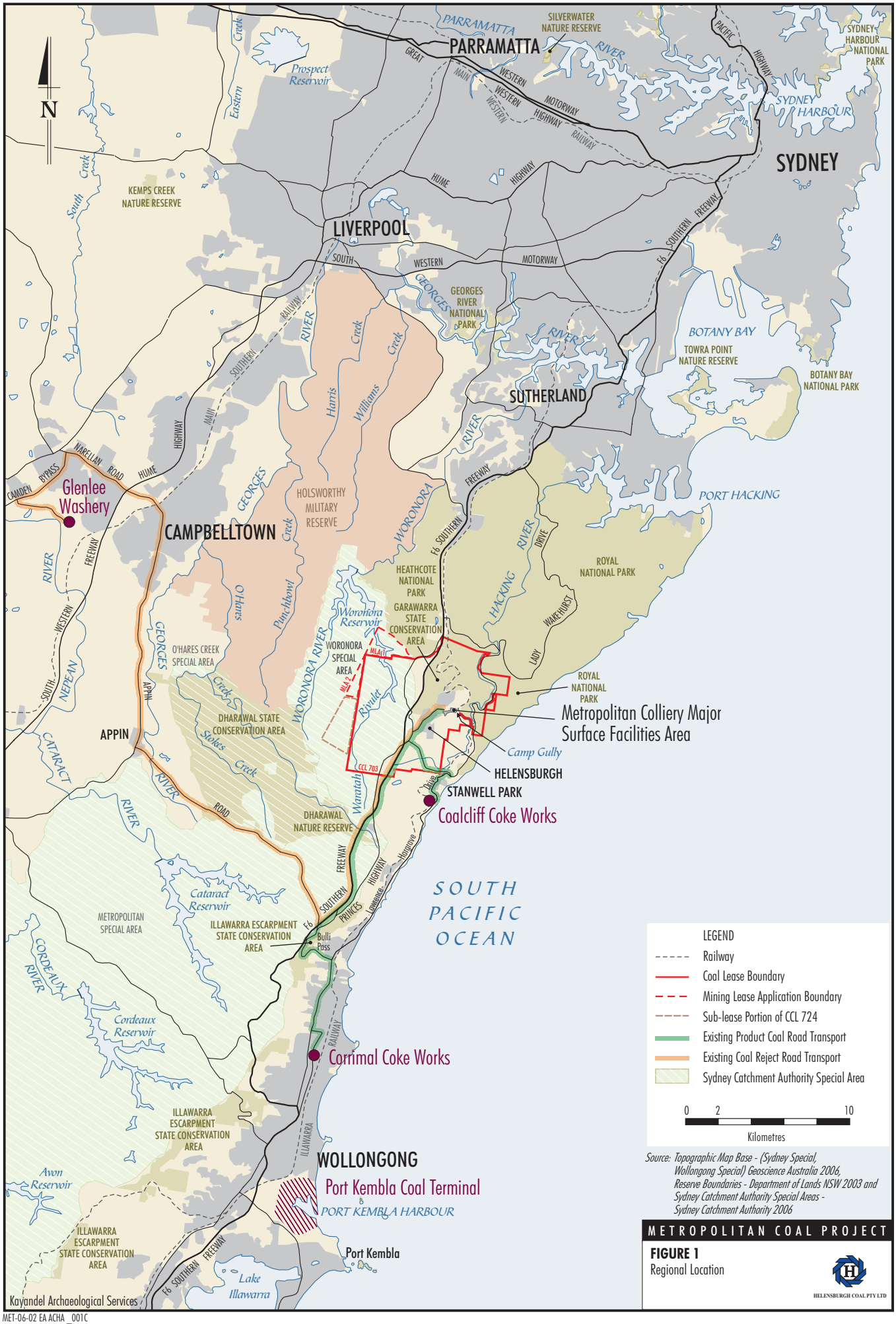
# 1. INTRODUCTION

Kayandel Archaeological Services has been commissioned by Helensburgh Coal Pty Ltd (HCPL) to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the Metropolitan Coal Project (the Project) (including the continuation and expansion of the Metropolitan Colliery). The Metropolitan Colliery (located near the township of Helensburgh, New South Wales [NSW]) (Figure 1) is owned and operated by HCPL, a wholly owned subsidiary of Peabody Pacific Pty Ltd.

HCPL is currently mining Longwall 15 and has approval from the NSW Department of Primary Industries – Mineral Resources (DPI-MR) (via a Subsidence Management Plan [SMP] application process) up to Longwall 17. HCPL lodged a SMP application with the DPI-MR for Longwall 18-19A in December 2007 and is currently awaiting approval. The current longwall mining area, comprising Longwall 14-19A is shown on Figure 2. HCPL proposes to continue underground mining operations at the Metropolitan Colliery and intends to consolidate existing Metropolitan Colliery activities into a Project Approval under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). It is anticipated that if the Project is approved, the Project Approval would include all existing and proposed surface facilities, existing and completed mining areas, as well as the proposed Project underground mining area.

Based on comments received by the Aboriginal community (refer Section 5), the below provides an overview of the structure of Project Environmental Assessment, including its appendices, and the public review process. The Project Environmental Assessment would comprise a main text component and a number of independent specialist reports included as Appendices A to O:

- Subsidence Assessment (Mine Subsidence Engineering Consultants [MSEC, 2008) (Appendix A);
- Groundwater Assessment (Heritage Computing, 2008) (Appendix B);
- Surface Water Assessment (Gilbert & Associates Pty Ltd, 2008) (Appendix C);
- Aquatic Ecology Assessment (Bio-analysis Pty Ltd, 2008) (Appendix D);
- Baseline Flora Survey (Bangalay Botanical Surveys, 2008) (Appendix E);
- Terrestrial Vertebrate Fauna Survey (Western Research Institute and Biosphere Environmental Consultants Pty Ltd, 2008) (Appendix F);
- Terrestrial Flora and Fauna Impact Assessment (FloraSearch and Western Research Institute, 2008) (Appendix G);
- Aboriginal Cultural Heritage Assessment (Kayandel Archaeological Services, 2008) (Appendix H);
- Non-Aboriginal Heritage Assessment (Heritage Management Consultants Pty Ltd, 2008) (Appendix I);
- Noise Impact Assessment (Heggies Pty Ltd, 2008) (Appendix J);
- Air Quality Impact Assessment (Holmes Air Sciences, 2008) (Appendix K);



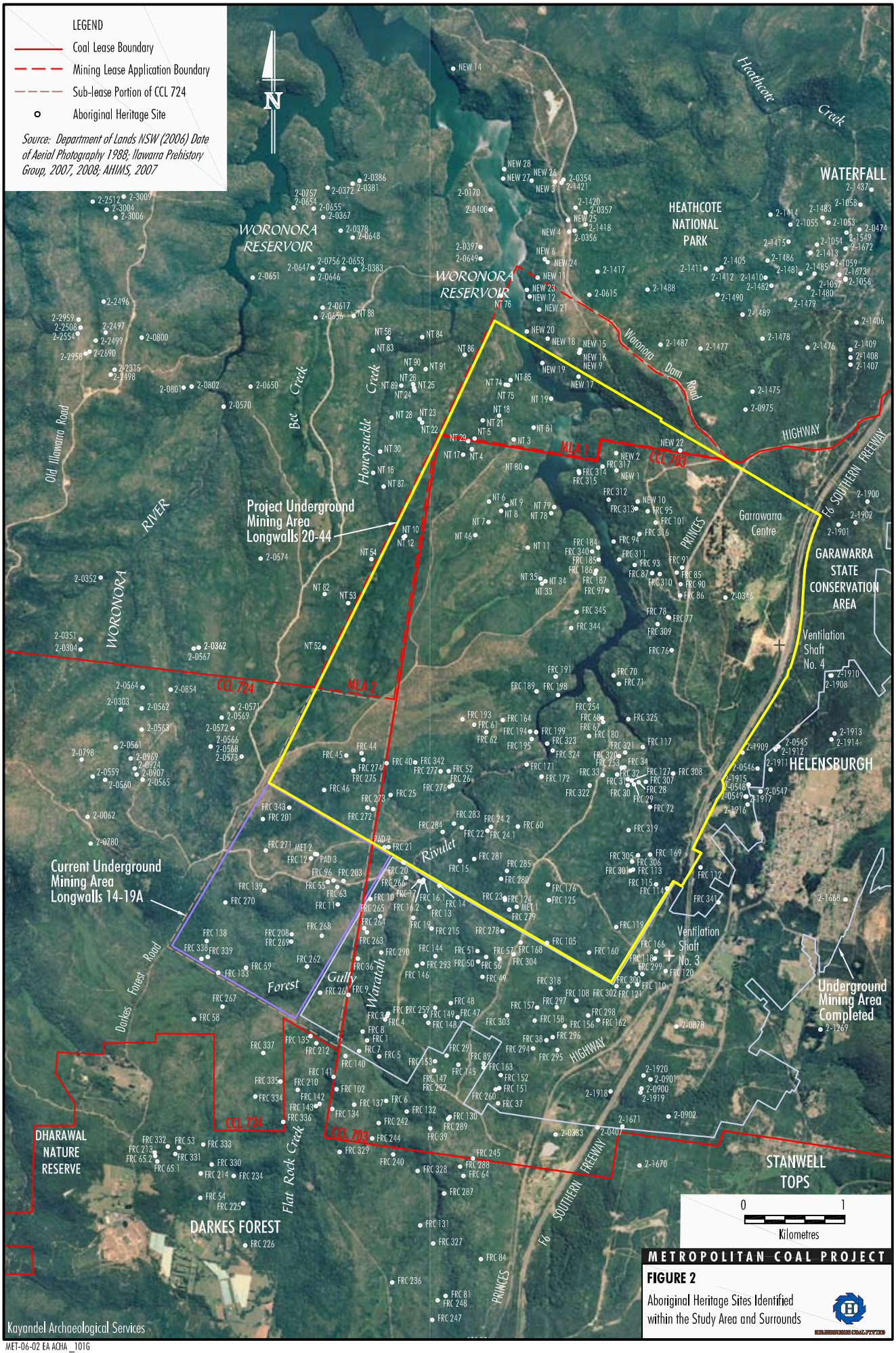

Source: Topographic Map Base - (Sydney Special, Wollongong Special) Geoscience Australia 2006, Reserve Boundaries - Department of Lands NSW 2003 and Sydney Catchment Authority Special Areas - Sydney Catchment Authority 2006

METROPOLITAN COAL PROJECT

**FIGURE 1**
Regional Location

HELENSBURGH COAL PTY LTD

MET-06-02 EA ACHA _001C




MET-06-02 EA ACHA _1016

- Traffic Assessment (Masson Wilson Twiney, 2008) (Appendix L);
- Socio-Economic Assessment (Gillespie Economics, 2008) (Appendix M);
- Preliminary Hazard Analysis (HCPL, 2008) (Appendix N); and
- Environmental Risk Assessment (SP Solutions, 2008) (Appendix O).

In accordance with Section 75H (1) of the EP&A Act, HCPL intends to submit the Project Environmental Assessment (including Appendices A to O) to the Director-General of the NSW Department of Planning (DoP) for assessment. Sections 75H (3) and (4) of the EP&A Act relevantly state:

> *75H*
>
> *(3) After the environmental assessment has been accepted by the Director-General, the Director-General must, in accordance with any guidelines published by the Minister in the Gazette, make the environmental assessment publicly available for at least 30 days.*
>
> *(4) During that period, any person (including a public authority) may make a written submission to the Director-General concerning the matter.*

## 1.1. Study Area

The study area is located to the west of the Southern Freeway approximately 5 kilometres (km) west of the township of Helensburgh (Figure 2). Helensburgh is located approximately 30 km north of Wollongong on the east coast of NSW.

The study area is approximately 25 square kilometres in area and is predominately contained within the Woronora Reservoir Catchment Area managed by Sydney Catchment Authority (SCA). Access to those areas managed by SCA is restricted.

A detailed description of the environmental context of the study area is presented in Section 2.

## 1.2. Proposed Works

HCPL has commissioned this assessment as part of an Environmental Assessment (including an Aboriginal Cultural Heritage Impact Assessment and community consultation) of the Project under Part 3A of the EP&A Act. This assessment focuses on Longwalls 18-44, and is supported by previous Aboriginal Heritage Assessments for Longwalls 14-17 (C. E. Sefton Pty Ltd, 2004; Kayandel, 2006) and Longwalls 18-19A (Kayandel, 2007). A significant amount of data has also been obtained from the Illawarra Prehistory Group (2007 unpublished data) and the NSW Department of Environment and Climate Change (DECC) Aboriginal Heritage Information Management System (AHIMS) database (DECC, 2006; 2008).

A detailed description of the Project is provided in Section 2 of the Project Environmental Assessment.

## 1.3. Assessment Personnel

Production of this report relied upon a collaborative process involving a number of Kayandel Archaeological Services staff.

The ACHA (including survey) was managed by Lance Syme. This assessment has been peer reviewed by R.G. Gunn.

In addition to the considerable fieldwork programme undertaken by the Illawarra Prehistory Group, field survey personnel for Kayandel Archaeological Services were Lance Syme, Anne Lambert, Clare Anderson, Jenni Lennox and Leigh Bate.

This report including the background research, initial consultation, interpretations and recommendations were completed by Lance Syme, Anne Lambert, Deborah Farina and Clare Anderson. Development of GIS database and mapping of AHIMS data and data from the Illawarra Prehistory Group was completed by Darrell Rigby and Clare Anderson.

The Illawarra Prehistory Group (lead by Mrs Caryll Sefton and including Mr Barrie Voorwinden, Mr Bruce Scurr, Mr Des Towne, Mr Guy Freer, Mr John Wyatt and Mr Ken Kort) is acknowledged for their recent systematic and detailed survey work across much of the Woronora Plateau. Their high quality work across the Woronora Plateau to identify accurate site co-ordinates and site descriptions is greatly appreciated.

Aboriginal community representatives who participated in the ACHA included:

| STAKEHOLDER/GROUPS | REPRESENTATIVE |
|---|---|
| Cubbitch Barta | Glenda Chalker, Alfred Fazldeen, Daniel Chalker |
| Illawarra Local Aboriginal Land Council | Sharralyn Robinson, Neville Maher |
| KEJ Tribal Elders Corporation | Reuben Brown, Gwenda Brown, Bart Brown |
| Gary Caines | Gary Caines |
| Northern Illawarra Aboriginal Collective, including representatives from: | Chris Illert, Daniela Reverberi, Shanon Wakeman, Darleen Jones |
| – Woronora Plateau Gundungara Elders Council; | Paul Cummins |
| – Wadi Wadi Coomaditchie Aboriginal Corporation; | Alan Carriage |
| – La Perouse Botany Bay Aboriginal Corporation; and | Keith Simms |
| Tharawal Local Aboriginal Land Council | Cliff Foley, Wendy Lewis |
| Wodi Wodi Elders Corporation | Rosina Davis, Kim Davis |

The Illawarra Aboriginal Corporation were invited to be included in this assessment however declined and indicated their support of the views/involvement of the Illawarra Local Aboriginal Land Council.

## 1.4. Study Aims and Objectives

The objective of this study is to provide HCPL with an ACHA of the Project suitable for inclusion in an Environmental Assessment in support of a Project Application under Part 3A of the EP&A Act. Part of this heritage assessment involves the identification of previous Aboriginal settlement patterns of the study area, with a particular view to identifying any past Aboriginal land use and potential impacts to Aboriginal heritage as a result of the Project.

This assessment has been undertaken in accordance with various guidelines including: *Aboriginal Cultural Heritage Standards and Guidelines Kit* (Department of Environment and Conservation [DEC], 1997); *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005); *Australian ICOMOS Charter for Places of Cultural Significance* (The Burra Charter, 1999); and *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (DEC, 2004).

The following tasks were undertaken to achieve these objectives:

- Identification of statutory requirements relevant to the project.
- Advertisement of the Project and seeking of groups/parties whishing to be consulted in regard to the assessment.
- Requests to groups/parties previously consulted with at the metropolitan Colliery in regard to Aboriginal cultural heritage to be involved in this assessment.
- A search of the relevant local, State and Federal heritage registers and listings.
- A review and analysis of existing reports relating to the study area and its immediate environs.
- Consultation with the Aboriginal community and other stakeholders in the area throughout the assessment process.
- Specific consultation with the Aboriginal community in regard to a draft assessment methodology.
- Undertaking an archaeological and cultural survey in consultation with the Aboriginal community.
- Assessment of archaeological and cultural heritage values.
- Evaluation of potential impacts.
- Development of proposed mitigation and management strategies.
- Drafting of this ACHA and providing the draft ACHA to Aboriginal community groups for comment.
- Considering the comments of Aboriginal community groups on the draft ACHA and addressing or incorporating comments in the final ACHA.

This assessment report has also considered the DECC's submission to the Independent Inquiry into Underground Coal Mining in the Southern Coalfield (DECC, 2007).

## 1.5. Limitations

The base geographic co-ordinate data utilised in this assessment has been acquired from the AHIMS Database maintained by DECC (2006; 2008), the Illawarra Prehistory Group (2007 unpublished data) and C.E. Sefton Pty Ltd (2001; 2004). In combining these datasets, it was identified that a number of duplicate records for single sites existed often on varying grid co-ordinates and datums.

The aims of the Illawarra Prehistory Group's systematic re-survey of the Woronora Plateau (2007 unpublished data) were to identify and record previously un-recorded Aboriginal heritage sites, to re-record previously recorded Aboriginal heritage sites and to update co-ordinates associated with each known Aboriginal heritage site. As part of the re-survey, the Illawarra Prehistory Group also undertook a review of the existing AHIMS database to identify errors in site recordings, specifically co-ordinate errors. The Illawarra Prehistory Group indicates that co-ordinates provided on the original site cards are considered inaccurate due to the accuracy of mapping at the time of original recording. The outcomes of Illawarra Prehistory Group review were used as the basis for plotting and locating known Aboriginal heritage sites during the site inspections (described below) undertaken across the Study Area.

It should also be noted that the vegetation in the study area greatly reduces surface visibility in most areas. It is therefore possible that although due care and skill were used, some sites may be present that have not have been identified during previous or recent surveys. However, it is considered that all site types and significance variations have been recorded within the study area (and reported within this ACHA) due to the comprehensive knowledge of the area arising from field surveys undertaken across the study area over the previous 37 years, in particular those undertaken recently by the Illawarra Prehistory Group.

# 2. ENVIRONMENTAL CONTEXT

The environmental context of the study area is important in order to give a context to the archaeological record. With respect to Aboriginal archaeology, land formation processes may impact upon the type and frequency of archaeological remains. Past climate may also impact upon the location and types of resources available, which in turn would impact upon settlement and mobility patterns of past Aboriginal groups in the area (National Parks and Wildlife Service [NPWS], 1997: 16, Mulvaney and Kamminga, 1999: 297-319).

Resource distribution and availability (such as the presence of drinking water, plant and animal foods, raw materials of stone, wood and vegetable fibre used for tool production and maintenance) is strongly influenced by the nature of soils, the composition of vegetation cover and the climactic characteristics of a given region.

The location of different site-types (such as rock-shelters, middens, open campsites, axe grinding grooves, petroglyphs [engravings] etc.) are strongly influenced by factors such as these along with a range of other associated features, which are specific to different land systems and bedrock geology (Mulvaney and Kamminga, 1999: 297-319).

Detailing the environmental context is an integral procedure that assists with the modelling of potential past Aboriginal land-use practices and/or predicting site distribution patterns within any given landscape (Guilfoyle, 2006). The information that is outlined below is considered to be pertinent to the assessment of site potential and site visibility within the specific contexts of the current study.

## 2.1. Climate

The climate of the Helensburgh area is considered as temperate maritime, and is characterised by warm to hot summers and cool to mild winters.

The Lucas Heights research station reports that the average annual rainfall is 1018.8 millimetres (mm), ranging from 52.6 mm in September to 113.3 mm in March. Higher rainfall is recorded in the months November through to March.

Summer months are usually the hottest months, with an average maximum of 26 degrees Celsius (°C) in February. July is the coldest month, with an average daily temperature of 15.8°C.

The microclimate of an area is influenced by factors such as rain shadows, aspect and topography, prevailing wind direction and frost hollows. These influences would seem particularly relevant to the terrain of the study area, resulting in frosts and localised temperatures and conditions often dependant on elevation and aspect.

In the past 10,000 years, changes in climatic conditions affecting south-east Australia, largely a result of receding/melting ice sheets in the Northern Hemisphere and Antarctica caused sea levels to rise and led to increased rainfall and temperatures (Harrison and Dodson, 1993, Flood, 1995, Mulvaney and Kamminga, 1999: 223-226). This increase in rainfall and temperature, commenced approximately 18,000 years before present (BP), and peaked at around 6,000 years BP (ibid). Temperatures then decreased slightly until 1,500 BP. For the past 1,000 years however, temperatures and rainfall have increased slightly to reach present conditions (ibid).

## 2.2. Topography and Geomorphology

The study area is located on the Woronora Plateau, on the south-eastern edge of the Cumberland Plain between the major metropolitan areas of Sydney and Wollongong (Figure 3). The study area is partially situated within the Woronora Reservoir catchment area administered by the SCA. Access within the catchment area is restricted.

The primary water course through the study area is the Waratah Rivulet, a tributary of the Woronora River. The Waratah Rivulet flows in a roughly northern direction through the centre of the study area and is bound by plateau on the east and west.

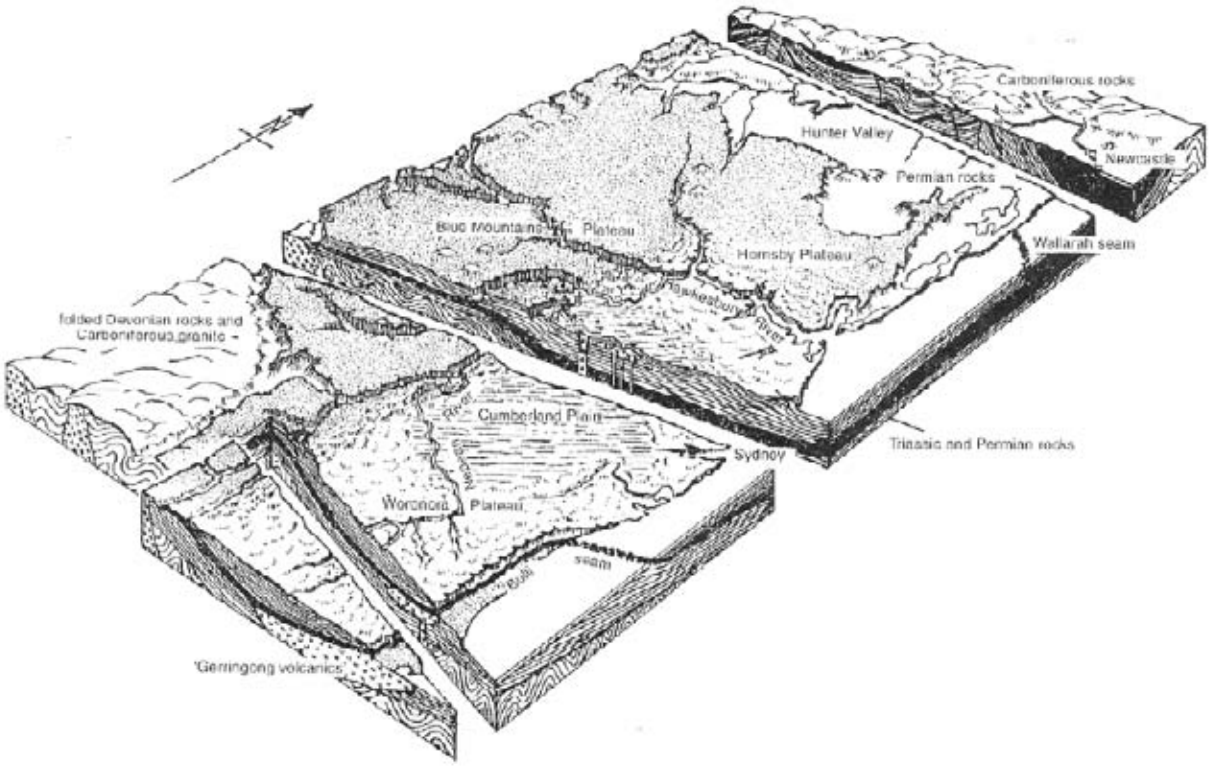



Figure 3: Geology of the Sydney Basin (Branagan and Packham, 2000: 62)

*Geology*

The study areas fall within the Sydney Basin geological survey area, with the outcropping geology of the study area being that of the Hawkesbury Sandstone formation. This geological formation is the most dominant of lithologies in the Sydney Basin, and is largely made up of quartz sandstone with shale lenses (Herbert, 1983: 18). It is believed that the Hawkesbury Sandstone formation was formed in the Triassic period, approximately 200 to 250 million years ago (ibid: 18-19).

The Hawkesbury Sandstone formation is a quartz-rich sandstone, and mainly medium to coarse grained, although it can vary from fine to very coarse grained (Ibid). Hawkesbury Sandstone is composed of approximately 67 quartz, 2% rock fragments and clay pellets, 1% feldspar and 1% mica (Ibid: 19). The remainder of the Hawkesbury Sandstone formation is comprised of 19% clay matrix, cemented by 6% secondary quartz, and 4% siderite, an iron compound (Ibid).

Quaternary geological contexts are a product of scarp retreat and erosion of soil cover, particularly on slopes. Quaternary deposits of gravel, sand, silt and clay are centred on river valleys, often as sequential river terraces. Slopes have been subject to various episodes of stability, erosion or burial. These have been noted to affect both the age and nature of soil cover laterally as well as vertically (Walker, 1989).

Coastal areas were also influenced by sea level changes causing the evolution of estuaries, drowning of river valleys and development of coastal barriers such as dunes.

*Soils*

The study area is made up of three distinct soil landscapes: the Hawkesbury (ha), the Bundeena (bu) and the Gymea (gy) landscapes (Hazelton & Tille, 1990). The Hawkesbury soil landscape is the dominant soil, particularly along watercourses, with the Bundeena profile present on ridges and crests (ibid). The Gymea landscape is present in isolated pockets in the northern and eastern portions of the study area (ibid).

The Hawkesbury soil landscape usually occurs on rugged, rolling to very steep hills on Hawkesbury sandstone. The soils are shallow (<50 centimetres [cm]) and range from loose quartz sand (ha1), earthy yellowish brown sandy clay loam (ha2) to pale, strongly pedal light clay (ha3) (Ibid: 47). Sheet erosion often occurs in this soil landscape during storms after groundcover has been removed by bushfires, and that gully erosion occurs along unprotected tracks and fire trails (Ibid).

The Bundeena soil landscape also occurs on Hawkesbury sandstone, but on very low, rolling rises on exposed coastal headlands (Ibid: 31). These soils are commonly found under bushland in areas designated as National Parks (ibid). The soil varies from loose, stony, dull yellowish brown sandy loam (bu1), earthy, yellowish brown light sandy clay loam (bu2) and friable yellowish brown clayey sand (bu3) (ibid). As with the Hawkesbury soil profile, poorly maintained roads, fire trails and walking tracks are subject to severe erosion, particularly during storms following bushfires (Ibid: 32).

The Gymea soil landscape also occurs on Hawkesbury sandstone on undulating to rolling rises and low hills (ibid: 67). This soil landscape generally varies from shallow to moderately deep (30 cm to 100 cm), and varies from loose, coarse sandy loam (gy1), earthy yellowish brown clayey sand (gy2), earthy yellowish sandy clay loam (gy3) and moderately to strongly pedal yellowish brown clay (gy4) (ibid: 67-68).

*Hydrology and Hydrogeology*

The proposed underground mining area is situated within the Woronora Special Area, which drains to the Woronora Reservoir. A number of streams flow in a northerly direction to the Woronora Reservoir including the Woronora River, the Waratah Rivulet and associated tributaries.

The Metropolitan Colliery major surface facilities are situated in the Hacking River catchment. Camp Gully is situated to the south of the surface facilities and flows in an easterly direction to the Hacking River.

Specific surface water (hydrology) and groundwater (hydrogeology) assessments have been undertaken for the Project by Heritage Computing and Gilbert & Associates Pty Ltd (respectively) and are included in the Project Environmental Assessment as Appendices B and C. Extracts from both of these assessments relevant to the hydrological and hydrogeological context of the study area are provided below:

> *"Whilst dominated by summer weather patterns, rainfall is widely spread throughout the year. Rainfall intensity and the regularity of rainfall are particular features of the area that have a significant bearing on surface water hydrology including runoff frequency, propensity of floods and on the moisture levels in catchment soils.*
>
> *The Metropolitan longwall mine is situated within the Woronora Reservoir catchment. The Woronora Reservoir supplies water to consumers within the Sutherland Shire Council area. The Woronora Reservoir catchment is part of the SCA's Special Water Supply Catchment Area. The area is relatively undisturbed and closed to public access."*
>
> ...
>
> *"The Southern Coalfield lies in the southern part of the Sydney Basin, which is infilled with sedimentary rocks of Permian age (<270 million years ago) and of Triassic age (<225 million years ago). Immediately overlying the Bulli Coal unit of the Illawarra Coal Measures are sandstones and claystones of the Narrabeen Group. At the top of the sequence in the area of interest is the Hawkesbury Sandstone.*
>
> *Apart from coal seam aquifers at depths of greater than 400 m, the recognised aquifers in the stratigraphic sequence at the Metropolitan Colliery are the Hawkesbury Sandstone and the sandstones of the Narrabeen Group. Whilst of very low permeability, the Hawkesbury Sandstone has the relatively higher permeability compared to other units and is therefore capable of higher groundwater yields.*

*The Hawkesbury Sandstone outcrops over the area of interest in the form of the Woronora Plateau and is subject to weathering processes. Secondary porosity in the form of fractures dominates over primary porosity. Due to alternation of sheet and massive facies, groundwater flow is primarily horizontal with minor vertical leakage. Surface water fed perched water tables (i.e. hydraulically disconnected from the regional aquifer) can be expected adjacent to cliff faces and within upland swamps.*

*The Narrabeen Group is a much poorer aquifer than the Hawkesbury Sandstone, and there is no known use of the aquifer in the Southern Coalfield. The low permeability of the Narrabeen Group lithologies is substantiated by the common experience of "dry mines" in the Southern Coalfield.*

*The base of the Narrabeen Group, at the top of the Bulli Seam, is marked by the Wombarra Claystone. This unit is an aquitard that will limit vertical flow into mine workings. The Coal Cliff Sandstone lies between the two where it is developed."*

## 2.3. Vegetation and Fauna

The vegetation of an area is dependent upon the geology and soil landscapes, which have a direct impact on soil fertility and vegetation cover. This in turn provides an indication of the type and locations of resources available to Aboriginal groups in the past.

Baseline flora surveys were conducted for the Project by Bangalay Botanical Surveys (2008) in spring 2006, summer 2006/2007, autumn 2007 and spring/summer 2007/2008. Previous surveys have also been conducted by Bangalay Botanical Surveys (2007) for the Longwalls 18-19A study area to the south in spring 2006, summer 2006 and autumn 2007. Field survey methods included random meanders, spot sampling, quadrat sampling, targeted searches for threatened flora (listed under the NSW *Threatened Species Conservation Act, 1995* [TSC Act] and Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* [EPBC Act]), targeted searches for flora of conservation significance and vegetation community mapping (including mapping of endangered ecological communities). The baseline survey report by Bangalay Botanical Surveys (2008) is provided in Appendix E of the Project Environmental Assessment.

Baseline terrestrial vertebrate fauna surveys were conducted for the Project in spring/early summer 2006 and autumn 2007 (Western Research Institute and Biosphere Environmental Consultants, 2008). Twenty fauna sampling sites were surveyed using a variety of methods including Elliott traps, cage traps, spotlighting, hair tubes, herpetofauna searches, bird surveys, call playback, platypus surveys, echolocation call detector systems, identification of faunal traces and opportunistic observations. Targeted surveys were conducted for threatened fauna species listed under the TSC Act and EPBC Act considered possibly occurrences in the Project area and surrounds. Details of the survey methodologies utilised are provided in Western Research Institute and Biosphere Environmental Consultants (2008), Appendix F of the Project Environmental Assessment.

A number of reference sources containing the results of local or regional flora and fauna surveys, database records and other scientific studies and literature were also reviewed and where appropriate included in the baseline flora and fauna assessments (Bangalay Botanical Surveys, 2008; Western Research Institute and Biosphere Environmental Consultants, 2008).

An overview of the findings of the baseline flora and fauna surveys is provided in Sections 2.3.1 and 2.3.2, respectively. A comprehensive assessment of the potential impacts of the Project on flora and fauna attributes of the study area is provided in Appendix G of the Project Environmental Assessment (FloraSearch and Western Research Institute, 2008).

### *2.3.1. Vegetation*

*Vegetation Communities*

Vegetation was mapped within the study area by Bangalay Botanical Surveys (2008) and includes:

- Sandstone Woodlands;
- Heaths and Mallee Heaths;
- Swamps;
- Riparian Scrub;
- Tall Open Forests; and
- Sandstone Forests.

The vegetation map units are described in Table 1 of Appendix E of the Project Environmental Assessment and their distribution is mapped on Figure 4 of Appendix E of the Project Environmental Assessment.

*Flora Species Composition*

The great majority of plant species occurring within the Woronora Special Area and the study area are native species (Bangalay Botanical Surveys, 2008). A total of 601 plant species were recorded by the baseline flora surveys, including 528 native and 73 introduced species (Bangalay Botanical Surveys, 2008). Plant families with the highest number of species were the Daisy family (Asteraceae), the Epacrids (Ericaceae subfamily Styphelioideae) the Pea Flowers (Fabaceae subfamily Faboideae), the Wattles (Fabaceae subfamily Mimosoideae), the Eucalypts and related genera (Myrtaceae), the Banksias, Grevilleas and related genera (Proteaceae), the Sedges (Cyperaceae) and the Grasses (Poaceae) (Bangalay Botanical Surveys, 2008).

### *Introduced Flora Species and Noxious Weeds*

Bangalay Botanical Surveys (2008) indicate that in general, introduced plant species were found to be limited to areas, which have been subject to prior and/or current disturbance (i.e. Map Units marked "r" and track margins). Exotic species occurred infrequently along fire roads within the study area, and generally included widespread and common species in low densities. Bangalay Botanical Surveys (2008) also indicate that exotic species diversity and abundance increased within vegetation along major roads (the F6 freeway and the Old Princes Highway) and larger areas of disturbed landscapes occur in the north-eastern and eastern sections of the study area.

A number of weeds recorded by the baseline flora surveys are regarded as noxious in the Wollongong Local Government Area including Pampas Grass (*Cortaderia selloana*), African Love Grass (*Eragrostis curvula*), Lantana (*Lantana camara*), African Boxthorn (*Lycium ferocissimum*), Bridal Veil Creeper (*Myrsiphyllum asparagoides*), Prickly Pear (*Opuntia stricta*), Oxalis (*Oxalis* spp. [all spp. except natives]), Onion Grass (*Romulea rosea*) and Blackberry (*Rubus fruticosus* sp. aggregate) (Bangalay Botanical Surveys, 2008).

### *Threatened Flora*

*Threatened Flora Species*

Three threatened flora species were recorded within the proposed longwall mining area by Bangalay Botanical Surveys (2008), *viz*. Bynoe's Wattle (*Acacia bynoeana*), Thick-leaf Star-hair (*Astrotricha crassifolia*) and Prickly Bush-pea (*Pultenaea aristata*). Deane's Paperbark (*Melaleuca deanei*), Prickly Bush-pea (*P. aristata*) and Bynoe's Wattle (*A. bynoeana*) have also been recorded within the Longwalls 18-19A study area by Bangalay Botanical Surveys (2007). Threatened flora species recorded in the Project area or surrounds are summarised in Table 14 of Appendix E of the Project Environmental Assessment and shown on Figure 5 of Appendix E of the Project Environmental Assessment.

*Endangered Flora Populations*

No endangered flora populations listed under the TSC Act are known to occur in the Project area or immediate surrounds (Bangalay Botanical Surveys, 2008; NPWS, 2003; DECC, 2007).

*Endangered Ecological Communities*

One endangered ecological community listed under the TSC Act was recorded by the Project baseline flora surveys, *viz*. Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion endangered ecological community (Bangalay Botanical Surveys, 2008). In addition, the O'Hares Creek Shale Forest endangered ecological community occurs to the south of the proposed longwall mining area in the vicinity of Longwalls 18-19A (*ibid*.).

### 2.3.2. Fauna

#### *Major Fauna Habitat Types*

Five broad fauna habitat types were identified in the study area by Western Research Institute and Biosphere Environmental Consultants (2008), namely, forest, woodland, heath and mallee, riparian (and associated watercourse) and upland swamp.

#### *Fauna Species*

*Native Fauna Species*

The number of native terrestrial fauna species identified during the surveys by Western Research Institute and Biosphere Environmental Consultants (2008) is provided per fauna type below:

- Amphibians: 17
- Reptiles: 19
- Birds: 77
- Mammals: 27

The species diversity recorded during the surveys is consistent with expected species diversity in a fire recovery mid-successional landscape, where populations are recovering gradually following the 2001 fire (*ibid*.).

Seven Myobatrachidae and 10 Hylidae amphibian species were recorded in the baseline fauna surveys. The Common Eastern Froglet (*Crinia signifera*) and Verreaux's Tree Frog (*Litoria verreaxii*) were the most widely distributed amphibian species across the study area during the surveys (Western Research Institute and Biosphere Environmental Consultants, 2008).

One Gekkonidae, eight Scincidae, three Agamidae, one Varanidae and six Elapidae reptile species were recorded during the baseline fauna surveys. Reptile species recorded at six or more of the systematic sampling sites included the Copper-tailed Skink (*Ctenotus taeniolatus*), Pale-flecked Garden Sunskink (*Lampropholis guichenoti*), Dark-flecked Garden Sunskink (*Lampropholis delicata*) and Lesueur's Velvet Gecko (*Oedura lesuerii*) (Western Research Institute and Biosphere Environmental Consultants, 2008).

One Ciconiidae, one Aedeidae, three Falconidae, three Accipitridae, one Charadriidae, four Columbidae, eight Psittacidae, three Cuculidae, one Tytonidae, one Strigidae, one Podargidae, one Caprimulgidae, one Aegothelidae, two Alcendinidae, one Menuridae, one Climacteridae, three Maluridae, two Pardalotidae, eight Acanthizidae, one Zosteropidae, twelve Meliphagidae, one Petroicidae, two Eupetidae, three Pachycephalidae, four Dicruridae, one Campephagidae, one Hirundinidae, four Artamidae, one Corvidae and one Sylviidae were recorded during the baseline fauna surveys (Western Research Institute and Biosphere Environmental Consultants, 2008).

Birds most widely distributed across the study area during the surveys included the Rainbow Lorikeet (*Trichoglossus haematodus*), White-throated Treecreeper (*Cormobates leucophaea*), Brown Thornbill (*Acanthiza pusilla*), Yellow-faced Honeyeater (*Lichenostomus chrysops*), White-eared Honeyeater (*Lichenostomus leucotis*), Little Wattlebird (*Anthochaera chrysoptera*), Red Wattlebird (*Anthochaera carunculata*), New Holland Honeyeater (*Phylidonyris novaehollandiae*), Eastern Spinebill (*Acanthorhynchus tenuirostris*), Grey Shrike-thrush (*Collurcincla harmonica*), Eastern Yellow Robin (*Eopsaltria australis*) and Rufous Whistler (*Pachycephala rufiventris*).

Native mammal species recorded during the baseline fauna surveys included one Ornithorhynchidae (Platypus), one Tachyglossidae (Short-beaked Echidna), three Dasyuridae (Antechinus spp. and the Common Dunnart), one Peramelidae (Southern Brown Bandicoot), one Vombatidae (Common Wombat), one Burramyidae (Eastern Pygmy-possum), one Phalangeridae (Common Brushtail Possum), two Petauridae (Sugar Glider and Squirrel Glider), one Pseudocheiridae (Common Ringtail Possum), three Macropodidae (Eastern Grey Kangaroo, Euro and Swamp Wallaby), one Pteropidae (Grey-headed Flying Fox), seven Vespertiliomidae (microchiropteran bats) and four Muridae (*Rattus* spp. and the Eastern Water Rat) (Western Research Institute and Biosphere Environmental Consultants, 2008).

### *Introduced Fauna Species*

Five introduced species were recorded during the baseline fauna surveys, including the House Mouse (*Mus musculus*), Dog (*Canis lupis familiaris*), Red Fox (*Vulpes vulpes*), Rusa Deer (*Cervus timorensis*) and Rabbit (*Oryctolagus cuniculus*) (Western Research Institute and Biosphere Environmental Consultants, 2008).

### *Threatened Fauna Species*

Threatened fauna species recorded in the vicinity of the Project by Western Research Institute and Biosphere Environmental Consultants (2008) are listed below and include two amphibians, one reptile, five birds and six mammals.

- Amphibians
  - Giant Burrowing Frog (*Heleioporus australiacus*); and
  - Red-crowned Toadlet (*Pseudophryne australis*).
- Reptiles
  - Broad-headed Snake (*Hoplocephalus bungaroides*).
- Birds
  - Black-necked Stork (*Ephippiorhynchus asiaticus*);
  - Square-tailed Kite (*Lophoictinia isura*);
  - Grey Falcon (*Falco hypoleucos*);
  - Eastern Ground Parrot (*Pezoporus wallicus wallicus*); and
  - Turquoise Parrot (*Neophema pulchella*).

- Mammals
  - Southern Brown Bandicoot (*Isoodon obselus obselus*);
  - Eastern Pygmy-possum (*Cercartetus nanus*);
  - Squirrel Glider (*Petaurus norfolcensis*);
  - Grey-headed Flying Fox (*Pteropus poliocephalus*);
  - Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*); and
  - Large-footed Myotis (*Myotis macropus*).

Figure 4 of Appendix F of the Project Environmental Assessment illustrates the location of threatened species recorded by the Project surveys. Although potential habitat exists within the study area for a number of other threatened fauna species, no other threatened fauna species were recorded within the study area during the surveys (Western Research Institute and Biosphere Environmental Consultants, 2008).

## 2.4. Resources for Subsistence

As outlined above, a wide range of floral and faunal resources are available in the study area and these were potentially seasonally exploited by Aboriginal communities. Past climatic changes and modern land use have however altered the distribution of vegetation and amount of water available, which in turn influence the distribution of plants and animals.

Semi-permanent water sources were available to Aboriginal groups in the drainage lines located within the study area. Variable climatic conditions affected the availability of water and may have subsequently influenced the way Aboriginal people moved through the landscape over time.

A study by Sue Wesson, with respect to the Illawarra region, noted 29 plants and animals in the Plateau region that were known to be exploited by Aboriginal people (Wesson, 2005: 80-81). These included macropods such as the red wallaby and the swamp wallaby, both of which were used for food, skin cloaks and binding (Ibid: 103), birds such as hawks (Accipiter or Falco species), emu, quail, currawong, wood duck, doves, crows, magpies (ibid: 80-81) and the wedge-tailed eagle (Ibid: 102). Smaller marsupials such as echidna, sugar gliders, platypus and koala were also utilised, as well as reptiles such as brown snake, red-bellied black snakes, death adders and heath monitors (Ibid: 80-81).

In addition to the above, the Northern Illawarra Aboriginal Collective has provided (as part of their comments on the draft version of this ACHA – discussed further in Section 5), a description of various local flora and fauna and their associated traditional uses and cultural significance, including (Northern Illawarra Aboriginal Collective, 2008):

*Plants*

- *Telopea speciosissima* (both Red and Wirrimbirra White varieties);
- *Epacris*;
- *Lomatia*;
- *Persoonia* (dji-b-ng or "Geeboong");
- *Podolepsis jaceoides* ("yam daisy");
- *Exocarpus* ("native cherry/currant");
- *Santalum obtusifolium*;
- *Dianella* ("snake whistle");
- *Lambertia formosa (*"red devil"*);*
- *Xanthorrhea* ("grass tree"*);*
- *Solanum aviculare* ("Contraceptive Apple");
- *Thysanotus virgatus* ("fringed violet"); and
- *Doryanthes excelsa* ("gigantic long-stalked lilly").

*Animals*

- *Phascolarctos cinereus* (goolaya-winy, "Koala");
- *Ornithorhynchus anatinus* (moola-ng-gayan:g, "platypus");
- *Euastacus australiensis* (red freshwater crayfish);
- *Calyptorhynchus funereus* ("yellow tailed black cockatoo");
- *Agrotis infusa* ("Bogong Moth"); and
- Frogs, Dragon Flies and Beetles, etc.

## 2.5. Disturbance and Visibility

### I. Disturbance – Past Land Use

The study area has been subjected to a limited number of current and past land uses, which may affect the context of any potential archaeological sites. Much of the study area is within the Woronora Special Area administered by the SCA. As a result, access to much of the area is restricted.

Construction workers and their families inhabited the Woronora Reservoir site during the construction of the Woronora Reservoir between 1927 and 1941 (SCA, undated).

On-going disturbance to the study area is caused by clearing for power line easements and on-going maintenance of fire roads throughout the study area.

Portions of the study area have been subject to longwall mining induced subsidence movements (i.e. from approved Longwalls 1 to 15).

The area has been subject to intensive wildfires, the most recent occurring in 2002. Whilst fire is recognised as part of the natural environment and a natural process, it is to be expected that there is now an increased risk and hence greater threat of bushfires having a far greater intensity (temperature and duration) since the cessation of traditional burning practices.

*Visibility*

There are a number of factors to be considered when assessing visibility over a study area. These include, but are not limited to, the time of day, aspect of the sun, vegetative cover, weather conditions and soil matrix.

On the days of fieldwork, ground visibility within the study area varied, but was generally rated between moderate and low, with dense vegetation cover being the most influential factor regarding visibility due to the undisturbed nature of the majority of the study area.

Moderate areas were characterised by areas of exposure associated with open ground under established trees, sandstone overhangs or outcrops, or ground surface visibility associated with bushfires, whilst areas of low visibility were characterised by native and introduced species of grass cover and scrub.

In regard to visibility of overhang sites, grinding sites, petroglyph sites and scarred trees, height and density of vegetation is important. While the majority of the study area was subject to a wildfire in 2001/2002, substantial understorey and midstorey regrowth has occurred since, which greatly reduces line of sight visibility and hinders identification of even larger sites at distance.

# 3. ARCHAEOLOGICAL CONTEXT

## 3.1. Ethnographic History

### *3.1.1. Pre-contact*

European historical accounts of past Aboriginal practice are often subjective and succumb to the prevailing morals and beliefs of the time. For this reason the following information is possibly an embellished reflection of Aboriginal culture in the Helensburgh area and best understood as a non academic record subject to culturally insensitive viewpoints and is potentially variable in nature.

Tribal boundaries with pre-contact Aboriginal groups are indistinct, and subject to temporal variation and variation between sources. For example, Dr David Horton's map (1996) uses major language groups to illustrate the distribution of Aboriginals at the time of European contact (Horton, 1996). Horton's map shows the entire area from the south of Sydney through to Shoalhaven Heads as belonging to the Tharawal language group. Horton however, adds a disclaimer that the locations are general, and that more precise boundaries should be sought from Local Aboriginal Land Councils (ibid).

In regard to land councils, the study area is predominantly within the Illawarra Local Aboriginal Land Council boundary with a portion crossing into the Tharawal Local Aboriginal Land Council boundary (Department of Lands, 2003). Norman Tindale's map (1974) illustrating Aboriginal groups' distribution at the time of European contact, shows that the two Aboriginal groups most frequently associated with the study area are the Tharawal (also known as Dharawal, Darawal, Carawal [Pacific islands phonetic system, c = th], Turawal, Thurawal, Thurrawal, Thurrawall, Turu-wal, Turuwul, Turrubul, Turuwull, Ta-ga-ry ['tagara = north], Five Islands tribe) language group and the Wodi Wodi (also known as Wadi Wadi, Woddi Woddi, Illawarra [a regional name]) clan (South Australian Museum, undated a). Following Tindale's map, Tharawal land is shown to have encompassed the area from the south of Botany Bay and Port Jackson down to the north of the Shoalhaven River, and inland to Campbelltown and Camden (South Australian Museum, undated b), whilst the Wodi Wodi was believed to occupy the area between the Illawarra and Shoalhaven (South Australian Museum, undated c). Whilst Cubbitch Barta do not appear on Tindale's map, they are a clan of the Dharawal and were known to colonists as the Cowpastures Tribe (Cubbitch Barta Native Title Claimants Aboriginal Corporation, letter dated 12 June 2008). Cubbitch Barta currently has a registered Native Title claim for a portion of land in the township of Helensburgh, which is proximal to the study area (Commonwealth of Australia, 2006).

The Tharawal people were broadly defined into two groups: the Sweet (Fresh) Water Tharawal, and the Salt Water Tharawal (Spackman & Mossop, 2000). The Helensburgh area was inhabited by the Salt Water Tharawal (ibid). According to oral tradition, the Tharawal people arrived in the Illawarra by sea (Organ and Speechley, 1997:3). This is reflected in a Dreaming story, as told to R H Matthews by a Shoalhaven man, about the Gang-man-gang or Billen-Billen (Windang Island) (ibid). According to that story, the Tharawal people came from a land at a great distance from Australia, and got here by a canoe that was stolen from a whale (ibid: 3-4). They brought with them the Dharawal, or Cabbage Tree Palm, after which they are named (Wesson, 2005: 5).

Although it is impossible to ascertain the size of the Aboriginal population in the Illawarra region in the pre-contact phase, some researchers believe there may have been 2,000 to 3,000 people living in the Illawarra area at the time of European contact (Butlin in Organ & Speechley, 1997: 2), or between two to four people per square kilometre (Organ & Speechley, 1997: 2). Archaeological evidence (i.e. the number of known Aboriginal sites) across the Illawarra region would seem to support that the region was well populated for a long period of time. The Aboriginal population density was purported to be related to the wealth of natural resources, the pleasant and stable climate and the topography (Ibid).

The above provides a summary of the recorded pre contact history of the area.

### *3.1.2. Post-contact*

Although the first Europeans credited with visiting the Illawarra region were George Bass and Matthew Flinders, who arrived on *Tom Thumb II* in 1796 at Port Kembla, it has been suggested that Europeans were aware of the Illawarra region and its original inhabitants since before the First Fleet arrived. Joseph Banks notes in his journal that several fires were noted, as well as canoes, on the shores (Banks, 1770).

George Bass had been told by the survivors of the wreck of the *Sydney Cove* which sank off Preservation Island in 1797, that the area of Coalcliff contained coal deposits (Australian Dictionary of Biography, undated). Later that year, together with two of the *Sydney Cove* survivors, Bass set off in Governor Hunter's whaling vessel and confirmed that extensive coal deposits existed in the Coalcliff area (approximately 3 to 4 km south-east of the current study area). This marked the first discovery of coal in European settlement of Australia.

In 1815, Charles Throsby steered a herd of cattle from Cowpastures near Camden through a pass at Bong Bong to enter the Illawarra area. Thereafter, the land in the Illawarra area was primarily used by graziers and cedar-getters (Organ & Speechley, 1997:11). Throsby and his nephew thereafter settled in the Wollongong area in 1823. However, the first recorded settler close to the area was a Matthew Gibbon, who was granted land in 1824 at "Little Bulli", approximately 3 km east of the study area (Adams, 2005). Gibbons named his farm "Stanwell Park", and the area is now known by that name (ibid). It is said that settlement of this area was determined by the government as desirable to provide a natural buffer between itself and the settlement of Port Jackson for absconding convicts (ibid). Ironically, one of the convicts assigned to "Stanwell Park" became head of a notorious bushranger gang named "Wolloo Jack", who based themselves at "Stanwell Park" (ibid).

Although coal was discovered at Coalcliff in 1797, a monopoly on coal extraction had been granted to the Australian Agricultural Company at Newcastle, preventing the development of Australia's coal industry (Wollongong City Council, undated a). This monopoly was lifted in 1848 (ibid). Mining at the Coalcliff site commenced in 1878, and continued until 1991 (Illawarra Coke Company, undated).

The earliest known European habitation of the Helensburgh area was a road house owned by Thomas MacIntosh and established in 1874 (Findlayson, 1985). The roadhouse, named "the Dummies", serviced the Old Illawarra Road, and stood on the site of the current Helensburgh exit ramp of the Southern Freeway (ibid). However, the first settlement in the Helensburgh area was originally known as "Camps Creek", and was initially a camp for mine and railway workers (Wollongong City Council, undated b). After the discovery of coal in the Helensburgh area in 1884 by the Cumberland Coal and Iron Mining Company, the Metropolitan Coal Company of Sydney took over Cumberland's 99 year lease of Crown land and commenced operations in 1887 (ibid). Further, in 1884 the rail line linking Sydney with the Illawarra region reached the Helensburgh area, bringing with it workers and the nucleus of a village (Findlayson, 1985). The station was opened in 1888 and named "Helensburgh" by Charles Harper, the man credited with the discovery of coal in the area in 1884 (ibid). It is said that the town was named after his daughter (ibid).

A comprehensive description of the post-contact history specific to the Metropolitan Colliery is provided in Appendix I of the Project Environmental Assessment (*Metropolitan Coal Project Non-Aboriginal Heritage Assessment*, Heritage Management Consultants Pty Ltd, 2008).

Separate to the above, the following quotes are extracts from the Northern Illawarra Aboriginal Collective's comments on the draft version of this ACHA (discussed further in Section 5) regarding local Aboriginal post-contact history:

> *"There are two apical ancestors that Aboriginal communities surrounding Metropolitan Colliery mostly derive from - one was bayarung˜ (1820 - 1888/9), also known as "Biddy Coolamin", whilst another was her elder brother dhaymbayal (1813 - 1887) known as "Joey". In about 1858 Biddy married the Englishman Billy Giles (thereafter being called "Granny Giles") and living with him on Dr. Alexander Cuthill's property, "Mill Creek", on the Georges River. An insight into life there was provided by The Saint Georges Call (14 May 1904, page 1) which observed that:*
>
> > *"the means of subsistence of the Giles family was wild honey and oysters. They also had a pack of dogs, and a well known Port Hacking resident who remembers the old girl, declares that on one of his occasional visits, the dogs were so poor that they had to lean up against a tree to bark".*
>
> *After Billy Giles died, Biddy though "... quite old, married a young white man (also very kind to her); lived him out". This young white-man was Mr Holdsworth who, along with Biddy's brother Joey, managed Thomas Holt's property at Sylvania Waters up to about 1885 where oystering was a main industry on and about Sandy Point near the entrance to Gawley Bay.*
>
> ...

*Granny Giles gave birth at Liverpool to a famous daughter, Queen Emma (1840-1916), who was described by one contemporary as "the last Dharug Princess". Most of today's D'harug, Korewal, Guriwayal, and D'harawal peoples - still residing on the old La Perouse Mission as well as throughout Sutherland and south western Sydney - generally trace their ancestry from Queen Emma.*

*Granny Giles also had two daughters in the Illawarra, Queen Rosy (1842-1931) and Ellen (1855-1933), from whom today's Wadi Wadi people (at Coomaditchie Reserve, Bellambi and elsewhere) generally trace their ancestry (ref [2]). The death certificate # 07672, of Biddy's daughter Ellen, specifically lists her father "Paddy Davis, Wollongong fisherman" and her mother "Biddy Giles". Biddy's older daughter Rosie, claiming to be "in her 88th year", told the Illawarra Mercury (4th July 1930) that she was born on the shores of "Lake Illawarra, and comes of Royal blood through her father, King Paddy, who died without a son to inherit the throne".*

*...*

*"Queen Emma" was born at Liverpool in 1840 and described in the early 1900's as "the last Dharug Princess". Her grandmother, "Granny Giles", lived on Mill Creek in the mid 19th century. The Georges River, through Appin Campbelltown and Liverpool, is believed to have roughly been the route taken by Queen Emma in 1890 when she walked "the littlest Gundungaras" - the last children still living a traditional lifestyle in accordance with Gundungara Law and Custom - off the Wara-N'hayara Plateau to the safety of La Perouse.*

*Ellen Anderson's version of the stories told during this "Great Walk", recorded by C.W. Peck at the Peakhurst Salt Pan Aboriginal settlement in the 1920's, relate in many instances to native plants and animals unique to this landscape; plants whose cultural and medicinal value was being explained to the Gundungara children by Queen Emma as they walked along, albeit pursued by Dhuligayal "Banksia-Men" who hurried dawdling toddlers along on their onerous and historic journey - providing a basis for the better known May Gibbs "Snugglepot and Cuddlepie" stories.*

*...*

*In December 1900 Mary Everitt published an account of Gundungara Aboriginal language in the Journal and Proceedings of the Royal Society of NSW. This fine account of Gundungara language, was obtained "from Bessy Simms alone", one of the children from the 1890 Great Walk, who gave a series of language lessons to Mary Everitt at La Perouse more than a century ago. Today there are Simms family descendants, including the oldest Aboriginal woman in the state, still in residence on the Mission at La Perouse and quite able to relate detailed oral traditions of how her father came to La Perouse with Queen Emma on the Great Walk of 1890.*

*Albert "Harry" Etchells, who was born in Appin on 14th April 1862, was the third settler at "Cobrakall", east of the river, on the Old Coach Road which went on for about five miles before turning into a bridle track through Darkes Forest and on to Bulli. Harry and his elder brother Frank made rum that they sold to thirsty Bulli miners. Some time prior to WW1 a young C.W. Peck (Ellen Anderson's biographer), who was born and raised at Bulli, set out with "Harry" from "a real old fashioned farm … at Macquarie Fields" on a cross-country shandradan buggy journey "all the way to Colong [in the Upper Wollondilly River Valley], and perhaps the Kowmung and Millnigang … and Bullnigang" – evidently attempting to retrace the epic 1901 expedition of Mary Everitt and her young niece who, together, successfully descended 2000 foot cliffs into an icy Burrogorang Valley, traversing 15 foot snow-drifts during the coldest winter in recorded history, riding on top of a frozen Wollondilly River, on two massive powerful draft horses, in order to meet Gundungara people at their Nulla Nulla camp and record their traditional songs. By comparison, Peck and Etchells were clowns, their buggy fell apart and they got into all sorts of difficulties, saved only by fine weather and other people.*

*The present Metropolitan Colliery occurs on this historic and culturally significant landscape - of "the Great Walk" oral traditions involving Liverpool's "last D'harug Princess" - not far from the forgotten "Cobrakall" township in the Holsworthy Military Reserve, which may have played an important role in post-contact Aboriginal history."*

## 3.2. Regional Context

The Sydney region has been inhabited by Aboriginal people for at least 30,000 years, and possibly longer (Nanson *et al*., 1987; McDonald, 2007). Archaeological sites from the Blue Mountains and Hawkesbury/Nepean River System have provided the earliest evidence of occupation within the region. Stockton and Holland (1974) produced a radiocarbon date of c.22,000 years BP from a site at Kings Tableland in the Blue Mountains. Excavation of the Greaves Creek rock shelter site of Walls Cave near Medlow Bath has produced a date of c.12,000 years BP (ibid). At Shaws Creek KII, a rock shelter on the west bank of the Nepean north of Penrith, a date of c13,000 BP is recorded (Kohen *et al.,* 1984).

Sites on the south coast of NSW, such as Burrill Lake (c.20,000) and Bass Point (c.17,000), provide complimentary dates (Lampert, 1971; Bowdler, 1970). At the time of these periods of occupation, both sites would have been located within hinterland areas some distance away from the sea. In the case of Burrill Lake, the sea would have been up to some 16 km further east than at present (McDonald, 1992). There are no other Pleistocene sites recorded on the NSW coastline. There are however two sites located at Curracurrang and the Prince of Wales Hospital, which are dated to around 7,000 years ago.

It is very likely that a large number of coastal sites of a similar antiquity within the Sydney region have been submerged and/or destroyed by sea-level changes that have occurred in eastern Australia during the last 17,000 years (Bayley, 1969).

On the basis of the available evidence it would appear that the initial occupation of the Eastern seaboard regions was sporadic, and with low population densities. From around 5000 years ago an increasing and continued use of many sites, which have been investigated through archaeology appears to have ensued. Evidence for the use and occupation of the Eastern seaboard regions from this period is far more 'archaeologically visible' than for the previous periods.

In support of the likelihood that occupation of the region intensified around this time, the majority of rock shelter and open camp sites within the region, which have been investigated contain archaeological deposits, features and artefacts, which generally date to c.2,500 BP or less. Kohen (1986) suggests however, that there was a more intensive use of open sites in the region during the last 1,500 years and therefore suggests that the majority of camp sites will belong within this time frame.

During the 30,000 years of occupation in the region, and in particular the last 5,000 to 8,000 years, changes in excavated stone tool assemblages have been observed. A number of temporal markers have subsequently been established by archaeologists in an attempt to distinguish what are considered to be the more significant changes in tool types and tool kit composition (e.g. McCarthy, 1948; Megaw, 1965; Lampert, 1971; Wright, 1997).

## 3.3. Model Of Aboriginal Occupation

The various models of past Aboriginal occupation, which have been developed for the region indicate that, as in virtually all other regions, sources of permanent or seasonally reliable water were not just a focus of past Aboriginal occupation. Therefore, it is expected that the greatest evidence of occupation would be found in association with reliable water sources such as creeks and rivers where they occur.

However, whilst the presence of water has been identified as having been the over-riding factor in determining levels of past Aboriginal occupation, the presence of suitable landforms for occupation to occur is also important. Basically, landform determines the type of archaeological evidence, which may be present or, in many instances, whether any evidence at all can be expected to occur.

In the study area, the dominant landforms are low discontinuous escarpments of Hawkesbury sandstone with the occasional plateau, which tend to present with exposed areas of Hawkesbury sandstone. Many site types, such as axe grinding grooves, are predominantly found in creek beds or creek banks. Other site types, such as petroglyph sites, are found on rock platforms on plateau, sometimes in association with pot holes and/or grinding grooves. Petroglyphs can also occur within sandstone overhang sites.

Sandstone overhangs are most often found on hillsides upslope from drainage lines, however can also occur away from drainage lines dependant on the local geology. Within the study area however, we expect that shelter sites will only be found on hillsides upslope from drainage lines. However, it should be noted that this is an occupation model for the study area only, and may vary significantly from region to region. It should also be noted that some sites may not conform to the model.

## 3.4. Previous Archaeological Investigations

This section provides a summary of Aboriginal heritage surveys, assessments, monitoring, site inspections and baseline recordings that have been undertaken within the study area and surrounds over the past 37 years. Relevant archaeological information on known sites within the study area from the below studies has been provided to representatives of the Aboriginal community as part of this ACHA and is also provided in Appendix 1.

Between 1971 and 1983, the Illawarra Prehistory Group and Caryll Sefton conducted numerous archaeological surveys across the Woronora Plateau. As evidenced by the original recording dates on the AHIMS site cards, these early surveys recorded the majority of currently known Aboriginal heritage sites within the study area and surrounds.

In 1990, Elizabeth Rich (along with a representative of the Illawarra Local Aboriginal Land Council) conducted an archaeological survey of Camp Gully, located adjacent to the Metropolitan Colliery administration offices and coal stockpiles. The survey did not identify any Aboriginal heritage sites and concluded that none were likely to occur (E. Rich, 1990 in Denehurst Limited, 1990). The Local Aboriginal Land Council indicated they were satisfied that no Aboriginal heritage sites occurred within the Camp Gully survey area (*ibid.*).

In 1994, C.E. Sefton Pty Ltd conducted an archaeological survey and assessment of a portion of the study area and surrounds (for Longwalls 1-8) in consultation with representatives of the Aboriginal community (C.E. Sefton Pty Ltd, 1994a and 1994b). The survey was undertaken by four people including an archaeologist, a representative of the Illawarra Local Aboriginal land Council and two experienced field assistants (*ibid.*).

In 2001, C.E. Sefton Pty Ltd conducted an archaeological survey and assessment of a portion of the study area and surrounds (for Longwalls 8-13) in consultation with representatives of the Aboriginal community (C.E. Sefton Pty Ltd, 2001). Similar to the survey for Longwalls 1-8, the survey for Longwalls 8-13 was undertaken over seven days by four people including an archaeologist, a representative of the Illawarra Local Aboriginal land Council and two experienced field assistants (*ibid.*).

In 2004, C.E. Sefton Pty Ltd conducted an archaeological survey and assessment of a portion of the study area and surrounds (for Longwalls 13-17 and 20-22) in consultation with representatives of the Aboriginal community (C.E. Sefton Pty Ltd, 2004). The survey was undertaken over seven days by four people including an archaeologist, a representative of the Illawarra Local Aboriginal land Council and two experienced field assistants (*ibid.*). The study area had been burnt by an intense wild fire one year previously so access and visibility was excellent (*ibid.*).

Between 2004 and 2007, the Illawarra Prehistory Group (original recorders of a large proportion of Aboriginal heritage sites on the Woronora Plateau, see above) conducted an archaeological survey of the majority of the Project study area and surrounds (Illawarra Prehistory Group, unpublished data). The aims of this survey were to identify and record previously un-recorded Aboriginal heritage sites and to re-record previously recorded and registered Aboriginal heritage sites on the Woronora Plateau and to update co-ordinates associated with each known Aboriginal heritage site.

In 2006, an ACHA was undertaken by Kayandel Archaeological Services for Longwalls 14-17 as part of the SMP Application for Longwalls 14-17 (Kayandel Archaeological Services, 2006). Fieldwork for this assessment covered a portion of the Project study area and surrounds and was undertaken in consultation with the Aboriginal community and included both archaeological and cultural assessments. This assessment was submitted as supporting information for an application under Part 6 of the *National Parks and Wildlife Act, 1974* (NP&W Act) to the DEC (now the DECC) in 2006.

In 2006, rock art specialist, R.G. Gunn, in association with Kayandel Archaeological Services undertook a comprehensive baseline recording of Aboriginal cultural heritage sites in the Longwall 14–17 area in consultation with the Aboriginal community (Gunn and Kayandel Archaeological Services, 2007a). The baseline recording was collected for use during the Aboriginal heritage monitoring programme for Longwalls 14-17 (*ibid.*).

Various DECC AHIMS data requests have been made across the Project study area with the most recent data provided in May 2008.

In 2007, an ACHA was undertaken by Kayandel Archaeological Services for Longwalls 18-19A as part of the SMP Application for Longwalls 18-19A (Kayandel Archaeological Services, 2007). This assessment was undertaken in consultation with the Aboriginal community and included both archaeological and cultural assessments along with proposed management and monitoring measures. The field surveys undertaken as part of this ACHA recorded two Aboriginal heritage sites within the Project study area not previously recorded. This assessment was submitted to the DPI–MR in 2007 and is currently undergoing regulatory review. The area assessed by the Longwall 18-19A ACHA is within the Project study area the subject of this ACHA and as such has been included as Appendix 2 for completeness.

In accordance with recommendations in C.E. Sefton Pty Ltd (1994a, 1994b, 2001 and 2004) and Kayandel Archaeological Services (2006), approximately 41 Aboriginal heritage sites at the Metropolitan Colliery have been systematically monitored (in consultation with representatives of the Aboriginal community) for the effects of mining subsidence (C.E. Sefton Pty Limited, 2006a and 2006b; Kayandel Archaeological Services, unpublished). Monitoring of Aboriginal heritage sites has been undertaken in 1995, 1996, 1998, 2000, 2002, 2004, 2006 and 2008 (*ibid.*). Management measures recommended by C.E. Sefton Pty Ltd (2006a and 2006b) as a result of this monitoring have been undertaken (e.g. installation of a silicone drip line in FRC10 to minimise impact to art from water seepage). A summary of the findings of this monitoring is provided in Section 8.

Further detail of the field survey methodologies of the more recent studies described above is provided in Section 4.

Relevant archaeological information from the above described archaeological investigations regarding Aboriginal heritage sites within the study areas was provided to each of the registered Aboriginal groups/parties as part of the draft methodology for this ACHA (Section 5).

From the existing information outlined above, there are 188 sites within the study area. Of the 188 sites, 142 sites are sandstone overhangs with various features. This represents 75.5% of the total sites. The remainder of the sites are open sites with either artefact scatter, grinding grooves, petroglyphs, water channels or a combination of these.

| Site Types | No. | % of Total Sites[1] |
|---|---|---|
| Open site with artefact scatter | 1 | 0.5 |
| Open site with petroglyphs only | 1 | 0.5 |
| Open site with grinding grooves and artefacts | 1 | 0.5 |
| Open site with grinding grooves and petroglyphs | 8 | 4.3 |
| Open site with grinding grooves only | 35 | 18.6 |
| **Subtotal** | **46** | **24.4** |
| Sandstone overhang with art and artefacts | 2 | 1.1 |
| Sandstone overhang with art and PAD | 7 | 3.7 |
| Sandstone overhang with art only | 42 | 22.3 |
| Sandstone overhang with art, artefacts and deposit | 43 | 22.9 |
| Sandstone overhang with art, artefacts, deposit and/or grinding grooves | 7 | 3.7 |
| Sandstone overhang with art, grinding grooves and petroglyphs | 1 | 0.5 |
| Sandstone overhang with artefacts and deposit | 32 | 17.0 |
| Sandstone overhang with artefacts only | 1 | 0.5 |
| Sandstone overhang with artefacts, grinding grooves and deposit | 2 | 1.1 |
| Sandstone overhang with PAD only | 5 | 2.7 |
| **Subtotal** | **142** | **76.5** |
| **TOTAL** | **188** | **100** |

[1] Percentage values may not total exactly 100 due to rounding.

Within the sandstone overhangs, the three most common are overhangs with art only (29.6%); overhangs with art, artefacts and deposit (30.3%); and overhangs with artefacts and deposit (22.5%).

With respect to the open sites, the majority of open sites (76.1%) have grinding grooves only, whilst only 2.2% of open sites have petroglyphs alone. The remainder of open sites have a combination of features such as grinding grooves and/or artefacts and/or petroglyphs.

## 3.5. Site Definitions

The following is a brief description of the site types that may occur in the current study area. Predictions of the type and nature of sites considered likely to occur within the study area is provided in Section 3.6. Where relevant, these definitions have come directly from the NPWS's *Aboriginal Cultural Heritage: Standards and Guidelines* (1997).

### *Artefact Scatters*

Artefact scatters are defined by the presence of two or more stone artefacts in close association (i.e. within fifty metres [m] of each other) (NPWS, 1997). An artefact scatter may consist solely of surface material exposed by erosion, or may contain sub-surface deposit of varying depth. Associated features may include hearths or stone-lined fireplaces, and heat treatment pits.

Artefact scatters may represent:

- camp sites: involving short or long-term habitation, manufacture and maintenance of stone or wooden tools, raw material management, tool storage and food preparation and consumption;
- hunting or gathering activities;
- activities spatially separated from camp sites (e.g. tool manufacture or maintenance); or
- transient movement through the landscape.

The detection of artefact scatters depends upon conditions of surface visibility, including vegetation cover, ground disturbance and recent sediment deposition. Unfavourable conditions can obscure artefact scatters and prevent their detection during surface surveys.

### *Bora Grounds*

Bora grounds are a ceremonial site associated with initiations. They are usually comprise two circular depressions in the earth, and may be edged with stone. Bora grounds generally occur on soft sediments in river valleys, although they may also be located on high, rocky ground in association with stone arrangements.

### *Burials*

The internment of human remains varies considerably throughout NSW and over time. In some cases human remains were placed in hollow trees, caves or sand deposits and may have been marked by carved or scarred trees. Others may be marked through the scattering of shells, glass and other materials or planting of various species. In some cases, markers may have been historically removed (NPWS, 1998). Burials have been identified eroding out of sand deposits or creek banks, or when disturbed by development. Knowledge of the locations of burials is frequently dependent on community awareness and may not be culturally appropriate to disclose (NPWS, 1998).

### *Culturally Modified Trees*

Culturally modified trees include scarred and carved trees and are defined by the process of deliberate removal of bark or wood from a tree. Culturally modification of trees occurred for several reasons including the; manufacture of items such as canoes, containers, shields or shelters; the manufacture of foot or hand holds for tree climbing; the hollowing of trees to collect food and for carving (Long, 2005). Carved trees are caused by the removal of bark to create a working surface, on which petroglyphs are incised. Carved trees were used as markers for ceremonial and symbolic purposes, including burials. Scarring from cultural modification is most likely to be present only on mature/ old growth trees remaining from original vegetation. While culturally modified trees were more common in the early 20th century; the natural lifespan of tree species, changes in landscape management practices and intense fire events have all reduced the visibility of culturally modified trees in the landscape. Furthermore, the identification of culturally modified trees is complicated by a range of natural impacts that result in very similar scarring patterns including long-term traumas, storm and fire damage, animal damage, impacts and abrasions and ringbarking (Long, 2005: 36-49).

### *Fish Traps*

Fish traps comprised arrangements of stone, branches and/or wickerwork placed in watercourses, estuaries and along coasts to trap or permit the easier capture of sea-life.

### *Grinding Grooves*

Grinding grooves are elongated narrow depressions in soft rocks (particularly sedimentary) with case hardened surfaces (Bednarik, 2007: 32). Generally this site type is found in association associated with watercourses; they are created by the shaping and sharpening of ground-edge implements and are technically referred to as Utilitarian Anthropic Marks (Bednarik, 2007: 30).

### *Petroglyph Sites (Engravings)*

Technically, petroglyph sites are considered Non-Utilitarian Anthropic Marks (Bednarik, 2007: 32). Petroglyphs are generally formed through a reductive process whereby a design is produce using one of a number of techniques to break through the surface lamina, the weathered crust of the rock, to what is usually the lighter natural colour of the rock (Bednarik, 1994).

### *Isolated Finds*

Isolated finds occur where only one artefact is visible in a survey area. These finds are not found in association with other evidence for prehistoric activity or occupation. Isolated finds occur anywhere and may represent loss, deliberate discard or abandonment of an artefact, or may be the remains of a dispersed artefact scatter.

### *Middens*

Shell middens comprise deposits of shell remaining from consumption and are common in coastal regions and along watercourses. Middens vary in size, preservation and content, although they often contain artefacts made from stone, bone or shell, charcoal, and the remains of terrestrial or aquatic fauna that formed an additional component of Aboriginal diet. Middens can provide significant information on land-use patterns, diet, chronology of occupation and environmental conditions.

### *Mythological/Traditional Sites*

Mythological and traditional sites of significance to Aboriginal people may occur in any location, although they are often associated with natural landscape features. They include sites associated with dreaming stories, massacre sites, traditional camp sites and contact sites. Consultation with the local Aboriginal community is essential for identifying these sites.

### *Rock Shelters with Art and/or Occupation Deposit*

Rock shelters occur where geological formations suitable for habitation or use are present, such as rock overhangs, shelters or caves. Rock shelter sites generally contain artefacts, food remains and/or rock art[1] and may include sites with areas of potential archaeological deposit, where evidence of rock-art or human occupation is expected but not visible. The geological composition of the study area greatly increases the likelihood for rock shelters to occur.

### *Stone Arrangements*

Stone arrangements include lines, circles, mounds, or other patterns of stone arranged by Aboriginal people. These may be associated with bora grounds, ceremonial sites, mythological or sacred sites. Stone arrangements are more likely to occur on hill tops and ridge crests that contain stone outcrops or surface stone, where impact from recent land use practices has been minimal.

### *Stone Quarries*

A stone quarry is a place at which stone resource exploitation has occurred. Quarry sites are only located where the exposed stone material is suitable for use either for ceremonial purposes (e.g. ochre) or for artefact manufacture.

[1] For the purpose of the ACHA and this Environmental Assessment, “rock art” refers only to pictograms (i.e. drawings/paintings). Whilst petroglyphs (i.e. engravings) are also a form of rock art, they are separated from pictograms in this assessment to maintain consistency with the extensive recordings and re-recordings undertaken across the study area over the past 37 years.

## 3.6. Site Type Predictions

Based upon analysis of existing archaeological information (See Section 3.4), the potential site types described in Section 3.5 and the local and regional archaeological and environmental contexts expressed above, the types of sites which could be expected to occur within the study area are outlined below.

The study area is expected to contain a large number of sandstone overhangs, mostly containing evidence of occupation and utilisation by Aboriginal inhabitants in the form of either rock art and/or lithic fragments with identifiable diagnostic attributes and/or PAD.

With respect to open sites, these sites are likely to be located in areas where ground surfaces are visible and organic litter, grasses and shrubs are absent. The most common known open sites within the study are grinding groove sites. The most likely contexts for locating these sites will obviously include areas of sandstone outcrop, which in the study area are mainly found along the two broad north-south aligned plateau.

Conditions for the potential for old growth and/or mature trees suitable to retain evidence of Aboriginal cultural modification (i.e. carving or scarring) is dependent on the nature and distribution of certain environmental parameters such as soils, aspect and drainage. Changes to the land management regimes of the past 200 or so years have also contributed to the rapid decline in mature/old growth trees, which may retain evidence of cultural modification. The traditional Aboriginal land management strategies, in particular regular low intensity burn off, which removed the understorey vegetation but retained large vegetation species has been replaced by uncontrolled bush/wild fires of sufficient intensity to consume the mature/old growth trees. Most recently this occurred in 2001 (Chafer, 2007). As major bushfire events have occurred over the past decades, there is limited potential for trees with evidence of cultural modification to remain within the study area.

# 4. METHODOLOGY AND METHODS

This study brings together sources of information, which assist in understanding and assessing the Aboriginal heritage within the study area.

A preliminary model of Aboriginal occupation, developed from historical sources, is given in Section 3 to provide a social context for the study area and the Woronora Plateau more generally.

Several archaeological studies have been carried out in the study area and a large number of other projects have been undertaken in the surrounding district. The results of those studies undertaken in areas immediately adjacent to the study area have been summarised within this report and been utilised to provide a context for the study area.

This ACHA utilises the significant body of previous surveys, assessments and data recordings (Section 3.4) undertaken within the study area. This existing information was used as the basis for determining appropriate supplementary fieldwork (survey and inspections) extent, methods and locations (undertaken in November/December 2007), and for determining appropriate assessment methods.

## 4.1. Field Survey and Site Inspection

As described in Section 3.4, various archaeological surveys have been undertaken within the study area and surrounds over the past 37 years. The following provides a summary of the field methodologies for more recent surveys within the study area and Section 4.1.1 provides the field methodologies implemented for the additional supplementary surveys and inspections undertaken in December 2007.

Most recently, the Illawarra Prehistory Group commenced a systematic re-survey of the Woronora Plateau in the period 2004 to 2007. The aims of the survey were to identify and record previously un-recorded Aboriginal heritage sites, to re-record previously recorded Aboriginal heritage sites and to update co-ordinates associated with each known Aboriginal heritage site.

The Illawarra Prehistory Group's survey included contour searches by up to six personnel over more than 50 survey days. Survey personnel walked on parallel contours maintaining voice contact. In addition to the contour searches, areas with increased potential to contain Aboriginal sites (e.g. cliff lines, creek beds, sandstone overhangs and sandstone outcrops) were targeted by survey personnel. All previously identified Aboriginal heritage sites were re-recorded to update existing information and provide a greater level of detail on each site.

As part of the re-survey of the area, the Illawarra Prehistory Group also undertook a review of the existing AHIMS database to identify errors in site recordings, specifically co-ordinate errors. As described above, the co-ordinates provided on the original site cards are considered inaccurate due to the accuracy of mapping at the time of original recording. The outcomes of this review were used as the basis for plotting and locating known Aboriginal heritage sites during the site inspections (described below) undertaken across the study area in 2007.

In 2006 and 2007, field surveys and site inspections were also undertaken within the study area by Kayandel Archaeological Services and representatives of the Aboriginal community as part of the ACHA's for Longwalls 14-17 and Longwalls 18-19A.

Inspections were undertaken in July 2006 and August 2007 to provide the Aboriginal community an opportunity to inspect the area and known Aboriginal heritage sites to assist with providing comment regarding cultural significance and proposed management recommendations. Prior to the commencement of these inspections, all community groups were provided with documentation (including existing sites cards and photographic recordings) of all known sites within the study area. Each community group was encouraged to review the provided information and advise the archaeologist of any particular sites/areas that they wished to survey/inspect. All such requests raised by the community groups/parties were incorporated into the survey design and undertaken during the fieldwork. Aboriginal community groups/parties who attended the July 2006 or August 2007 inspections included:

- Cubbitch Barta;
- Illawarra Aboriginal Corporation;
- Illawarra Local Aboriginal Land Council;
- KEJ Tribal Elders Corporation;
- Mr Gary Caines;
- Northern Illawarra Aboriginal Collective, including representatives from:
  - Woronora Plateau Gundungara Elders Council;
  - Wadi Wadi Coomaditchie Aboriginal Corporation;
  - La Perouse Botany Bay Aboriginal Corporation; and
  - Wulungulu Group;
- Tharawal Local Aboriginal Land Council; and
- Wodi Wodi Elders Corporation.

Surveys were also undertaken in August 2007 in consultation with the Aboriginal community across those portions of the Application Area not subject (at the time) to recent systematic survey by the Illawarra Prehistory Group. This survey included four archaeologists and representatives of the Aboriginal community over three days and involved contour searches and additional targeted survey of areas with increased potential to contain Aboriginal heritage sites (e.g. cliff lines, sandstone overhangs and sandstone outcrops). Twelve Aboriginal groups/parties were invited to attend the August 2007 surveys, including:

- Cubbitch Barta;
- Illawarra Aboriginal Corporation;
- Illawarra Local Aboriginal Land Council;
- KEJ Tribal Elders Corporation;
- Mr Gary Caines;

- Northern Illawarra Aboriginal Collective, including representatives from:
  - Woronora Plateau Gundungara Elders Council;
  - Wadi Wadi Coomaditchie Aboriginal Corporation;
  - La Perouse Botany Bay Aboriginal Corporation; and
  - Wulungulu Group;
- Tharawal Local Aboriginal Land Council; and
- Wodi Wodi Elders Corporation.

With the exception of the Illawarra Aboriginal Corporation and the KEJ Tribal Elders Corporation, all of the above groups/parties participated in the survey.

### *4.1.1. Supplementary Aboriginal Heritage Fieldwork 2007*

Following the above surveys, additional supplementary fieldwork was undertaken by two teams over seven days in December 2007 (i.e. 5, 6, 7, 10, 11, 12 and 14 December 2007) in the study area. Each team consisted of two archaeologists and between two and six representatives from the Aboriginal community. The aim of the supplementary field survey and inspections was to provide the contemporary Aboriginal community the opportunity to inspect the study area and Aboriginal heritage sites within the study area in order to provide comment on cultural significance and proposed management recommendations.

To assist in supplementary field surveys and inspections, the following desktop tasks were undertaken prior to the supplementary fieldwork:

- A review of existing archaeological reports and DECC AHIMS Register site cards for the study area and surrounding region.
- Interpretation of the topographic context and landform units of the study area.
- Plotting of all known Aboriginal sites onto a topographic map of the study area.
- Development of a desktop significance assessment to focus the supplementary field surveys and site inspection.
- Consultation with the Aboriginal community in regard to specific known sites and/or areas of particular interest.

Also prior to the commencement of supplementary fieldwork, all community groups were provided with several comprehensive documents including existing sites cards and photographic recordings of all known sites within the study area. Each community group was encouraged to review the provided information and advise the archaeologist of any particular sites/areas that they wished to survey/inspect. All such requests raised by the community groups/parties were incorporated into the survey design and undertaken during the supplementary fieldwork.

All indigenous community groups were required to provide certificates of currency of public liability and workers compensation for its representatives attending the supplementary fieldwork. Fieldwork participants attended an occupational health and safety site induction on the first day of fieldwork at the administration office of Metropolitan Colliery in Helensburgh. Weather conditions during the fieldwork resulted in variable start and finish times on some days and the postponement of fieldwork from the 13 December to the 14 December.

Community representatives alternated between the two field teams throughout the course of the fieldwork. The community representatives were given the opportunity to select which team they wanted to be on and were given an indication of the sites/areas to be surveyed/inspected. A list of the community representatives in attendance is provided in Section 5 and Appendix 3.

*Supplementary Surveys*

The supplementary field survey strategy was designed to maximise the potential to identify previously unrecorded archaeological material. Assessments were made on levels of disturbance from previous land use, survey variables (ground visibility and archaeological visibility) and the potential archaeological sensitivity of the area.

Representative areas not subject to recent systematic survey were selected for thorough systematic pedestrian survey in December 2007. Survey involved pedestrian survey of topographic traverses and opportunistic transects across the survey area:

- Topographic traverses involved people spaced evenly across the width of the study area (i.e. Up-slope and Down-slope) and inspecting the ground, escarpment and debris slopes while walking along the length of the survey area. The surveyors were spaced between 20 and 75 m apart depending on the width of the survey area and the level of ground exposure and topographic features present.
- Opportunistic transects were undertaken to inspect areas of particular topographic sensitivity within the study area (e.g. cliff lines or areas of exposed sandstone).
- The number of survey transects conducted in any particular area were dependent on the number of identifiable escarpment and boulder features. Where the study area was well vegetated or there were limited escarpment or boulder features, only a single transect was required. Where there was a large number of escarpment or boulder features, numerous transects were required.
- All old growth trees identified within the study area were inspected for Aboriginal scarring.
- Any sites identified in the course of the survey were recorded (see site recording).

*Supplementary Inspections*

Prior to undertaking the December 2007 field surveys and inspections for the Project, 188 sites had previously been recorded within the study area. Based on existing available information (including sites cards, photographic records, position in the landscape and previous archaeological survey/assessment results) a preliminary archaeological significance assessment was undertaken for each of these 188 previously recorded sites. Site inspections were undertaken for all sites ranked as either high or moderate archaeological significance (including all sites listed on the Register of National Estate) with a representative sample of sites with a low archaeological significance also inspected. In addition, and as described above, all sites identified by the Aboriginal community as being of particular interest were also inspected.

During the site inspections, opportunistic transects were undertaken in areas of topographic sensitivity. This resulted in a wider coverage of the area than would other wise be expected with direct travel to any given site.

*Site Recording*

The supplementary archaeological field work aimed at identifying material evidence of Aboriginal occupation as revealed by surface and above ground artefacts, stone petroglyphs, rock shelters with artwork and/or artefacts and rock shelters with potential archaeological deposits in contexts unassociated with artefacts.

When a known site was inspected, it was compared with the existing site cards. Where the GPS recording was considered inaccurate, new GPS readings were taken using a handheld unit. A basic photographic record of the site was then taken and photo numbers recorded. Where it was noted that the site card contained insufficient details, a note was made to update the appropriate section (e.g. site plan required to be redrawn). Section 9.1 provides recommendations in regard to updating site cards.

## 4.2. Archaeological Significance Criteria

Following the 2007 supplementary survey and inspections, a re-assessment of archaeological significance was undertaken for each of the known sites within the study area. The archaeological significance assessment was based on: the C.E. Sefton Pty Ltd (2004) assessment; the Kayandel Archaeological Services (2006 and 2007) archaeological significance assessment; information provided by the Illawarra Prehistory Group in 2007 and 2008; information on sites cards registered on the DECC AHIMS database (data retrieved in 2006 and 2008); information collected as part of the comprehensive baseline recording of Aboriginal heritage sites within the Longwall 14-17 area (Gunn, R. G. and Kayandel Archaeological Services, 2007a); and data gathered during the 2007 supplementary survey and site inspections.

The assessment of archaeological significance was undertaken in accordance with the *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (NPWS, 1997) and the *Burra Charter* (Marquis-Kyle and Walker, 2004) value criteria (i.e. scientific, aesthetic, social, spiritual and historical). With consideration of these value criteria, an overall archaeological significance assessment (low, medium or high) of each of the sites within the study area was determined on a context with consideration of the Woronora Plateau. The following features were considered in the assessment of archaeological significance:

- the current condition of the Aboriginal heritage site (e.g. are the grooves/art work faint, has the Aboriginal heritage site been subject to historical and on-going natural deterioration/damage, is the art clearly visible);
- the potential for natural impacts in the future which may affect the condition of the Aboriginal heritage site (e.g. wind, water or fire impacts);
- the representativeness of the Aboriginal heritage site in the region (e.g. is the Aboriginal heritage site represented by other similar Aboriginal heritage sites or site types in the region); and
- the rarity of the Aboriginal heritage site type or elements within the Aboriginal heritage site (e.g. does the Aboriginal heritage site include motifs rare to the region or include an uncommon collection of items/artefacts).

While the above criterion act as a guide to assessing archaeological significance, for any site or place to have the capacity to inform any of these values, it must be in the condition to do so. Therefore the preservation, conservation and general condition of the site is a key factor in any significance assessment. This includes the risk of natural or cultural impacts to the places in question. As a result, an assessment of archaeological significance is not static. Significance changes over the life of a place, as does its associated values, in correlation with the awareness of the visitor or user of the place (Marquis-Kyle & Walker, 2004: 11).

As part of the cultural heritage assessment and as outlined above, representatives of the Aboriginal community have inspected the Study Area and a representative sample of Aboriginal heritage sites and site types within the Study Area and surrounds. The cultural significance of the study area and known sites within the study area is primarily to be determined by representatives of the registered Aboriginal community groups/parties.

As an archaeological significance assessment, greater weighting is given to scientific values – the ability for a place to inform future studies on human behaviour and past practices. Taking into consideration each of the above value criteria, an overall archaeological significance assessment (low, medium or high) is assigned to each site. Examples of how these criteria have been used to determine archaeological significance for specific site types within the study area are provided in Section 4.2.1.

### *4.2.1. Site Type Specific Criteria*

*Shelters with Art (Drawings and Stencils)*

Criteria used to assess the significance of shelters with art in the study area include:

- the number of motifs present at the site and/or the size of the motifs;
- the uniqueness/rarity of the motifs;
- an identifiable cultural/mythological value of the motifs;
- method of application (e.g. drawing, hand stencil etc.);
- representativeness of the site within the study area and/or region;
- spatial relationship between motifs; and
- connectivity to other sites.

Drawings

The most common artwork type in the region is charcoal drawings. These drawings are generally of animals, people, decorative motifs and mythological themes. Some of these mythological themes were identifiable, whereas others are not. In some cases, the charcoal artwork consists of representations, which could not be identified, generally appearing as lines or scratched areas. Red, orange, and white pigments were also observed, but were less common. In general drawings resemble sketched works and were fairly small in scale. Only a few sites exhibiting extensive artwork panels (with many figures). These larger and more diverse sites have generally been ranked as more significant sites than the smaller artwork panels with fewer motifs. However, where a smaller site has exhibited a motif that could be associated with a mythological theme, then a higher significance rating has been assigned to the site.

Motifs are differentiated on size, technique, motif type and material. For instance, the use of ochre in an area predominately of charcoal drawings is given a higher archaeological significance than those of charcoal.

Hand Stencils

This type of artwork is created most commonly by placing a hand or other object against a rock surface and spraying pigment, from the mouth, over it and the rock surface. When the object or limb is removed, a negative image of the object remains on the rock surface (Whitley, 2005: 9). Ethnography suggests that stencils, particularly hand stencils, have been used as cultural connector between people or groups of people and particular places in a landscape. They have been associated with identity, ownership and other cultural factors. Hand stencils are generally the most common type of stencil.

*Petroglyphs/Engravings*

This site type involves the systematic removal of the rock crust to create a visual image with three-dimensional relief. Petroglyphs in the Hawkesbury sandstone mostly depict mythological figures, zoomorphs, animals, fish and anthropomorphs. On account of their generally large size (up to several metres long), these petroglyphs generally required a substantial time investment to execute relative to drawings and stencils. Based on existing information, rock petroglyphs are generally rare in the study area thus increasing their archaeological significance ratings.

*Grinding Grooves*

Stone axes were manufactured and resharpened by abrading the tools against sandstone platforms or boulders. Water was used in the process to reduce the heat produced by friction in the grinding process and these sites generally occur near to sources of water, particularly in creek beds where suitable types of sandstone are present. These site types had an important utilitarian function, because ground stone axes were an important aspect of the Aboriginal tool kit (McCarthy, 1976). Grinding groove sites are important archaeologically because they represent a chronological marker.

The use of ground stone percussive implement technology has been dated to the late Holocene and therefore the presence of grinding grooves may indicate Aboriginal occupation in the area during this time. Older occupation usually can only be dated through intact stratigraphic sequences, which are more difficult to locate and study than axe grinding grooves.

Criteria used to assess the significance of grinding groove sites in the study area include:

- the number, size and depth of the grinding grooves present at the site;
- representativeness of the site within the study area and/or region;
- spatial relationship between grooves; and
- connectivity to other sites.

*Artefact Scatters/ Stone Artefacts*

Stone artefacts and artefact scatters have the potential to provide insight into a number of aspects of past Aboriginal culture in terms of trading practices, technological capabilities and resource utilisation among other things. There is also an established chronology for stone artefacts and the approximate date that may be attributed to a site based upon the style/type of stone artefacts present at a site. There are a number of characteristics and attributes that distinguish stone artefacts from naturally occurring stone in the landscape. These features include a striking platform, bulb of percussion, point of impact, bulbar scar, shear fracture and hertzian cone.

Criteria used to assess the significance of sites with artefacts in the study area include:

- the number of artefacts;
- variation of assemblage i.e. variation of tool types and stages in production (where possible);
- representativeness of the site within the study area and/or region;
- connectivity to other sites; and
- potential to inform future studies of human behaviour.

# 5. CONSULTATION

Comments from Aboriginal groups/parties received in regard to the consultation undertaken for this ACHA include:

> *"TLALC has been involved in the Metropolitan Coal Project since early 2007 and is satisfied with the level of survey coverage and consultation undertaken throughout the Aboriginal heritage assessment. The level of information provided on each of the sites is of a high standard and appreciated when commenting on cultural significance and management."* Tharawal Local Aboriginal Land Council, 30 May 2008.
>
> "*KEJ Elouera is pleased to have been involved in the assessment on an ongoing basis and would like to be involved in the project into the future once approved."* KEJ Tribal Elders Corporation, 5 June 2008.
>
> "*I have appreciated the cultural engagement/consultation between myself and the company's agents throughout the assessment process to date and would be honoured to be involved in project investigation/continuation by personal engagement between myself and Peabody Energy."* Mr Gary Caines, 6 June 2008.
>
> *"The Illawarra Local Aboriginal Land Council looks forward to continuing and strengthening our relationship with Helensburgh Coal Pty Ltd into the future"* Illawarra Local Aboriginal Land Council, 10 June 2008.
>
> "We have been involved at *the Metropolitan Colliery since early 2006.....We have always been consulted, even though this means that we have not always been in agreeance with proposals that have taken place in the past."* Cubbitch Barta, 12 June 2008.
>
> "*The WWEC is satisfied with consultation undertaken in regard to the Draft Aboriginal Heritage Assessment."* Wodi Wodi Elders Corporation, 16 June 2008.

Written comments were received from all registered Aboriginal community groups/parties viz. Cubbitch Barta, Illawarra Local Aboriginal Land Council, KEJ Tribal Elders Corporation, Mr Gary Caines, Northern Illawarra Aboriginal Collective (on behalf of La Perouse Botany Bay Aboriginal Corporation, Wadi Wadi Coomaditchie Aboriginal Corporation and Woronora Plateau Gundungara Elders Council), Tharawal Local Aboriginal Land Council and Wodi Wodi Elders Corporation. The full comments are described further in Section 5.2.

Section 5.1 below provides an outline of the consultation process undertaken for this assessment and Section 5.2 outlines comments received from the Aboriginal community and how they have been considered and/or incorporated into this ACHA.

## 5.1. Consultation Process Overview

The DECC has adopted the following heritage management principles (NPWS, 1997: 8-10):

- DECC recognises that Aboriginal culture is living and unique and recognises the right of Aboriginal people to protect, preserve and promote their culture;

- DECC recognises that Aboriginal people are the rightful cultural owners of Aboriginal cultural heritage information and Aboriginal sites and objects;
- DECC encourages Aboriginal participation in assessment and salvage work and supports direct negotiation between Aboriginal communities and developers; and
- DECC encourages Aboriginal communities to carry out their own assessments, including oral history and anthropology.

The following section outlines consultation undertaken to date in relation to this ACHA. This section includes the following:

- an overview of the key steps undertaken during the consultation process in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (DEC, 2004); and
- comments received from the Aboriginal community in relation to the proposed methodology, Aboriginal heritage sites and cultural significance.

In addition to the consultation undertaken specifically for this ACHA, the Aboriginal community has been involved in archaeological surveys, management and monitoring at the Metropolitan Colliery since 1990. Most recently, consultation with the Aboriginal community has been undertaken through a process similar to that outlined below for Aboriginal cultural heritage assessments undertaken for Longwalls 14-17 (Kayandel Archaeological Services, 2006) and Longwalls 18-19A (Kayandel Archaeological Services, 2007) and as part of monitoring Aboriginal heritage for Longwalls 8-13 (C.E. Sefton, 2006b) and Longwalls 14-17 (Kayandel Archaeological Services, unpublished)

Additional consultation with respect to this ACHA has (to date) consisted of the following:

- HCPL published a public notice in the Illawarra Mercury on 20 April 2007 advising of its intention to seek approval under Part 3A of the EP&A Act for further development of the Metropolitan Colliery and to undertake an ACHA (Appendix 4). The advertisement asked persons or groups to contact HCPL if they wished to be consulted in relation to the ACHA. All those parties who registered an interest were invited to participate.
- HCPL also wrote separately to parties and groups of the Aboriginal community that were involved in previous consultation at the Metropolitan Colliery for previous archaeological investigations (Section 3.4) (i.e. Cubbitch Barta; Illawarra Aboriginal Corporation; Illawarra Local Aboriginal Land Council; KEJ Tribal Elders Corporation; Mr Gary Caines; Northern Illawarra Aboriginal Collective; Tharawal Local Aboriginal Land Council and Wodi Wodi Elders Corporation). These groups/parties were provided with a copy of the advertisement that was published in the Illawarra Mercury and were invited to participate in the ACHA.
- In addition, HCPL wrote separately to the Wollongong City Council, the DECC, the NSW Department of Aboriginal Affairs (DAA) and the NSW Native Title Services. These organisations were provided with a copy of the advertisement that was published in the Illawarra Mercury and were requested to advise HCPL of any person or group who would like to be involved in the consultation process.

- Subsequent to the above, the following parties/groups registered their interest in being involved in the consultation process:
  - Cubbitch Barta;
  - Illawarra Local Aboriginal Land Council;
  - Mr Gary Caines;
  - Northern Illawarra Aboriginal Collective, including representatives from:
    - La Perouse Botany Bay Aboriginal Corporation;
    - Wadi Wadi Coomaditchie Aboriginal Corporation;
    - Woronora Plateau Gundungara Elders Council;
  - Tharawal Local Aboriginal Land Council; and
  - Wodi Wodi Elders Corporation.

- HCPL wrote to each of the registered groups/parties on 23 October 2007 providing a copy of the Proposed Methodology for the Cultural and Archaeological Assessment of the Project. The accompanying letter invited feedback in regard to the proposed methodology.

- Attachment 2 of the Proposed Methodology for the Cultural and Archaeological Assessment of the Project provided detailed information (including sites cards, photos and relevant baseline recordings) on each of the known Aboriginal heritage sites within the Project study area. This detailed information was compiled from the previous archaeological investigations undertaken within the study area and surrounds (Section 3.4).

- Comments were received verbally from some of the parties/groups regarding the proposed methodology. Received comments were considered and where relevant implemented as part of the finalised methodology.

- HCPL wrote to each of the following groups/parties on 20 November 2007 inviting them to participate in the supplementary Aboriginal heritage field surveys and site inspections for the Project:
  - Cubbitch Barta;
  - Illawarra Aboriginal Corporation;
  - Illawarra Local Aboriginal Land Council;
  - KEJ Tribal Elders Corporation;
  - Mr Gary Caines;
  - Northern Illawarra Aboriginal Collective, including representatives from:
    - La Perouse Botany Bay Aboriginal Corporation;
    - Wadi Wadi Coomaditchie Aboriginal Corporation;
    - Woronora Plateau Gundungara Elders Council;

- Tharawal Local Aboriginal Land Council; and
- Wodi Wodi Elders Corporation.

- In addition to the invitation to participate, the abovementioned letters also encouraged each of the groups/parties to notify HCPL of any specific Aboriginal heritage sites of interest that they wished to inspect during the field surveys.

- In accordance with the finalised methodology, the supplementary Aboriginal heritage surveys and site inspections were undertaken in December 2007. Representatives from the following Aboriginal parties/groups participated in the Aboriginal field surveys and site inspections:
  - Cubbitch Barta;
  - Illawarra Local Aboriginal Land Council;
  - KEJ Tribal Elders Corporation;
  - Mr Gary Caines;
  - Northern Illawarra Aboriginal Collective, including representatives from:
    - La Perouse Botany Bay Aboriginal Corporation;
    - Wadi Wadi Coomaditchie Aboriginal Corporation;
    - Woronora Plateau Gundungara Elders Council;
  - Wodi Wodi Elders Corporation; and
  - Tharawal Local Aboriginal Land Council.

  Additional detail on Aboriginal participation in the Aboriginal heritage survey and site inspections is detailed in Appendix 3.

- During the December 2007 field surveys, Aboriginal groups/parties were again invited to indicate Aboriginal heritage sites of particular interest that they wished to inspect. All such requests by the Aboriginal groups/parties were accommodated.

- The draft ACHA was provided to each of the registered parties/groups on 19 May 2008. In accordance with correspondence with the registered parties/groups, comments on the draft ACHA were requested by 11 June 2008.

- The registered parties/groups were contacted in the week commencing 26 May 2008 to confirm that the draft ACHA had been received and inquire if the parties/groups had any queries or comments that they would like to discuss and/or if they would like to meet to discuss the draft ACHA.



- HCPL representative met with Mr Gary Caines (27 May and 6 June 2008), Tharawal Local Aboriginal Land Council (28 May 2008), Northern Illawarra Aboriginal Collective (29 May 2008), KEJ Tribal Elders Corporation (5 June 2008), Illawarra Local Aboriginal Land Council (5 June 2008), Cubbitch Barta (6 June 2008) and Wodi Wodi Elders Corporation (6 June 2008) to discuss the assessment and any comments or issues that the community had in regard to the Project. During these meetings, each of the parties/groups were encouraged to submit written comments on the draft ACHA.

- Written comments were received from all registered Aboriginal community groups/parties *viz.* Cubbitch Barta, Illawarra Local Aboriginal Land Council, KEJ Tribal Elders Corporation, Mr Gary Caines, Northern Illawarra Aboriginal Collective (on behalf of La Perouse Botany Bay Aboriginal Corporation, Wadi Wadi Coomaditchie Aboriginal Corporation and Woronora Plateau Gundungara Elders Council), Tharawal Local Aboriginal Land Council and Wodi Wodi Elders Corporation. A full copy of these comments is provided in Appendix 5.

- Comments (including cultural significance comments, suggested management and mitigation comments and general comments regarding the appropriateness of specific terminology) received from the Aboriginal community throughout the ACHA process to date (including those received during the December 2007 field surveys) have been considered as part of this ACHA by considering relevance to cultural significance, potential impacts to Aboriginal heritage and proposed management and mitigation measures.

  In addition, comments (including cultural significance comments, suggested management and mitigation comments and general comments regarding the appropriateness of specific terminology) received from the Aboriginal community as part of the ACHA undertaken in 2007 for the Metropolitan Colliery *Longwalls 18-19A Subsidence Management Plan Application* (copies provided in Appendix 2) have also been considered as part of this ACHA by considering relevance to cultural significance, potential impacts to Aboriginal heritage and proposed management and mitigation measures.

## 5.2. Consideration of Comments Received

As outlined above, written comments were received from all registered Aboriginal community groups/parties with a full copy of these comments provided in Appendix 5. The below discussion details the comments received (in regard to Aboriginal cultural heritage) on the draft version of this ACHA and how they have been considered and/or addressed as part of this assessment:

- The KEJ Tribal Elders Corporation and Wodi Wodi Elders Corporation indicated their support of the Project, provided that the recommendations and/or management measures outlined in the ACHA are implemented.

- Mr Gary Caines indicated "*The draft ACHA is adequate following consideration of the comments provided in the previous consultation as noted in Attachment 1*". Mr Gary Caines subsequently indicated that the letter should stand as is, without the referenced "Attachment 1".

- The Illawarra Local Aboriginal Land Council, KEJ Eloura, Mr Gary Caines and Wodi Wodi Elders Corporation indicated that they supported the development of the Aboriginal Cultural Heritage Management Plan (ACHMP), which includes the application of the management and mitigation measures proposed in Sections 9 and 10.

- Cubbitch Barta, the Illawarra Local Aboriginal Land Council and the Tharawal Local Aboriginal Land Council indicated that they support the proposed management and mitigation measures except for the undertaking of invasive survey techniques at Aboriginal heritage sites. It was noted by these groups that these techniques (i.e. brushing of floors, test pits, moving rocks, draining waterholes) can greatly impact Aboriginal heritage sites both culturally and physically. The Tharawal Local Aboriginal Land Council acknowledged that there *"may be appropriate application of these techniques at some sites and TLALC would appreciate being involved in any assessment of the application of these techniques. Perhaps it should be undertaken as part of the development of the Aboriginal Cultural Heritage Management Plan"*. Cubbitch Barta indicated that application of these techniques "*would destroy these sites, as they exist today. I do believe in detailed baseline recordings of the sites and regular monitoring, but I do not support any recommendations or works that would partially or fully destroy any site, based purely on scientific, or even cultural curiosity"*. The Tharawal Local Aboriginal Land Council suggested that assessment of the application of invasive survey techniques could be undertaken as part of the development of the ACHMP.

  Section 10 of this ACHA acknowledges that, due to the disturbance that would result, such investigations are not recommended unless consultation undertaken during development of an ACHMP (Section 9.4) indicates consensus between the Aboriginal community and the DECC.

- Cubbitch Barta, Illawarra Local Aboriginal Land Council, KEJ Tribal Elders Corporation, Mr Gary Caines, Northern Illawarra Aboriginal Collective, Tharawal Local Aboriginal Land Council and Wodi Wodi Elders Corporation all expressed their interest in being consulted and involved in all aspects of Aboriginal heritage management at the Metropolitan Colliery, including the development and implementation of the ACHMP, mitigation and management measures, recording and monitoring of Aboriginal heritage sites. The Illawarra Local Aboriginal Land Council indicated "*As part of the development of the Aboriginal Management Plan, site representatives should be able to further discuss and develop the proposed management measures with Helensburgh Coal Pty Ltd representatives both in the office and on-site. Final decisions regarding management of Aboriginal heritage should be undertaken through the development of the Aboriginal Management Plan (in consultation with the Illawarra Local Aboriginal Land Council) which should include time in the field (at select sites to ensure appropriateness of measures)*".

Sections 9.4 and 10 discuss and recommend the development of an ACHMP for the Project to assist with the overall management of Aboriginal heritage at the Metropolitan Colliery. As discussed in Section 10, the ACHMP would include a protocol for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures). Section 10 also recommends that the ACHMP be developed in consultation with representatives of the Aboriginal community.

In addition, Sections 9.1 and 9.3 indicate that the detailed design of the general management and mitigation measures should be undertaken in consultation with the Aboriginal community and the DECC and Section 9.2 recommends that the monitoring program be developed in consultation with the Aboriginal community.

- Cubbitch Barta commented: "*I would like to participate in developing a protocol for consultation for the project".*

As discussed in Section 10, it is recommended that an ACHMP be developed for the Project, which includes a protocol for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures). Also as discussed in Section 10, all Aboriginal groups/parties (including Cubbitch Barta) will be included in the development the ACHMP (including the development of a protocol for consultation with the Aboriginal community).

- The Wodi Wodi Elders Corporation commented that: "*We need to ensure that there is a comprehensive record of all sites across the area".*

Appendix 1 of this ACHA contains detailed information on all known Aboriginal heritage sites within the study area. As outlined in Section 10, it is recommended that a comprehensive baseline record be collected for Aboriginal heritage sites of high and moderate archaeological significance and all sites specifically identified by the Aboriginal community as being of particular cultural significance (Section 7) within the study area as part of the proposed monitoring program. Section 10 also recommends the baseline record be collected by a suitably qualified archaeologist and members of the Aboriginal community.

- The KEJ Tribal Elders Corporation noted that they considered the pre-contact history provided in the ACHA to be incorrect. The KEJ Tribal Elders Corporation indicated that they would provide a "*true description of the history*" for inclusion in the ACHA by 13 July 2008.

  HCPL subsequently wrote to all Aboriginal community groups/parties advising that while the date for receipt of comments was formally the 11 June 2008, comments received by 27 June 2008 would be incorporated into the ACHA. In this letter, HCPL expressly reminded KEJ of their comment that they would provide a "true description of history". HCPL also indicated that comments received after the 27 June 2008 would not be incorporated into the ACHA. As at 28 June 2008, KEJ Elouera had not provided the referenced *"true description of the history"*.

- The Illawarra Local Aboriginal Land Council, Mr Gary Caines and Northern Illawarra Aboriginal Collective indicated that they, in principle, oppose all mining and any impact to Aboriginal heritage.

- The Wodi Wodi Elders Corporation commented that: *"The WWEC would appreciate Helensburgh Coal Pty Ltd considering an Indigenous Liaison Officer to undertake day to day inspections of the area to help reduce potential unauthorised access or graffiti to Aboriginal sites. This action "will" ensure the protection and preservation of Aboriginal sites"*.

  As discussed in Sections 9.2 and 10, it is recommended that an Aboriginal heritage monitoring program be developed as part of the Aboriginal Cultural Heritage Management Plan for the Project in consultation with the Aboriginal community. In regard to unauthorised access, the surface area is administered and policed by the SCA as it is within the Woronora Special Area. The SCA has locks on all entry gates and public access is restricted. Access can only be granted by the SCA via application. The SCA is aware that unauthorised access occurs in all of their catchment lands and they endeavour to restrict and police this where possible. In addition, HCPL report all observed or evidenced unauthorised access to the SCA for their investigation.

- The Wodi Wodi Elders Corporation noted: "*it is important that the DEC Guidelines be implemented at all times by Helensburgh Coal and the Archaeologists*".

  As discussed in Section 1.4 and outlined above, the ACHA (including consultation, survey and assessment) has been undertaken in accordance with various guidelines including: *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC, 1997); *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005); *Australian ICOMOS Charter for Places of Cultural Significance* (The Burra Charter, 1999) and *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (DEC, 2004).

As outlined in Section 10, it is recommended that a protocol be developed for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures).

- Mr Gary Caines commented that *"involvement of the Aboriginal stakeholders in the assessment process in the Illawarra in general is currently incoherent and unjustifiable". The DECC and the NSW government need to work closely with development proponents to achieve processes whereby only determined or de-facto indigenous proprietry/proprietors as holders have authority among stakeholders".*

  The involvement of the Aboriginal community in the ACHA process is described above and has been undertaken in accordance with various guidelines including: *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC, 1997); *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005); *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (DEC, 2004); and *Australian ICOMOS Charter for Places of Cultural Significance* (The Burra Charter, 1999).

- The Illawarra Local Aboriginal Land Council indicated "*We also support as part of the project, the proposal in the report to develop a protocol for access to the area for personal or cultural reasons. Such access would be beneficial to the Aboriginal community and allow us to assist the Aboriginal community to utilise a cultural and educational resource not currently utilised*".

  As outlined in Section 10, it is recommended that a protocol be developed for Aboriginal community members to access the Project area for personal and/or cultural reasons or as part of scheduled field activities. HCPL has indicated that they would facilitate access (in accordance with the relevant HCPL safety requirements, and the SCA's access requirements) to the Project area for members of the Aboriginal community. While this offer has been made to the Aboriginal community during previous field work programs and no-one to date has taken up the offer, HCPL has indicated that they remain committed to facilitating access to the area for members of the Aboriginal community.

- Mr Gary Caines and the Northern Illawarra Aboriginal Collective commented in regard to lodgement of the Project Environmental Assessment prior to the release of findings from the 'Independent Inquiry into Underground Coal Mining in the Southern Coalfield'.

  HCPL has advised that timing of lodgement of the Project Environmental Assessment is based on ensuring continuity of production and employment of some 320 people at the Metropolitan Colliery. However, the panel report became available prior to lodgement of the Project Environmental Assessment and its findings have been incorporated into the Project Environmental Assessment, where relevant. A relevant recommendation of the panel report is further discussed and addressed in Section 6.3 and Appendix 8.

- The Northern Illawarra Aboriginal Collective, Tharawal Local Aboriginal Land Council and Wodi Wodi Elders Corporation commented that they consider all Aboriginal heritage to be culturally significant (regardless of archaeological significance) and noted that Aboriginal heritage sites provide evidence of ancestry and links to past occupation. These comments are all reflected in the discussion of cultural significance in Section 7.

- Cubbitch Barta and Northern Illawarra Aboriginal Collective have commented that they would like to inspect some additional sites and re-survey some portions of the Project area as part of future SMP applications or the Aboriginal Cultural Heritage Management Plan, prior to effects on these locations.

  It is considered that there has been sufficient fieldwork to date for the purpose of this ACHA. Notwithstanding and based on the above comment, it is recommended in Sections 9.1 and 10 that additional fieldwork be undertaken (in consultation with the Aboriginal community) on a progressive basis across the Project area as part of future SMP applications. It is recommended that the scope of this additional fieldwork be developed as part of the Aboriginal Cultural Heritage Management Plan (Section 9.4) in consultation with the Aboriginal community.

- The Illawarra Local Aboriginal Land Council indicated that: "*In regard to further investigating the motifs on some Aboriginal sites and collecting updated information on some Aboriginal sites, Illawarra Aboriginal Land Council supports this proposal as part of the project on the condition that Illawarra Local Aboriginal Land Council site officers are present".*

  As discussed in Section 10, it is recommended the ACHMP be developed in consultation with the Aboriginal community and include a protocol for consultation with the Aboriginal community over the lifespan of the Project, including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures). Also as discussed in Section 10, it is recommended the ACHMP include a program for developing updated site cards and plans for sites, which have been subject to natural deterioration since their original recording up to 37 years ago (i.e. FRC 28, FRC 29, FRC 31, FRC 32, FRC 57, FRC 62, FRC 63, FRC 117, FRC 194, FRC 253, FRC 276, NT 8, NT 46, and NEW 17) and a program for further investigation (via additional site inspection and Aboriginal community consultation) of the artwork in sites FRC93 and FRC198 against the description of art provided on the AHIMS site card (i.e. whether the art depicts a kangaroo).

- Cubbitch Barta and Northern Illawarra Aboriginal Collective expressed concern that the draft ACHA contains accurate co-ordinates of sacred Aboriginal heritage sites at the Project. Cubbitch Barta indicated that "*this information should not be available to the public, and I request that all coordinate data is removed from any reports that are to be made public*".

The ACHA has been revised accordingly and co-ordinates for Aboriginal heritage sites have been removed. In addition, the detailed information provided in Appendices 1 and 2 will not be included in the publically exhibited version of the report and would be made available only upon request to appropriate parties.

- Cubbitch Barta noted that, although the draft ACHA stated that the Cubbitch Barta clan do not appear on Tindale's (1974) map, "*Cubbitch Barta are a clan of the Dharawal, and were known to the colonists as the Cowpastures Tribe*".

  Based on the above comment, Section 3.1.1 of the ACHA has been revised.

- Cubbitch Barta commented that: "*Monitoring does not, unfortunately prevent damage from occurring, and I believe that there is no accurate way, at this point in time of accurately predicting any damage into the future".*

  Potential subsidence impacts resulting from longwall mining in the study area have been assessed by MSEC (2007; 2008) and are summarised in Section 8. As discussed in Section 8, MSEC (2007; 2008) predictions are conservative in nature as they are based on a conservative empirical methodology that takes into account a comprehensive data set of previously recorded subsidence magnitudes. Section 8 indicates that the majority of identified Aboriginal heritage sites would be expected to experience no significant change, particularly when compared to natural deteriorating processes unrelated to mining and the conservative nature of the MSEC (2007; 2008) subsidence predictions.

  Further, the monitoring program (described in Section 9.2) aims to identify if subsidence has impacted Aboriginal heritage sites and also to validate the subsidence movements predicted by MSEC (2007; 2008). Should monitoring indicate that an Aboriginal heritage site of high archaeological significance is likely to or has been subject to subsidence movements beyond the values at which MSEC (2008) indicate that sandstone has the potential to crack (Section 8), it is recommended that the mitigation measures outlined in Section 9.3 be considered for implementation.

- Cubbitch Barta commented that: *"On page 82, the statement that says "Monitoring of Aboriginal heritage sites to date indicates that subsidence has not resulted in the collapse of any Aboriginal heritage site at the Metropolitan Colliery". Please do not take this as factual, it could mean that sites that have not been monitored, and not all have, could have been damaged. It could also mean that it just simply has not happened yet. There has been the collapse recently of a shelter in the Cataract catchment, even though there has been a report prepared absolving the Colliery of blame, I believe that is was caused by mine subsidence damage, not just simply the wet weather and natural disturbance, when the longwall mining is so close".*

  Following further investigation, the text in Section 8 has been modified and reports on two alleged overhang collapses, including one Aboriginal heritage site (FRC 149 – with artefacts and archaeological deposit although no artwork) located above previous longwalls at Metropolitan Colliery (C. E. Sefton Pty Ltd, 2004).

- The Illawarra Local Aboriginal Land Council commented: "*As a representative body for Aboriginal people in the Illawarra, we would like to further engage with Helensburgh Coal in regard to potential employment and/or skill development opportunities. We have many able persons who could provide many valuable services including administration, construction, landscaping, rehabilitation projects and general land management. The Illawarra Local Aboriginal Land Council hopes that we can discuss these opportunities further and work in partnership to provide such opportunities to our people. We would expect and appreciate further discussion and development of such opportunities through the development of the Aboriginal Management Plan*".

  It is recommended in Sections 9.4 and 10 that HCPL undertake further consultation with the Aboriginal community during the preparation of an Aboriginal Cultural Heritage Management Plan. In addition and based on the above comment, Section 10 also recommends the ACHMP include a protocol/program for HCPL to sponsor existing or new projects which benefit the wider Aboriginal community. These may include (for example): Aboriginal community field days; restoration of culturally significant buildings; rehabilitation/protection of areas with high cultural values; and/or potential employment/skill development opportunities. Any such sponsorship should be made available to the wider Aboriginal community with submissions presented to HCPL and projects selected based on their individual merit and benefit to the wider Aboriginal community.

- Cubbitch Barta commented that: "*I would like to comment on the statement on page 74, in reference to deterioration (including rockfall) of rock surfaces and art. Some of this may be attributed to natural occurrences and or fires, however I would like to bring to your attention that this natural or unnatural process will be exacerbated by mine subsidence, if and when it occurs within the area of these sites that are listed".*

  Based on the above comment the following text has been included in Section 8 of this ACHA, "*The Project also has the potential to exacerbate some existing natural deterioration processes such as those observed during field surveys and described in Section 6.2 (e.g. cracking of sandstone and rockfall)*".

- Cubbitch Barta commented that "*all surface infrastructure development should be checked for ground artefact scatters".*

  As described in Section 10, it is recommended that the ACHMP include a preclearance survey program to identify the most appropriate location for Project surface infrastructure. Based on the above comment, the wording in Section 9.1 has been altered to more clearly include ground artefact scatters as follows: "*preclearance survey should be undertaken in areas above the proposed mining domain (in consultation with representatives of the Aboriginal community) to identify the most appropriate location for required Project surface infrastructure. Project surface infrastructure should be located so as to avoid or minimise potential impacts to Aboriginal heritage sites (including ground artefact scatters) of particular significance*". Also as recommended in Section 10, the ACHMP should include a protocol for managing Aboriginal heritage sites in areas above the mining domain located proximal to required surface disturbance works, which would include:

  – avoidance of impacts to Aboriginal heritage sites where practicable;

- demarcation of Aboriginal heritage sites where proximal surface works are required; and
- developing a comprehensive baseline record in consultation with representatives of the Aboriginal community prior to disturbance where avoidance is not practicable.

- Cubbitch Barta, Illawarra Local Aboriginal Land Council, Mr Gary Caines and Wodi Wodi Elders Corporation all raised concerns regarding the involvement of other specific Aboriginal groups/parties in the ACHA process and also regarding their involvement in future consultation and management of Aboriginal heritage at Metropolitan Colliery.

  As described above, consultation with the Aboriginal community for the ACHA (including the identification of stakeholders) has been undertaken in accordance with the *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (DEC, 2004). In regard to future involvement, HCPL is committed to consulting with any members of the Aboriginal community who have expressed an interest in being involved. Notwithstanding, Section 10 recommends the development of a protocol for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures).

- Cubbitch Barta commented that "*I am not sure of some of the mitigation measures that are made in the recommendations, as to the how, whys and whens such measures would be implemented. Perhaps this would need developing with consultation further*".

  As outlined in Section 9.3, "*development of the detailed design of the mitigation measures should be undertaken in consultation with the Aboriginal community and the DECC as part of the ACHMP process"*. Whilst the detailed design is to be developed as part of the ACHMP, Section 9.3 provides examples of the mitigation measures and how they would be implemented. In addition, based on the above comment regarding "why", the following text has been inserted into Section 9.3 "*These measures have been developed (and recommended in Section 10) to mitigate the potential impacts of Project on Aboriginal heritage sites of high archaeological significance*".

- Mr Gary Caines verbally commented that it would be useful if the ACHA made mention (and provided an overview) of the some of the other assessments being undertaken for the Project Environmental Assessment and identified how/when they would be available for public review/comment. It was suggested by Mr Gary Caines that this would benefit the Aboriginal people with an interest in the project and help people to appreciate the cultural setting or perspective of the area.

  Based on this comment, more detailed summaries of the surface water and groundwater, and the flora and fauna attributes of the study area have been included in Sections 2.2, 2.3.1 and 2.3.2 (respectively) of this ACHA. In addition, each of the complete independent specialist reports appended to the Project Environmental Assessment will be made available for review and comment by the Aboriginal community as part of the public exhibition and review period outlined in Section 1.

The Northern Illawarra Aboriginal Collective provided (on behalf of the La Perouse Botany Bay Aboriginal Corporation, Wadi Wadi Coomaditchie Aboriginal Corporation and Woronora Plateau Gundungara Elders Council) extensive comments on the draft version of this ACHA. As per other comments received, a complete copy of Northern Illawarra Aboriginal Collective's comments is included in Appendix 5. Some of the relevant points made in Northern Illawarra Aboriginal Collective's comments and how they have been considered in this ACHA are outlined below:

- "*The archaeological section with sites cards and photographs of Aboriginal sites is 1,800 pages on the CD file. This section is good. Some photographs have deteriorated with age but putting the material in electronic form helps document it*".

- "*The site cards are also not visually clear for the general reader. They need to be redesigned*".

- The site cards provided to each of the registered Aboriginal community groups/parties (as part of the draft methodology and again as part of the draft ACHA) as part of the detailed information on each of the 188 known Aboriginal heritage sites within the study area are based on the standard Aboriginal Site Recording Forms developed (and require for use) by the DECC.

- "*The site card for MET 1 and MET 2 falsely describes Allan Carriage as being from the "Wodi Wodi Elders" but he is in fact a member of the Wadi Wadi Coomaditchie Aboriginal Corporation (a member group of NIAC)*".

- The site cards for MET 1 and MET 2 have been updated accordingly and revised versions are included in Appendix 1.

- "*Whilst the fieldwork to date with Resource Strategies and Kayandel has been friendly and professional, and the reports produced by Kayandel are responsive to issues raised, the elders from NIAC's respective Traditional Owner member groups have not to date been involved in anywhere near enough fieldwork visiting, and seeing first-hand, all of the AHIMS-listed sites within the project area even once. They have only been involved in a week or two's fieldwork once every year or six months, enabling them to study a sample of interesting sites, some more than once over a period of years, gradually developing a worthwhile database and some degree of continuity of knowledge, allowing some degree of informed feedback*."

  As outlined in Sections 3.4 and 4.1, a significant amount of fieldwork has been undertaken across the study area over the past 37 years. Supplementary Project specific field work (both survey and inspections) was undertaken in July 2006 and November/December 2007. Survey was undertaken across representative areas not subject to recent systematic survey. Inspections were undertaken to provide the contemporary Aboriginal community with an opportunity to inspect the area and known Aboriginal heritage sites to assist with providing comment regarding cultural significance and proposed management recommendations. Prior to the commencement of these inspections, all community groups were provided with documentation (including existing sites cards and photographic recordings) of all known sites within the study area and a list of the sites that were proposed to be inspected.

Each community group was encouraged to review the information and advise the archaeologist of any particular sites/areas that they wished to survey/inspect. As described in Section 4.1, site inspections were undertaken for all sites ranked as having either high or moderate archaeological significance, with a representative sample of sites with a low archaeological significance also inspected. Also as described in Section 4.1, all sites on the Register of National Estate and those identified by the Aboriginal community as being of particular interest were inspected.

- "*Section 6, "Survey Results" is useful. It lists tables of AHIMS listed sites within and around the study area, followed by section with brief paragraph descriptions of each site. The AHIMS tables in section 6.1 are useful. We note that in the tables, the reference to site MET 2 did not mention the directed water channels carved onto the rock platform. These directed water channels are a significant feature. Sites FRC 1 to FRC 10 seem to have been left out of the paragraph description section. Of course FRC 10 is of particular interest because it had examples of cracks from longwall mining, one crack being vertically and over an art panel. In October 2006 this crack was about 1 cm in width. In February 2008 this crack-width had closed to around 1 mm indicating rock movement in the intervening period*".

Based on the above, additional descriptive text has been included Section 6.1 for site MET 2 regarding the depressions and channels. While it is agreed that the depressions make the area more suitable for grinding (by maintaining supply of water), it is considered that the depressions are natural rather than carved.

In regard to the absence of sites FRC 1 to FRC 10 noted in the above comment, these sites are not located within the study area and as such have not been included in this ACHA. Notwithstanding, the effects to site FRC 10 (subject to subsidence from approved longwalls and part of a current Aboriginal heritage monitoring program) referred to above are documented and discussed in Section 8 under the heading "*Previous Monitoring and Risk Assessments*".

- *"… the destruction of Aboriginal caves and rock art is occurring at an accelerating rate throughout the entire Wara-N'hayara Plateau – as measured by the unprecedented number (in the thousands) of 'consents to destroy' granted in recent years and currently being sought. It is becoming a serious question just how many sites will ultimately be left … for future generations, even ten years from now, if Aboriginal Traditional Owners are not soon given some real say in the management and control of their country.*"

Section 8 provides a description of the potential impacts of the Project on Aboriginal heritage. As outlined in Section 8, the potential subsidence impacts resulting from longwall mining in the study area have been assessed by MSEC (2008) (included in full as Appendix A of the Project Environmental Assessment). As outlined in Sections 9 and 10, it is recommended that all Aboriginal heritage mitigation and management measures be developed and undertaken in consultation with the Aboriginal community.

- *"Section 6.2, at the end of the paragraph descriptions notes that, "during the August 2007 survey, a tree was identified with three horizontal markings of indeterminate origin. One of the Aboriginal community groups has commented that that the tree may be an Aboriginal birthing tree. Archaeologists and the other Aboriginal community representative present consider the markings to be naturally occurring lesions common to the type of tree." NIAC's previous report explained that this particular tree near the gate of Fire 9H was not a tree bearing birth marks. However there is a tree bearing likely birth-marks near FRC 279, and possibly at FRC 265. Jean Carriage, late mother of Allan Carriage, taught that cuts were made in trees when a child was born. A longer cut was made for male babies. As the tree grew and children were born these marks would indicate the number and gender of children born to a particular family"*.

  Based on the above comment, Section 6.1 and the proposed management measures outlined in Sections 9.1 and 10 have been altered to recognise these trees and suggest that they be further investigated as part of required future fieldwork. Should it be agreed (by a suitably qualified archaeologist and/or arborist in consultation with the Aboriginal community) that the trees contain markings of Aboriginal origin, they should be recorded and registered with the DECC. Notwithstanding, based on the outcomes of the Flora and Fauna Impact Assessment (Appendix G of the Project Environmental Assessment), it is not expected that these trees (irrespective of the origin of the markings) would be impacted by the Project.

- "*This section, 6.2, also briefly mentions inappropriate behaviour by visitors camping in the area, presumably illegally. Mention is made of the dust and graffiti caused by inappropriate levels of access. Visitor access should be restricted and the area policed*".

  The surface area is administered and policed by the SCA as it is within the Woronora Special Area. The SCA has locks on all entry gates and public access is restricted. Access can only be granted by the SCA via application. The SCA is aware that unauthorised access occurs in all of their catchment lands and they endeavour to restrict and police this where possible. In addition, HCPL report all observed or evidenced unauthorised access to the SCA for their investigation.

- "*Interestingly NT 8 is given a Moderate Archaeological Significance Rating, despite being listed on the Register of the National Estate.*

  *…*

  *Even if there are specific criteria and tests, which are applied to rate the archaeological significance of a site, value judgment is still involved, possibly different observers would yield different results. The elders believe that far more sites should be assigned High and Moderate Archaeological Significance Rating. NT 8 for example should be rated as High*".

The archaeological significance assessment criterion that has been applied by this ACHA is described in Section 4.2. As outlined in Section 4.2 "*The assessment of archaeological significance was undertaken in accordance with the Aboriginal Cultural Heritage: Standards and Guidelines Kit (NPWS, 1997) and the Burra Charter (Marquis-Kyle and Walker, 2004) value criteria. With consideration of these value criteria, an overall archaeological significance assessment (low, medium or high) of each of the sites within the study area was determined on a context with consideration of the Woronora Plateau*……and……*for any site or place to have the capacity to inform any of these values, it must be in the condition to do so. Therefore the preservation, conservation and general condition of the site is a key factor in any significance assessment. This includes the risk of natural or cultural impacts to the places in question. As a result, an assessment of archaeological significance is not static. Significance changes over the life of a place, as does its associated values, in correlation with the awareness of the visitor or user of the place (Marquis-Kyle & Walker, 2004: 11)*". Whilst NT 8 is listed on the Register of National Estate (and reported as such in Sections 6.1 and 7), it has been assessed in accordance with the above criteria and accordingly been reported as being of moderate archaeological significance.

Notwithstanding, this ACHA reports cultural significance separately to archaeological significance. In this regard, Section 4.2 states: "*The cultural significance of the study area and known sites within the study area is primarily to be determined by the Aboriginal community*". In addition, NT 8 has already been identified in Section 7 as being of particular cultural significance: "*Cubbitch Barta suggested that NT 8 is of particular cultural significance as it may have been used as a teaching site*". Based on the above comment by Northern Illawarra Aboriginal Collective, Section 7 has been edited to recognise that Northern Illawarra Aboriginal Collective's member groups also consider NT 8 to of particular cultural significance. In addition, Sections 9.2 and 10 recommend that all sites specifically identified by the Aboriginal community as being of particular cultural significance within the study area (including NT 8) be included in the monitoring program.

- "*The Aboriginal groups suggested that NT 8, NT 48, FRC 62, FRC 185, FRC 340, NT 9, NT 46, FRC 316, NEW 1, NEW 17, and NT 35 were of special significance for various reasons.*

  *….*

  *The attitude that a site is of "low significance because it is represented by other similar sites" in the area, implies that only unique sites should be preserved. Taken to extremes this implies that only one example of each particular type should be preserved. All these sites are important because they collectively represent the lives and culture of past people – the material remains. Such evidence of the vibrant lives of these peoples is also important spiritually, culturally, and scientifically to any humane and progressive society – especially one that has apologised to its Aboriginal people*".

Based on the above comments, the cultural significance section of Section 7 has been edited to recognise the above comments in regard to the cultural significance of NT 8, NT 48, FRC 62, FRC 185, FRC 340, NT 9, NT 46, FRC 316, NEW 1, NEW 17, and NT 35 and also to recognise the comment that all sites are culturally important.

- *"Section 8,"Nature of Predicted Impacts from the Project", states that "The Project has the potential to impact Aboriginal heritage directly via general surface disturbance and indirectly via mining induced subsidence movements." This may subtly suggest that "direct" disturbance may somehow have a greater impact than "indirect" disturbance. "Direct" disturbances such as exploration works, ground water monitoring bores, undertaking subsidence monitoring, undertaking surface rehabilitation, etc, would not be necessary if "indirect" disturbances like longwall mining did not occur. One could therefore argue that longwall mining will cause both "direct" and "indirect" disturbance".*

The distinction between direct and indirect impacts provided in the introduction to Section 8 is included to provide a distinction between the main mechanism by which Aboriginal sites may be effected. That is, subsidence versus potential impacts from surface infrastructure required as part of the Project. The distinction is required so that Section 8 can discuss potential effects from subsidence separately to potential effects from surface infrastructure. The introduction in Section 8 does not infer that potential direct disturbance from Project surface infrastructure is greater than potential indirect disturbance from subsidence.

- *"So many of these sites, in such a state of preservation, being located in uneven country directly over or within the likely zone of influence of current and proposed longwalls is a very real concern to Aboriginal Traditional Owners … given the heritage that is at stake, throughout and adjoining the application area, at such risk of collapsing that numerous 'permits to destroy have already been recommended by expert consultants … the sheer number of fragile irreplaceable Aboriginal heritage sites within the zone of influence, in the context of the known cracking and damage to sites from previous longwalls, requires at least weekly (perhaps twice weekly) inspections by a NIAC team of no less than three Aboriginal Traditional Owner site workers (given the size and ruggedness of the terrain), over the next few years, for the duration of the proposed mining. Only in this way can cracking and damage to the giant rock art panels and sites be detected in time for any sort of remediation to be attempted in meaningful way'."*

As outlined above, Section 8 provides a description of the potential impacts of the project on Aboriginal heritage. As outlined in Section 8, the potential subsidence impacts resulting from longwall mining in the study area have been assessed by MSEC (2008) (included in full as Appendix A of the Project Environmental Assessment). As outlined in Sections 9.2, 9.4 and 10, it is recommended that a monitoring program be developed (including frequency of monitoring) in consultation with the Aboriginal community as part of the development of an ACHMP. It is also recommended in these sections that all Aboriginal heritage monitoring be undertaken in consultation with the Aboriginal community.

- *"During fieldwork the elders have begun to study culturally important flora and fauna, finding marked and scarred trees (see Fig 4 on page 11 of ref [8]) and other interesting things (see Figs 5, 6 & 7 on pages 12-13 of ref [8]), but there has been insufficient fieldwork to do this to their satisfaction. This is a shame because human impact in and about Metropolitan Colliery has caused loss of the Grey Kangaroo, Wallaroo, Potaroo, Eastern Quoll, Tiger Quoll, Koala, Rock Wallaby, Platypus and Brown Phascogale, the Powerful and Sooty Owls are endangered, there are concerns for the Greater Glider and the Mountain Brushtail Possum, whilst amphibians and fish stocks in the Waratah Rivulet and Woronora Reservoir appear to be reducing or at least changing in nature."*

As outlined above and in Sections 3.4 and 4.1, a significant amount of fieldwork has been undertaken across the study area over the past 37 years. In addition, supplementary field work (survey and inspections) was undertaken specifically for the Project in July 2006 and November/December 2007. Survey was undertaken across representative areas not subject to recent systematic survey. Inspections were undertaken to provide the contemporary Aboriginal community an opportunity to inspect the area and representative known Aboriginal heritage sites to assist with providing comment regarding cultural significance and proposed management recommendations.

In addition, comprehensive flora and fauna surveys and assessments have been undertaken for the Project and are presented in full as Appendix D (aquatic ecology survey and impact assessment), Appendix E (baseline terrestrial flora survey), Appendix F (baseline terrestrial fauna survey) and Appendix G (terrestrial flora and fauna impact assessment). Following a request by Northern Illawarra Aboriginal Collective, a copy of the species lists from each of these reports was provided to Northern Illawarra Aboriginal Collective on 6 June 2008. In addition, following comments from Mr Gary Caines, a summary of the baseline information from these reports has been included in Section 2 of this ACHA. As previously indicated, a copy of these assessments will be provided to each of the registered Aboriginal community groups/parties for review and comment as part of the public exhibition and review period of the Project Environmental Assessment.

Further, as outlined in Section 10, it is recommended that a protocol be developed for Aboriginal community members to access the Project area for personal and/or cultural reasons or as part of scheduled field activities. HCPL has indicated that they would facilitate access (in accordance with the relevant HCPL safety requirements, and the SCA's access requirements) to the Project area for members of the Aboriginal community to study culturally important flora and fauna, find marked and scarred trees and other interesting things. This offer has been made to the Aboriginal community during previous field work programs although no-one to date has taken up the offer.

- *"The elders from NIAC's Traditional Owner groups throughout the region all oppose Metropolitan Colliery's present application proposing mining underneath 1) the Waratah Rivulet, 2) the Woronora Reservoir, and 3) scores of Aboriginal heritage sites, listed under both state and federal laws".*

- *The NSW Scientific Committee recently determined longwall mining to be a Key Threatening Process on and about the Woronora Plateau, generating cracks that could extend for more than a kilometre. Additionally Figure 18 shows that most of the Aboriginal art-sites listed on the Register of The National Estate, and also most of the AHIMS-listed sites deemed by Kayandel to be of "the highest conservation value", lie approximately within a corridor extending one kilometre either-side of the centreline of the Waratah Rivulet. The elders require that the Waratah Rivulet, the reservoir, and their highest conservation sites as shown on Figure 18, should not be mined underneath. They suggest a compromise that would not interrupt continuity of supply, but may meet some basic conservation criteria".*

Section 8 contains a summary of the potential subsidence impacts to Aboriginal heritage sites resulting from longwall mining as assessed by MSEC (2008). The full subsidence report is included as Appendix A of the Project Environmental Assessment. The Project Environmental Assessment also includes a Groundwater Assessment (Appendix B of the Project Environmental Assessment) and a Surface Water Assessment (Appendix C of the Project Environmental Assessment). Section 3 and Appendix A of the Project Environmental Assessment discuss Project alternatives that have been comprehensively considered and assessed, including stand-offs from various features including Aboriginal heritage sites, the Waratah Rivulet and the Woronora Reservoir. A full copy of the Project Environmental Assessment will be provided to each of the registered Aboriginal community groups/parties for review and comment as part of the public exhibition and review period of the Project Environmental Assessment.

- "*Under stringent conditions, outlined below, the elders of NIAC's Traditional Owner member groups might not object to First Working Approval being given to Metropolitan Colliery if they observe this one kilometre buffer either-side of the whole remaining length of the Waratah Rivulet, and about the Woronora Reservoir, in accordance with the NSW Scientific Committee's findings. It is a generous compromise on the Aboriginal community's part because, although the proposed one kilometre buffer would probably maintain the integrity of the remainder of the waterway and reservoir, some of the highest conservation value Aboriginal cultural heritage sites still lie toward the edge of the proposed buffer zone, within the zone of likely adverse influence, but at least they would not be mined directly underneath.*"

...

"*In stating this, it does not mean that Traditional Owners from NIAC's member groups agree with the Longwall mining project. In fact, they oppose Longwall mining with in 1 km of major rivers and dams and Aboriginal Sites of High and Moderate Archaeological Rating…*".

Similar to the above, Section 8 contains a summary of the potential subsidence impacts to Aboriginal heritage sites resulting from longwall mining as assessed by MSEC (2008). The full subsidence report is included as Appendix A of the Project Environmental Assessment. The Project Environmental Assessment also includes a Groundwater Assessment (Appendix B of the Project Environmental Assessment) and a Surface Water Assessment (Appendix C of the Project Environmental Assessment). Section 3 and Appendix A of the Project Environmental Assessment discuss Project alternatives that have been comprehensively considered and assessed, including stand-offs from various features including Aboriginal heritage sites, the Waratah Rivulet and the Woronora Reservoir.

- In regard to Appendix 6, which provides the MSEC (2007; 2008) subsidence predictions for each known Aboriginal sites within the study area, Northern Illawarra Aboriginal Collective note that: "*there are some literacy problems within the general community, and the engineering appendix would not be easy for the general reader*".

  Based on previous comments from the Northern Illawarra Aboriginal Collective, explanations of the different subsidence parameters were provided in the draft version of this ACHA. These explanations are also presented in this final version in Section 8 and on the cover page of Appendix 6. Based on the above comment, additional text has been included to help describe each of the subsidence parameters to the general reader.

- "*The engineering predictions claim to be conservative, and that subsidence will be less than predicted, but we argue that the variables are too great and that the science is not good enough*".

  The Subsidence Assessment for the Project has been undertaken by MSEC (highly qualified subsidence experts with extensive experience, especially in the southern coalfields) and is provided as Appendix A of the Project Environmental Assessment, which will be provided to each of the registered Aboriginal community groups/parties for review as part of the Part 3A public exhibition period. The following are extracts from the Subsidence Assessment providing an overview of methodology undertaken for determining the subsidence predictions of the Project:

  > "*The standard Incremental Profile Method as used for the Southern Coalfields was calibrated to local data using observed monitoring data above the previously extracted longwalls at the colliery. Data used for calibration of the model was analysed from the monitoring lines that were located over the previous underground mining area (i.e. east of Longwall 1) and the D-Line monitoring data that is located over Longwalls 1 to 15.*

*The maximum predicted systematic subsidence parameters have been obtained using the Incremental Profile Method and have been compared to those obtained using the other methods. The predicted profiles obtained using the calibrated model showed good correlation to the observed profiles.*

...

*The method is an empirical model based on a large database of observed monitoring data from previous mining within the Southern, Newcastle, Hunter and Western Coalfields of New South Wales.*

*The database consists of detailed subsidence monitoring data from collieries including: Angus Place, Appin, Baal Bone, Bellambi, Beltana, Bulli, Chain Valley, Clarence, Coalcliff, Cooranbong, Cordeaux, Corrimal, Cumnock, Dartbrook, Delta, Dendrobium, Eastern Main, Ellalong, Fernbrook, Glennies Creek, Gretley, Invincible, John Darling, Kemira, Lambton, Liddell, Metropolitan, Mt. Kembla, Munmorah, Nardell, Newpac, Newstan, Newvale, Newvale 2, South Bulga, South Bulli, Stockton Borehole, Teralba, Tahmoor, Tower, Wambo, Wallarah, Western Main, Ulan, West Cliff, West Wallsend, and Wyee.*

...

*The method has a tendency to over-predict the systematic subsidence parameters (ie: is conservative) where the proposed mining geometry and geology are within the range of the empirical database.*

...

*The predicted systematic subsidence parameters for the proposed longwalls were determined using the standard Incremental Profile Model for the Southern Coalfield based on monitoring data from the Bulli Seam, calibrated to local data*

...

*The model was calibrated using the observed monitoring data over the previously extracted longwalls at the colliery*".

- "*FRC 10, FRC 265, FRC 263, FRC 264, FRC 36, PAD 2, FRC 21, FRC 11, FRC 268, FRC 208, and FRC 269 and possibly more shelter sites were visited in February 2008. To our knowledge, all or most of these shelters had pink marks made on their walls, in groups of three or four, so that surveyors can measure and monitor the relative change in position of these groups of marks, in order to measure rock movement. This methodology can only work if marks are put on different rock panels*".

The above listed sites are currently being monitored (in consultation with and with the involvement of the Aboriginal community) as part of a monitoring program (which also includes sites FRC 261, FRC 265, FRC 12, FRC 63, FRC 139, FRC 55, FRC 59, FRC 96, FRC 133, FRC 203, FRC 267, FRC 271, FRC 338, FRC 339, PAD2 and PAD3) for Longwalls 14-17. The "pink marks" referred to in the Northern Illawarra Aboriginal Collective's above comment indicate subsidence monitoring locations on and around each Aboriginal heritage site within the LW14-17 area. Subsidence monitoring locations were selected by HCPL surveyor and engineer to allow for periodic measurement of subsidence movements (i.e. vertical subsidence, tilt, tensile strain and compressive strain) at each Aboriginal heritage site over time. Marks do not need to be placed on different rock panels because survey marks only need to be placed such that the maximum and minimum strain directions and tilts can be determined which generally requires a minimum of three points. Since the objective is to measure the strains and tilts to compare with predicted values, only a representative rock surface in the vicinity of the area of interest needs to be marked, not every rock face (HCPL, 2008).

- The Northern Illawarra Aboriginal Collective identify in their comments, a potential new Aboriginal heritage site proximal to NT 4 (2-0619) and NT 17 (2-0629). They describe this potential Aboriginal heritage site as a "*possible cairn, comprising a central large stone surrounded by smaller ones that may have been disturbed*".

  Based on the above comment, Section 6.1 and the proposed management measures outlined in Sections 9.1 and 10 have been altered to recognise this potential new Aboriginal heritage site and suggest that it be further investigated as part of required future fieldwork. Should it be agreed (by a suitably qualified archaeologist in consultation with the Aboriginal community) that this stone arrangement represents a new Aboriginal heritage site, it should be appropriately recorded and registered with the DECC. Notwithstanding, potential impacts to this stone arrangement are expected to be similar to those described in Section 8 for the other 188 known Aboriginal heritage sites within the study area.

- Northern Illawarra Aboriginal Collective include in their comments on the draft version of this ACHA, an Appendix detailing "*some of the non-lithic Traditional Materials, as defined in Section 203FCA(2) of the Native Title Act (Commonwealth) 1993, occurring in and about the Metropolitan Colliery study area*". In this Appendix, Northern Illawarra Aboriginal Collective describe various flora and fauna and their associated traditional uses and cultural significance.

  As outlined above, potential impacts of the Project on the flora and fauna attributes of the study area are assessed in Appendix G of the Project Environmental Assessment. This assessment (along with all other assessments) will be provided to each of the Aboriginal stakeholders for their review and comment as part of the public exhibition and review of the Project Environmental Assessment. Notwithstanding, the list of flora and fauna provided in Northern Illawarra Aboriginal Collective's Appendix 4 has been incorporated into Section 2.4 of this ACHA.

- Northern Illawarra Aboriginal Collective include in their comments on the draft version of this ACHA, a request for HCPL to consider funding some of Northern Illawarra Aboriginal Collective's projects, including: *"the NIAC dairy at Menagle which supplies free A2 milk on a weekly basis to needy families throughout the region"*; the "*Bellambi Lagoon Landcare group*"; "*Aboriginal language books and CD's*" for educational purposes; restoring the "*historic UAM Colebrook Memorial Church on the Old La Perouse Mission*" for use as a "*community meeting place and craft centre, and possibly a day-care centre for Aboriginal children"*; "*restoring the Old Menangle Primary School*" for use as an Aboriginal sports centre, "*Aboriginal language school, and as a craft centre/shop"*; and "*developing picnic and bushwalking facilities … on and about the Elladale Homestead*".

  It is recommended in Sections 9.4 and 10 that HCPL undertake further consultation with the Aboriginal community during the preparation of an Aboriginal Cultural Heritage Management Plan. In addition and based on the above comment, Section 10 also recommends the ACHMP include a protocol/program for HCPL to sponsor existing or new projects, which benefit the wider Aboriginal community. These may include (for example): Aboriginal community field days; restoration of culturally significant buildings; rehabilitation/protection of areas with high cultural values; and/or potential employment/skill development opportunities. Any such sponsorship should be made available to the wider Aboriginal community with submissions presented to HCPL and projects selected based on their individual merit and benefit to the wider Aboriginal community.

The below discussion details the comments received (in regard to Aboriginal cultural heritage) (both written and verbal) on the *Longwalls 18-19A Subsidence Management Plan Application Aboriginal Cultural Heritage Assessment* and how they have been considered and/or addressed as part of this assessment:

- The Tharawal Local Aboriginal Land Council indicated that they were satisfied with the consultation and assessment undertaken for the Longwalls 18-19A ACHA and the proposed mitigation and management measures proposed.

- Cubbitch Barta noted that the archaeological assessment provided in the draft Longwalls 18-19A ACHA was of a high standard (with a high level of detail).

- It was noted by Cubbitch Barta and the Northern Illawarra Aboriginal Collective that the draft Longwalls 18-19A ACHA contained some high quality information (e.g. images, drawings, site plans etc.) on the Aboriginal heritage sites.

- The use of the term "Daramulin" (in Attachment 2 of the draft Longwalls 18-19A ACHA) in reference to the engraved figure identified at FRC 12 was questioned by the KEJ Tribal Elders Corporation as it was believed to be incorrect. The KEJ Tribal Elders Corporation requested that the term "Daramulin" be removed from references to FRC 12. As a result, Attachment 2 of Appendix 2 was amended to remove this terminology. In addition to this, all future reports (including this ACHA) will be amended to reflect this change.

- Mr Gary Caines indicated that the term "Aboriginal community" used in the draft Longwalls 18-19A ACHA was too broad as it potentially included Aboriginal people not from the local/regional area. It was suggested that an alternative term be used (e.g. "registered knowledge holders" [meaning knowledge holders registered as Traditional Owners] or "representative members or groups"). However, HCPL does not wish to exclude any members of the Aboriginal community that would like to be involved in the consultation process and therefore retained the terminology used in this ACHA and Appendix 2.

- Cubbitch Barta, Illawarra Local Aboriginal Land Council, KEJ Tribal Elders Corporation, Mr Gary Caines, Northern Illawarra Aboriginal Collective and Tharawal Local Aboriginal Land Council indicated that all Aboriginal heritage sites (both known and unknown), when considered collectively as a 'bundle', are culturally significant. It was indicated that FRC 12 is of particular cultural significance, which is reflected in Section 7 of this ACHA.

- The Northern Illawarra Aboriginal Collective commented in regard to the cultural significance of the area and evidence of historic occupation and use (e.g. rich biodiversity ideal for foraging and large tree species, which potentially would have been suitable for coolamins). The cultural significance of the study area is discussed in Section 7.

- The Illawarra Local Aboriginal Land Council commented in regard to the Application Area and surrounds that: "*This Traditional Site is of great importance to Aboriginal people; this land that is visited by our Ancestors must be preserved and protected*". Management and mitigation recommendations are detailed in Section 9.

- Mr Gary Caines suggested that HCPL apply for a permit under Section 87 and a consent under Section 90 in order to undertake additional work on Aboriginal heritage sites (where appropriate) and to salvage artefacts if required in consultation with the Aboriginal community. The generic intent of such works would be to maintain living/dead vegetation, rocks and debris and to identify additional artefacts (e.g. to remove vegetation covering grinding grooves at FRC 12 and/or undertake salvage at some sites). The recommended management and mitigation measures are described in Section 9 of this ACHA including recommendations for such invasive surveys.

- The Illawarra Local Aboriginal Land Council commented: "*The fact that there are so many recorded sites and the real possibility of still more sites being identified, a thorough search of the entire area should be carried out to locate and register all sites so they can be protected*". Sections 3.4 and 4 of this ACHA outline the comprehensive work which has been undertaken in the study area and surrounds, including Aboriginal heritage surveys, assessments, monitoring, site inspections and baseline recordings. In addition, as indicated in Section 9.4, the ACHMP would include a protocol for the registering of any new sites identified within the study area.

- The Illawarra Local Aboriginal Land Council commented that: "*This whole area should be monitored regularly by Aboriginal Site Officers to make sure no damage is caused by longwall mining to Traditional Sites, rock shelters and Koori artworks*". As described in Section 9.2, it is recommended that an Aboriginal heritage monitoring program be developed, which builds on the existing monitoring and management programs described in the *Longwalls 14-17 Site Monitoring Plan* (R.G. Gunn & Kayandel Archaeological Services, 2007b) and the *Aboriginal Cultural Heritage Assessment for Longwalls 18-19A* (Kayandel Archaeological Services, 2007).

- Several Aboriginal groups/parties (including the Illawarra Local Aboriginal Land Council, KEJ Tribal Elders Corporation and Tharawal Local Aboriginal Land Council) expressed their interest in being involved in the monitoring of Aboriginal heritage sites. As discussed in Section 9.2, it is recommended that an Aboriginal heritage monitoring program be developed for the Project in consultation with the Aboriginal community. The monitoring program would include the proposed monitoring team (including Aboriginal representation).

- Mr Gary Caines suggested that HCPL consider undertaking additional monitoring of Aboriginal heritage sites following a significant ground movement event (e.g. a seismic event or significant subsidence event). As discussed in Section 9.2, it is recommended that an Aboriginal heritage monitoring program be developed for the Project in consultation with the Aboriginal community, which would detail the frequency of monitoring and the tasks to be undertaken during each monitoring round.

- The Northern Illawarra Aboriginal Collective commented that: "*Some sites of interest were visited, and some understanding was gained, but it is not possible to quantify under the circumstances. Also a photo database could profitably be compiled and made available to workers in the field so they can make comparisons*". As discussed in Section 9.2, it is recommended that an Aboriginal heritage monitoring program be developed for the Project. The monitoring program would detail the tasks to be undertaken during each monitoring round, including collation of a comprehensive baseline record and comparison of the baseline record against the status of the site at the time of monitoring.

- The Northern Illawarra Aboriginal Collective commented that they see "*little evidence of ongoing monitoring of damage arising from previous longwall blocks*". As indicated in Section 9.2, the existing monitoring and management programme is described in the *Longwalls 14-17 Site Monitoring Plan* (R.G. Gunn & Kayandel Archaeological Services, 2007b) and the *Aboriginal Cultural Heritage Assessment for Longwalls 18-19A* (Kayandel Archaeological Services, 2007). Section 9.2 recommends that the monitoring of Aboriginal heritage sites located within the study area build upon the existing monitoring and management program.

- The Cubbitch Barta, Mr Gary Caines and Northern Illawarra Aboriginal Collective commented on the importance of the minimisation of impacts and post-mining recovery. It was requested that HCPL consider alternative mining methods and longwall layouts in order to minimise impacts due to mining. A detailed evaluation of alternatives (including longwall layout, orientation, width and length) is included in Section 3 of the Project Environmental Assessment.

- It was suggested by Mr Gary Caines that HCPL consider protective and/or preventative measures to minimise impacts on Aboriginal heritage sites (specifically FRC 12) (e.g. engineering stabilisation measures etc.). The monitoring and management program described in Section 9 indicates that, should monitoring indicate that an Aboriginal heritage site is being impacted by mining, management measures would, where practicable, be developed in consultation with the DECC and the Aboriginal community to minimise further impacts. Management measures would be site specific and dependant on the nature and extent of impact observed. In addition, Section 3 and Appendix A of the Project Environmental Assessment include comprehensive consideration and assessment of alternatives, including stand-offs from various features including Aboriginal heritage sites, the Waratah Rivulet and the Woronora Reservoir.

- Several Aboriginal representatives suggested during field work the possibility of establishing a 'keeping place' on-site for all Aboriginal-related documentation and any artefacts salvaged from the Application Area. Section 8 of Appendix 2 recommends that any salvaged artefacts should either: be stored in a keeping place for future placement in the landscape once subsidence has effectively ceased in that location; relocated to an area outside the Application Area, or otherwise managed in accordance with the wishes of the Aboriginal community. The management of artefacts salvaged as part of the Project and even whether salvage of artefacts is appropriate would be determined in consultation with the Aboriginal community as part of the development of the ACHMP (refer Sections 9.4 and 10).

- In several comments, the Northern Illawarra Aboriginal Collective inferred impacts to Aboriginal heritage sites due to mining (e.g. "*the proposed longwalls are likely to cause cracking and draining here, ruining the fluvial function of this site*"). Potential subsidence impacts have been assessed in a specialist Subsidence Assessment (MSEC, 2008) (Appendix A of the Project Environmental Assessment) and summarised in Section 8. As previously indicated, a copy of the Project Environmental Assessment would be provided to each of the Aboriginal stakeholders for their review and comment as part of the public exhibition and review of the Project Environmental Assessment.

- The Northern Illawarra Aboriginal Collective commented that: "*At the very least Aboriginal heritage should be documented, and data collected, in written and photographic form for future generations*". As detailed in Sections 9.2 and 10, it is recommended that an Aboriginal heritage monitoring program be developed for the Project in consultation with the Aboriginal community. The monitoring program would detail the tasks to be undertaken during each monitoring round, including comparison of the baseline record against the status of the site at the time of monitoring.

- The Northern Illawarra Aboriginal Collective noted that the presence of artefacts that are marine in origin (e.g. seashells) may indicate a relationship between the previous Aboriginal inhabitants and the ocean. This relationship is discussed in Section 7.

- The Northern Illawarra Aboriginal Collective indicated that the table presented in Attachment 3 of the draft Longwalls 18-19A ACHA does not show units of measurement and the technical terms used to describe subsidence impacts are not explained. As a result, the table in Appendix 6 of this ACHA (and also in the final version of the Longwalls 18-19A ACHA) has been revised to include units of measurement and Section 8 has been revised to include more appropriate definitions.

- In addition to the draft Longwalls 18-19A ACHA, the Northern Illawarra Aboriginal Collective commented on flora, fauna and surface water/groundwater aspects of the Longwalls 18-19A area, particularly in relation to:

  - The different vegetation communities present and the potential for adverse effects on vegetation communities (including potential cracking and draining of underlying Hawkesbury sandstone in "*hanging swamps/heath areas*") and terrestrial fauna as a result of underground mining.

Potential subsidence impacts due to the mining of Longwalls 18-19A were assessed in specialist studies attached to the Longwalls 18-19A SMP Application (i.e. Gilbert & Associates Pty Ltd [2007], AccessUTS [2007], Bangalay Botanical Surveys [2007] and Western Research Institute and Biosphere Environmental Consultants [2007]) and summarised in Sections 6 and 8 of the Longwalls 18-19A SMP Application. Potential impacts of the Project on surface water, groundwater, flora and fauna are assessed in Appendices B, C, D, E, F and G of the Project Environmental Assessment. As previously indicated, a full copy of the Project Environmental Assessment would be provided to each of registered Aboriginal groups /parties for their information, review and comment as part of the public exhibition and review period of the Project Environmental Assessment.



# 6. SURVEY RESULTS

## 6.1. Aboriginal Heritage Sites

188 Aboriginal heritage sites were identified within the study area including 142 sandstone overhangs and 46 open sites (i.e. grinding grooves and petroglyphs) (Figure 2 and Table 1). The recorded Aboriginal heritage sites include sandstone overhangs with art, grinding grooves, rock petroglyphs, engraved channels and PAD's. Appendix 1 provides a copy of detailed information on each of the Aboriginal heritage sites identified within the study area. All Aboriginal heritage site types recorded are represented elsewhere on the Woronora Plateau.

The approximate location of all known Aboriginal heritage sites within the study area is provided on Figure 2. Table 1 indicates which sites were inspected by the Aboriginal community during the August and/or December 2007 fieldwork. The locations of other known Aboriginal heritage sites in the vicinity of the study area are also provided on Figure 2.

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected[1] |
|---|---|---|---|---|
| 52-2-0089 | FRC 11 | Overhang with art and PAD | 23 | - |
| 52-2-0255 | FRC 12 | Open site with grinding grooves and petroglyphs | 104 | ✓ |
| 52-2-0125 | FRC 13 | Overhang with art only | 9 | ✓ |
| 52-2-0138<br>52-2-0392* | FRC 14 | Overhang with art only | 13 | - |
| 52-2-0396 | FRC 15 | Overhang with artefacts and deposit | 5 | - |
| 52-2-0120 | FRC 16.1 | Overhang with art, artefacts and deposit | 32 | ✓ |
| 52-2-120 | FRC 16.2 | Overhang with art, artefacts and deposit | 9 | ✓ |
| 52-2-0121 | FRC 17 | Overhang with art, grinding grooves and petroglyphs | 7 | ✓ |
| 52-2-0107 | FRC 20 | Overhang with art only | 7 | - |
| 52-2-0105 | FRC 21 | Overhang with art, artefacts and deposit | 52 | ✓ |
| 52-2-0145 | FRC 22 | Overhang with art, artefacts and deposit | 18 | ✓ |
| 52-2-0161<br>52-2-0403* | FRC 23 | Overhang with art only | 17 | ✓ |
| 52-2-159 | FRC 24.1 | Overhang with art, artefacts, deposit and/or grinding grooves | 23 | ✓ |
| 52-2-0160 | FRC 24.2 | Overhang with art, artefacts and deposit | 12 | ✓ |
| 52-2-0129<br>52-2-0398* | FRC 25 | Overhang with art, artefacts and deposit | 9 | - |
| 52-2-0135 | FRC 26 | Overhang with art only | 13 | ✓ |
| 52-2-0154<br>52-2-0342* | FRC 28 | Overhang with art, artefacts, deposit and/or grinding grooves | 10 | ✓ |
| 52-2-0155<br>52-2-0193* | FRC 29 | Overhang with art and PAD | 12 | ✓ |
| 52-2-0200<br>52-2-0339* | FRC 30 | Overhang with art and artefacts | 10 | ✓ |
| 52-2-0722 | FRC 31 | Overhang with art, artefacts and deposit | 10 | ✓ |
| 52-2-0194 | FRC 32 | Open site with grinding grooves only | 9 | ✓ |
| 52-2-0188<br>52-2-0325* | FRC 33 | Open site with grinding grooves only | 8 | ✓ |
| 52-2-0195 | FRC 34 | Overhang with art, artefacts and deposit | 12 | ✓ |
| 52-2-0333<br>52-2-0136* | FRC 40 | Overhang with art, artefacts and deposit | 14 | - |

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected[1] |
|---|---|---|---|---|
| 52-2-0103<br>52-2-0328* | FRC 44 | Overhang with art only | 4 | - |
| 52-2-0102 | FRC 45 | Overhang with art, artefacts and deposit | 10 | - |
| 52-2-0408<br>52-2-0327* | FRC 46 | Overhang with art, artefacts and deposit | 12 | - |
| 52-2-0257 | FRC 52 | Overhang with art only | 11 | - |
| 52-2-0256 | FRC 55 | Open site with grinding grooves only | 22 | - |
| 52-2-258<br>52-2-373* | FRC 57 | Open site with grinding grooves and petroglyphs | 85 | ✓ |
| 52-2-0228<br>52-2-0331* | FRC 59 | Open site with grinding grooves only | 15 | - |
| 52-2-0177<br>52-2-0318* | FRC 60 | Overhang with PAD only | 12 | - |
| 52-2-0152 | FRC 61 | Overhang with artefacts only | 6 | ✓ |
| 52-2-0168 | FRC 62 | Overhang with art, artefacts, deposit and/or grinding grooves | 27 | ✓ |
| 52-2-0409 | FRC 63 | Open site with grinding grooves and petroglyphs | 40 | - |
| 52-2-0185 | FRC 67 | Overhang with artefacts and deposit | 21 | ✓ |
| 52-2-0186<br>52-2-0326* | FRC 68 | Overhang with art, artefacts and deposit | 7 | ✓ |
| 52-2-0192 | FRC 70 | Overhang with art, artefacts and deposit | 17 | ✓ |
| N/A | FRC 71 | Overhang with art only | 11 | ✓ |
| 52-2-0199 | FRC 72 | Overhang with art, artefacts, deposit and/or grinding grooves | 12 | ✓ |
| N/A | FRC 76 | Overhang with art only | 30 | - |
| 52-2-0330<br>52-2-0886* | FRC 77 | Overhang with art, artefacts and deposit | 8 | ✓ |
| 52-2-0885 | FRC 78 | Overhang with art only | 10 | ✓ |
| 52-2-0883 | FRC 85 | Overhang with art, artefacts and deposit | 16 | ✓ |
| 52-2-0207<br>52-2-0898* | FRC 86 | Overhang with art only | 6 | ✓ |
| 52-2-0899 | FRC 87 | Overhang with art, artefacts and deposit | 10 | ✓ |
| 52-2-0869 | FRC 90 | Overhang with artefacts and deposit | 16 | ✓ |
| 52-2-0870 | FRC 91 | Overhang with art, artefacts and deposit | 9 | ✓ |
| 52-2-0198<br>52-2-0346<br>52-2-0872* | FRC 93 | Overhang with art only | 7 | ✓ |
| 52-2-0873 | FRC 94 | Overhang with art only | 26 | ✓ |
| 52-2-0347<br>52-2-0874* | FRC 95 | Open site with grinding grooves only | 15 | ✓ |
| 52-2-0230 | FRC 96 | Open site with grinding grooves only | 22 | - |
| 52-2-0220<br>52-2-0337* | FRC 97 | Overhang with art only | 7 | ✓ |
| 52-2-0875 | FRC 101 | Open site with grinding grooves only | 12 | ✓ |
| 52-2-0340<br>52-2-0724* | FRC 105 | Overhang with artefacts, grinding grooves and deposit | 10 | - |
| 52-2-0365<br>52-2-0721* | FRC 113 | Overhang with art, artefacts, deposit and/or grinding grooves | 14 | ✓ |
| 52-2-0725 | FRC 114 | Open site with grinding grooves only | 6 | ✓ |
| 52-2-0726 | FRC 115 | Overhang with art only | 6 | ✓ |
| 52-2-0739 | FRC 117 | Overhang with art and PAD | 10 | ✓ |
| 52-2-0196 | FRC 119 | Overhang with artefacts and deposit | 15 | ✓ |

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected1 |
|---|---|---|---|---|
| 52-2-0162<br>52-2-0305* | FRC 124 | Overhang with art, artefacts and deposit | 30 | ✓ |
| 52-2-0310<br>52-2-0727* | FRC 125 | Overhang with art, artefacts and deposit | 14 | ✓ |
| 52-2-0203<br>52-2-0414* | FRC 127 | Overhang with art only | 15 | ✓ |
| 52-2-0410 | FRC 133 | Open site with grinding grooves only | 7 | - |
| 52-2-0238 | FRC 138 | Open site with grinding grooves only | 8 | - |
| 52-2-0239<br>52-2-0334* | FRC 139 | Open site with grinding grooves and petroglyphs | 30 | - |
| 52-2-0823 | FRC 160 | Overhang with PAD only | 6 | - |
| 52-2-0171 | FRC 164 | Open site with grinding grooves only | 32 | ✓ |
| 52-2-0541 | FRC 168 | Open site with grinding grooves only | 18 | ✓ |
| 52-2-0747 | FRC 169 | Open site with grinding grooves and artefacts | 14 | ✓ |
| 52-2-0734 | FRC 171 | Overhang with art, artefacts and deposit | 23 | - |
| 52-2-0735 | FRC 172 | Overhang with art only | 3 | - |
| 52-2-0826 | FRC 176 | Overhang with art, artefacts and deposit | 16 | ✓ |
| 52-2-0828 | FRC 180 | Overhang with art only | 7 | - |
| 52-2-0222 | FRC 184 | Overhang with artefacts and deposit | 20 | ✓ |
| 52-2-0223 | FRC 185 | Overhang with art, artefacts and deposit | 16 | ✓ |
| 52-2-0224 | FRC 186 | Overhang with art and PAD | 10 | ✓ |
| 52-2-0225 | FRC 187 | Overhang with art only | 15 | ✓ |
| 52-2-0180 | FRC 189 | Overhang with art only | 11 | ✓ |
| 52-2-0183 | FRC 191 | Overhang with art only | 19 | ✓ |
| 52-2-0144<br>52-2-0307* | FRC 193 | Open site with grinding grooves only | 5 | ✓ |
| 52-2-0263<br>52-2-0308* | FRC 194 | Overhang with art only | 66 | ✓ |
| 52-2-0264 | FRC 195 | Overhang with art only | 14 | ✓ |
| 52-2-0268 | FRC 198 | Overhang with art only | 90 | ✓ |
| 52-2-0265<br>52-2-0415* | FRC 199 | Overhang with art only | 14 | ✓ |
| 52-2-0267 | FRC 201 | Overhang with PAD only | 19 | - |
| 52-2-0259 | FRC 203 | Open site with grinding grooves only | 50 | - |
| 52-2-0246 | FRC 208 | Overhang with art and PAD | 9 | - |
| 52-2-0738 | FRC 253 | Open site with grinding grooves only | 45 | ✓ |
| 52-2-0829 | FRC 254 | Overhang with artefacts and deposit | 12 | - |
| N/A | FRC 266 | Overhang with art, artefacts and deposit | 16 | ✓ |
| N/A | FRC 267 | Open site with grinding grooves only | 30 | - |
| 52-2-3095 | FRC 268 | Open site with grinding grooves only | 5 | - |
| 52-2-3135 | FRC 269 | Overhang with art only | 7 | - |
| 52-2-3136 | FRC 270 | Open site with grinding grooves only | 4 | - |
| N/A | FRC 271 | Open site with grinding grooves only | 8 | - |
| 52-2-3074 | FRC 272 | Overhang with art, artefacts and deposit | 9 | ✓ |
| 52-2-3075 | FRC 273 | Open site with grinding grooves only | 25 | ✓ |
| N/A | FRC 274 | Overhang with art, artefacts and deposit | 16 | - |
| N/A | FRC 275 | Overhang with art only | 7 | - |

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected1 |
|---|---|---|---|---|
| 52-2-3078 | FRC 276 | Overhang with artefacts and deposit | 16 | ✓ |
| 52-2-3079 | FRC 277 | Overhang with art, artefacts and deposit | 7 | - |
| 52-2-3080 | FRC 278 | Open site with grinding grooves only | 12 | - |
| 52-2-3081 | FRC 279 | Overhang with artefacts and deposit | 17 | ✓ |
| 52-2-3082 | FRC 280 | Open site with grinding grooves only | 4 | ✓ |
| 52-2-3083 | FRC 281 | Overhang with art, artefacts and deposit | 10 | - |
| 52-2-3085 | FRC 283 | Overhang with art only | 22 | ✓ |
| 52-2-3086 | FRC 284 | Overhang with artefacts and deposit | 25 | - |
| 52-2-3097 | FRC 285 | Overhang with artefacts and deposit | 20 | ✓ |
| N/A | FRC 301 | Open site with grinding grooves only | 60 | ✓ |
| N/A | FRC 302 | Overhang with artefacts and deposit | 9 | - |
| N/A | FRC 304 | Open site with grinding grooves only | 25 | ✓ |
| N/A | FRC 305 | Overhang with art, artefacts and deposit | 7 | ✓ |
| N/A | FRC 306 | Overhang with art only | 4 | - |
| N/A | FRC 307 | Open site with grinding grooves only | 2 | ✓ |
| N/A | FRC 308 | Overhang with art only | 7 | ✓ |
| N/A | FRC 309 | Overhang with artefacts and deposit | 10 | - |
| N/A | FRC 310 | Overhang with art only | 7 | ✓ |
| N/A | FRC 311 | Overhang with artefacts and deposit | 12 | ✓ |
| N/A | FRC 312 | Overhang with artefacts and deposit | 28 | - |
| N/A | FRC 313 | Overhang with artefacts and deposit | 21 | - |
| N/A | FRC 314 | Overhang with art, artefacts and deposit | 7 | ✓ |
| N/A | FRC 315 | Overhang with artefacts and deposit | 10 | ✓ |
| N/A | FRC 316 | Overhang with artefacts and deposit | 8 | ✓ |
| N/A | FRC 317 | Overhang with art, artefacts and deposit | 4 | - |
| N/A | FRC 319 | Overhang with art only | 9 | - |
| N/A | FRC 320 | Overhang with artefacts and deposit | 10 | ✓ |
| N/A | FRC 321 | Overhang with art, artefacts and deposit | 13 | ✓ |
| N/A | FRC 322 | Open site with petroglyphs only | 12 | ✓ |
| N/A | FRC 323 | Overhang with artefacts and deposit | 7 | - |
| N/A | FRC 324 | Overhang with artefacts and deposit | 20 | - |
| N/A | FRC 325 | Overhang with art only | 7 | ✓ |
| N/A | FRC 338 | Open site with grinding grooves only | 8 | - |
| N/A | FRC 339 | Open site with grinding grooves only | 7 | - |
| N/A | FRC 340 | Overhang with art only | 12 | ✓ |
| N/A | FRC 342 | Open site with artefact scatter | 1 | - |
| N/A | FRC 343 | Overhang with artefact and deposit | 6 | - |
| N/A | FRC 344 | Overhang with artefacts and deposit | 6 | - |
| N/A | FRC 345 | Overhang with artefacts and deposit | 7 | ✓ |
| - | MET 1 | Overhang with art, artefacts and deposit | ^ | - |
| - | MET 2 | Open site with grinding grooves only | ^ | ✓ |
| N/A | NEW 1 | Open site with grinding grooves only | 35 | ✓ |
| N/A | NEW 2 | Overhang with artefacts, grinding grooves and deposit | 40 | ✓ |
| N/A | NEW 9 | Overhang with art only | 6 | ✓ |

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected1 |
|---|---|---|---|---|
| N/A | NEW 10 | Overhang with art only | 20 | ✓ |
| N/A | NEW 15 | Overhang with art only | 16 | ✓ |
| N/A | NEW 16 | Overhang with artefacts and deposit | 7 | ✓ |
| - | NEW 17 | Overhang with art, artefacts and deposit | 38 | ✓ |
| N/A | NEW 18 | Open site with grinding grooves only | 2 | - |
| N/A | NEW 19 | Overhang with art, artefacts and deposit | 8 | - |
| N/A | NEW 20 | Overhang with art only | 12 | - |
| N/A | NEW 22 | Overhang with artefacts and deposit | 7 | ✓ |
| N/A | NT 3 | Overhang with art, artefacts and deposit | 15 | ✓ |
| 52-2-0619 | NT 4 | Overhang with art, artefacts and deposit | 13 | - |
| 52-2-0620 | NT 5 | Overhang with art, artefacts and deposit | 13 | - |
| N/A | NT 6 | Overhang with art, artefacts and deposit | 30 | ✓ |
| N/A | NT 7 | Open site with grinding grooves only | 15 | ✓ |
| N/A | NT 8 | Open site with grinding grooves and petroglyphs | 42 | ✓ |
| N/A | NT 9 | Overhang with art and PAD | 60 | ✓ |
| 52-2-0625 | NT 10 | Overhang with art, artefacts and deposit | 17 | - |
| N/A | NT 11 | Overhang with art only | 15 | ✓ |
| 52-2-0753 | NT 12 | Open site with grinding grooves only | ^ | ✓ |
| 52-2-0629 | NT 17 | Open site with grinding grooves and petroglyphs | ^ | ✓ |
| 52-2-0751 | NT 18 | Overhang with art, artefacts and deposit | 22 | ✓ |
| N/A | NT 19 | Overhang with art only | 9 | ✓ |
| 52-2-0630 | NT 21 | Open site with grinding grooves only | 15 | - |
| 52-2-0758 | NT 22 | Overhang with artefacts and deposit | 4 | - |
| 52-2-0631 | NT 23 | Overhang with art, artefacts and deposit | 4 | - |
| 52-2-0637 | NT 29 | Open site with grinding grooves only | ^ | ✓ |
| 52-2-0641 | NT 33 | Overhang with art, artefacts and deposit | 12 | ✓ |
| 52-2-0642 | NT 34 | Overhang with art, artefacts, deposit and/or grinding grooves | 14 | ✓ |
| 52-2-0643 | NT 35 | Overhang with art, artefacts, deposit and/or grinding grooves | 12 | ✓ |
| 52-2-0755 | NT 46 | Open site with grinding grooves and petroglyphs | 20 | ✓ |
| 52-2-0652 | NT 52 | Open site with grinding grooves and petroglyphs | 25 | - |
| 52-2-0371 | NT 53 | Open site with grinding grooves only | 15 | - |
| 52-2-0374 | NT 54 | Overhang with art, artefacts and deposit | 14 | - |
| 52-2-0658 | NT 74 | Overhang with artefacts and deposit | 20 | ✓ |
| 52-2-0659 | NT 75 | Overhang with artefacts and deposit | 20 | ✓ |
| 52-2-0660 | NT 76 | Overhang with artefacts and deposit | 7 | - |
| N/A | NT 78 | Overhang with art only | 5 | - |
| N/A | NT 79 | Overhang with art only | 7 | - |
| N/A | NT 80 | Overhang with artefacts and deposit | 17 | - |
| N/A | NT 81 | Overhang with artefacts and deposit | 26 | ✓ |
| N/A | NT 85 | Overhang with art and PAD | 23 | - |
| N/A | NT 86 | Overhang with artefacts and deposit | 6 | - |
| N/A | PAD 2 | Overhang with PAD only | 10 | - |
| N/A | PAD 3 | Overhang with PAD only | 8 | - |

| AHIMS Site No. | Site Code (Refer Figure 2) | Site Type | Approximate Maximum Site Dimension (m) | Sites Recently Inspected1 |
|---|---|---|---|---|
| 52-2-0346 | 2-0346 | Overhang with art and artefacts | ^ | - |

Source: DEC AHIMS (2006 and 2007); Illawarra Prehistory Group (2007); Kayandel Archaeological Services (2007 and in prep.).
* Single Aboriginal heritage site registered more than once on the AHIMS database (Illawarra Prehistory Group, 2007).
^ Approximate maximum dimension could not be determined from site card.
N/A Information provided to the DECC although not yet registered on the AHIMS database.
[1] These Aboriginal heritage sites have been recently inspected as part of the ACHA for Longwalls 18-19A (Kayandel Archaeological Services, 2007 in HCPL, 2007) and/or Aboriginal heritage surveys undertaken as part of this ACHA for the Project in December 2007.

**Table 1: Aboriginal Heritage Sites Identified Within the Study Area**

A brief summary description of each of the known Aboriginal heritage sites within the study area is provided below.

### *FRC 11*

FRC 11 is an art shelter with deposit located under the first sandstone overhang up from a small drainage line approximately 600 m west by south-west from Flat Rock Crossing. The shelter is oriented south-east and is 23 m in length, 5.7 m in width and 3.2 m in height. The surface of the shelter is noted to be poor with water seepage. The art at the site consists of 18 indeterminate and figurative charcoal drawings. Three artefacts are noted along the dripline.

### *FRC 12*

FRC 12 is a grinding groove site located at the edge of a swamp on the western side of Fire Road 9C. Thirty-three grinding grooves are present in five groups. Average length, width and depth between the groups varied between 28 to 35 cm, 5 cm and 0.5 cm respectively. An abraided channel is also located at the site. This site is listed on the Register of National Estate as Place ID 13701.

### *FRC 13*

FRC 13 is an art shelter located below the first ridgeline on the northern side of the first gully north of Flat Rock Crossing on the Waratah Rivulet. The shelter is 9 m in length, 2.8 m in width and 1.9 m in height and is oriented west. Sixty-two art motifs are located at the site, including five white pigment stencils, six red ochre drawings and 51 charcoal drawings. The condition of the art is considered to be poor with open bedding planes, granular loss, cracking, fungal growth and water seepage over the art. Graffitied initials are present in a concavity (CW, WP), on the main art wall (ARW) and on the upper front wall (FWP, FRS 30/9/61).

### *FRC 14*

The site is an art shelter located on the eastern side of the Waratah Rivulet, 175 m east from FRC 16.2 and above the second tributary downstream from Flat Rock Crossing. The shelter is oriented east and is 13 m long, 3 m wide and 2.7 m in height.

Four charcoal motifs are present at the site, one in red. The condition of the art is considered fair with some flaking noticed on the ceiling, closed bedding planes and micro-organism growth.

### *FRC 15*

FRC 15 is an art shelter with artefact and deposit located approximately 800 m west of the junction between Fire Roads 9G and 9J, close to a large tributary that runs north into the Waratah Rivulet. It is located under the first line of sandstone overhangs approximately 30 m from the drainage line. The shelter is oriented east and is 5 m in length, 1.9 m wide and 1.5 m in height. Ten indeterminate charcoal drawings and one quartz bipolar flake are present at the site. The potential deposit is approximately 50 cm in depth. The condition of the shelter surface is considered weathered.

### *FRC 16.1*

FRC 16.1 is an art shelter with artefacts and deposit located under the first line of sandstone overhangs from the drainage line, approximately 40 m east of the Waratah Rivulet. FRC 16.1 is located in close proximity to FRC 16.1 and approximately 285 m downstream from Flat Rock Crossing. The shelter is oriented west and is 32 m in length, 8 m wide and 2.6 m in height. The surface condition of the shelter is considered poor with water damage, fungal growth, chemical weathering, open bedding planes, cracks and water seepage over the art. Fifteen white drawings are present on the rear wall of the shelter. Five stone artefacts are present at the site, including two chert flakes, two quartz bipolar flakes and a grey igneous flake. The shelter floor is highly disturbed by animal habitation and camping.

### *FRC 16.2*

FRC 16.2 is an art shelter with artefact and deposit located in close proximity to FRC 16.1 and FRC 17, approximately 40 m to the east of Waratah Rivulet and 285 m downstream from Flat Rock Crossing under the first line of sandstone overhangs from the drainage line. The shelter is oriented north and is 8.6 m long, 2.8 m wide and 1.2 m in height. The condition of the surface shelter is considered poor with concave weathering, fungal growth and water damage. The bedding planes are closed but water seepage occurs over the art. Five outline and infill drawings are present at the site. Several artefacts are present including a grey silcrete backed blade and several bone fragments.

### *FRC 17*

The site is a shelter with art, grinding grooves and rock petroglyphs located a short distance upstream of FRC 16.1 and FRC 16.2 on a large bend on the eastern side of the Waratah Rivulet, approximately 40 m from the creek and 285 m downstream from Flat Rock Crossing. The site is oriented north-west and is 7 m in length, 3 m in width and 0.8 m in height. Ten charcoal drawings are present, some superimposed on older charcoal drawings. The condition of the art is noted to be faded in the 1975 recording.

### *FRC 20*

FRC 20 is an art shelter located approximately 200 m west of the Waratah Rivulet on the southern side of the first drainage line downstream of Flat Rock Crossing to enter the Waratah Rivulet from the west. The shelter is oriented north and is 7 m long, 2.6 m wide and 2.2 m in height. The site contains one indeterminate charcoal drawing. The condition of the art is considered poor.

### *FRC 21*

The site is an art shelter with artefacts and deposit located under the second line of sandstone overhangs down from the ridge top on the southern side of Fire Road 9C, approximately 500 m north of Flat Rock Crossing. The shelter is oriented south and is 52 m in length, 4.2 m in width and 2.2 m in height. The site contains sixteen charcoal drawings. Three artefacts are present along the dripline including two quartz bipolar flakes.

### *FRC 22*

The site is an art shelter located under the first sandstone outcrop up from the Waratah Rivulet. The shelter is 18 m in length, 4 m in width, and 3.1 m in height, and faces north. This shelter contains both art and artefacts. The art consists of charcoal outline and infill drawings. All the art is in good condition. One panel consists of superimposed motifs.

### *FRC 23*

FRC is an art shelter located approximately 230 m west of Fire Road 9G near the top of the ridgeline and 1.1 km east of Waratah Rivulet. The site is oriented north-west and is 17 m in length, 2 m wide and 2 m in height. Site condition is considered poor. Fifty-seven charcoal outline drawings with charcoal, white or orange infill are present. The original site card identifies seven human figures, two strings of 14 circles and several animal motifs.

### *FRC 24.1*

The site is an art and artefact and deposit shelter located under the first sandstone outcrop down from the ridge top, approximately 50 m to the south of FRC 24.2. The shelter is 23 m in length, 5 m in width and 4.2 m in height, and faces west. This shelter contains a great amount of art, including several wet ochre drawings, as well as charcoal drawings and archaeological artefacts. The shelter contains a good source of orange ochre as an iron rich deposit coming from an actively dripping crack in the rear wall. The original site card is accurate. This site is listed on the Register of National Estate as Place ID 13703. The site contains grinding grooves.

*FRC 24.2*

The site is an art and artefact and deposit shelter located under the first sandstone outcrop down from the ridge top, and is 50 m to the north of FRC 24.1. The shelter is 12 m in length, 2.5 m in width and 3 m in height, and faces west. The shelter possesses only a small overhang and is open to the weather. It has been affected by bushfire activity and there is obvious flaking of the art surface as a result. There is a great amount of art present, consisting of red ochre hand stencils, and numerous other motifs. The original site card is accurate although there has been extensive deterioration of the site due to wildfire. This site is listed on the Register of National Estate as Place ID 13703.

*FRC 25*

FRC 25 is an art shelter with artefacts and deposit located on an unnamed track that runs north-west of Fire Road 9C and is under the second line of sandstone overhangs up from a drainage line. The shelter is oriented south-west and is 9 m in length, 5.7 m in width and 2.6 m in height. An indeterminate charcoal drawing and a red ochre drawing are located on the sloping ceiling of the shelter. Three quartz artefacts are present in the dripline, including a pink quartz bipolar core.

*FRC 26*

The site is an art shelter located mid-slope above a drainage line, immediately north of Fire Road 9C. The shelter is 13 m in length, 3.8 m wide, 3.2 m in height and faces east. Six charcoal motifs are present; three indeterminate, one kangaroo and one human figure. The site card is accurate.

*FRC 28*

The site is an art shelter with artefact and deposit located on the second ridgeline up from a drainage line. The shelter is 10 m in length, 5.4 m in width and 1.8 m in height. It is oriented north. The art consists of nine white stencils, one white drawing and one charcoal indeterminate drawing. A grinding groove is located on a rock at the northern end of the shelter and an artefact in the dripline. The art is deteriorating significantly and when inspected is barely discernable.

*FRC 29*

FRC 29 is a shelter located on the first ridgeline up from a drainage line, approximately 40 m south-west of FRC 28. The shelter is 12 m long, 3 m wide, 2.3 m in height and is oriented west. A single indeterminate charcoal motif is located on the upper rear wall. The art is not visible.

*FRC 30*

The site is an art shelter with artefacts and is located mid-slope above a drainage line, approximately 280 m east of Fire Road 9G. The shelter is 10 m in length, 2.8 m in width, 2.7 m in height and is oriented east. The art consists of two red stencils and four charcoal drawings. Two artefacts are present on the dripline. The art appeared to be in poor condition, with art appearing to have deteriorated since last surveyed. The site itself is very wet.

*FRC 31*

FRC 31 is an art shelter with artefact and deposit located mid-slope, midway between Fire Road 9G and the main eastern drainage line running into the stored water of Woronora Reservoir. The shelter is 10 m long, 2 m wide and is 1.9 m in height. The shelter is oriented north. Sixty-seven art motifs were recorded in the site card, including predominately charcoal drawings, four white drawings and a scratched area. A single bipolar flake is also present at the site. The shelter surface has been observed to be degrading. The rear wall of the shelter has not been recorded. This site is listed on the Register of National Estate as Place ID 13704.

*FRC 32*

FRC 32 is grinding groove site located in the bed of a sandstone drainage line approximately 1 km north-east of the intersection of Fire Roads 9G and 9J and is approximately 100 m north-west of FRC 31. The site is approximately 9 m in length and 3.5 m wide. The site contains 65 grinding grooves. The average grinding groove is 30 cm in length, 6 cm wide and 1.2 cm in depth.

*FRC 33*

FRC 33 is a grinding site located 30 m east of Fire Road 9G on open sandstone in a swamp on a ridge top. The site is 8 m long and 3 m wide. Four grinding grooves are present averaging 30 cm in length, 6 cm wide and 1 cm deep. The site card is accurate.

*FRC 34*

FRC 34 is a shelter with art and artefacts and deposit located under a ridgeline, approximately 150 m from the main eastern drainage line running into the Woronora Reservoir. The shelter is 12.2 m in length, 2 m wide and 2 m in height. The shelter is oriented north-east. Ten charcoal drawing motifs are present. The co-ordinates for the site were updated.

*FRC 40*

The site is an art shelter with artefacts and deposit located 450 m south-east of the major bend on Fire Road 9E and approximately 100 m east of the cliff line. The shelter is oriented south and is 14 m in length, 3.1 m wide and 2.1 m in height. Nine art motifs are present, including eight charcoal drawings and one yellow ochre painting. Three artefacts are present in the dripline including a grey chert thumbnail scraper and two quartz bipolar flakes.

*FRC 44*

FRC 44 is an art shelter located under a hollowed-out boulder under the top ridge on the northern side of the drainage line that runs between Fire Roads 9C and 9E. It is approximately 150 m south-east from the bend in Fire Road 9E. The shelter is oriented south-west and is 3.9 m in length, 2.2 m in width and 1.3 m in height. One charcoal indeterminate drawing in poor condition is located on the rear wall.

*FRC 45*

The site is an art shelter with artefacts and deposit located under the first cliff line from the ridge top on the northern side of the drainage line that runs between Fire Roads 9C and 9E. It is approximately 150 m south from the bend in Fire Road 9E and 150 m west of FRC 44. The shelter is oriented south-east and is 10 m in length, 3 m in width and 2 m in height. The surface of the shelter is case hardened with water damage, flaking and substrate loss. Four charcoal drawings are present, including three indeterminate and one figurative drawing. Eight bipolar flakes are present; three chert and two quartz.

*FRC 46*

FRC 46 is an art shelter with artefacts and deposit located under the first line of sandstone overhangs, approximately 1.1 km north-east of Waratah Rivulet and approximately 650 m west of the end of the unnamed Fire Road that runs north-west of Fire Road 9C. The shelter is oriented east and is 12 m in length, 3 m in width and 2.2 m in height. The art surface is noted as being case hardened with concave weathering. The site contains eight charcoal drawings including seven indeterminate and one figure interpreted in the original site card as human. Four artefacts were originally recorded.

*FRC 52*

The site is an art shelter located under the second ridgeline up from a drainage line running south-east into Waratah Rivulet, 230 m north from the end of Fire Road 9C and 1 km south-east of Fire Road 9E. The shelter is oriented east and is 11 m long, 2.1 m wide and 3.6 m in height. Three orange ochre paintings are located on the back wall of the shelter. Of these three paintings, two are figurative and one is indeterminate.

*FRC 55*

FRC 55 contains 15 grinding grooves in five groups located on a rock platform on the western margin of the head of a small drainage line south of Fire Road 9H. The platform consists of a single outcrop of sandstone oriented on a north–south alignment. A discrete water flow is situated immediately to the east of the rock platform and is fed from diversion channels along the road margin. The platform measured 22 m in length and 5 m in width. The grinding groove's average length, width and height measured 22 to 35 cm, 4 to 7 cm, 0.5 cm respectively.

*FRC 57*

FRC 57 is an open site with petroglyph and grinding grooves located on bare stone on the top of a ridge 100 m west of Fire Road 9G and 1.5 km north of the intersection of Fire Roads 9G and 9H. The site is approximately 85 m in length and 40 m wide on an open pan with 360 degree views. The five grinding grooves are present, averaging 28 cm in length, 5 cm in width and 1 cm deep. A vertical crack runs across the main rock near the grooves in an E-W alignment but does not affect them.

*FRC 59*

FRC 58 contains six grinding grooves and is located on a sandstone platform (approximately 1 km south-west of Fire Road 9H) on the downslope side of a hanging swamp within a drainage line, which flows east into Waratah Rivulet. The platform measures 15 m in length and 7 m in width. The grinding grooves average 18 cm in length, 3.5 cm in width and 1 cm in depth. Water erosion has been noted to have reduced groove visibility. Seven grinding grooves had previously been recorded.

*FRC 60*

FRC 60 is a shelter with deposit located 70 m east of the drainage line, which flows parallel to Fire Road 9J into the Waratah Rivulet. The shelter is oriented north-west and is 12 m in length, 2.8 m in width and 1.6 m in height. One small turban shell and three limpets are present in the shelter.

*FRC 61*

The site is a shelter with artefacts located to the north of an unnamed Fire Trail which runs east of Fire Road 9E. FRC 61 is located approximately 600 m west of Waratah Rivulet. The shelter is 6 m in length, 1.5 m in width and 2.7 m in height, and oriented south-west. A quartz core and quartzite flake are located just outside the shelter. Five indeterminate charcoal drawings had been identified in previous site cards but are no longer visible.

*FRC 62*

The site is an art shelter with artefacts and deposit, located below the ridgeline on the northern side of the unnamed fire road running east of Fire Road 9E. The shelter is 27 m in length, 3.7 m wide, 2.8 m in height and faces south. The art consists of 62 motifs including a human figure, foot, snake and bat. The site contains twenty-one artefacts. A vast amount of graffiti is present. Thirty artefacts and seven grinding grooves are present.

*FRC 63*

FRC 63 is a grinding groove site consisting of 38 grinding grooves in five groups located on a well defined sandstone shelf at the top of the plateau on the southern side of Fire Trail 9H. The platform is 40 m in length and 7 m in length. The grinding grooves average 14 to 30 cm in length, 3 to 6 cm in width and less than 1 cm in depth.

*FRC 67*

FRC 67 is a shelter with artefacts and deposit located under the first cliff line from the top of the ridge on the eastern side of the point between Waratah Rivulet and the main eastern drainage line entering the Woronora Reservoir. It is approximately 150 m west of the stored water and 40 m north of a tributary drainage line which runs west to east. The shelter is oriented east and is 21 m long, 5.6 m wide and 5.6 m in height. Seven stone artefacts are located in the dripline including four quartz flakes and one silcrete flake.

*FRC 68*

The site is an art shelter with artefacts and deposit located under the first cliff line down from the ridge top east of the point between the Waratah Rivulet and the main eastern drainage line entering the Woronora Reservoir. It is approximately 100 m north of the tributary drainage line that runs west to east and 60 m north of FRC 67. The shelter is oriented north-east and is 7 m in length, 2.4 m in width and 2 m in height. The condition of the art surface is case hardened. Fifteen art motifs are present at the site including seven white hand stencils, two white foot stencils, a white stencilled axe and multiple figurative and indeterminate charcoal drawings. Multiple artefacts are located within the site including a single anadora shell, two cores, two flakes and a manuport.

*FRC 70*

FRC 70 is an art shelter with artefact and deposit located mid-slope on the eastern side of the eastern arm of the Woronora Reservoir, 150 m north of FRC 71. The shelter is 17 m long, 4.2 m wide, 4.2 m in height and faces south-west. Twenty motifs are present, one is multi-chromatic, three are red ochre and one white. The remainder are charcoal drawings, four of which are human figures. A stone artefact was also originally recorded. The site is heavily graffitied and very little of the art is discernable.

*FRC 71*

FRC 71 is an art shelter located mid-slope on the eastern side of the eastern arm of the Woronora Reservoir and approximately 350 m south-east of the confluence of the two arms. The shelter is 11 m in length, 3.4 m wide, 3.5 m in height and faces south. Two charcoal drawings are present.

*FRC 72*

The site is an art shelter with artefacts and deposit and grinding grooves located on the mid cliff line, approximately 20 m north-east of the small eastern tributary which flows into the main eastern arm of Woronora Reservoir. The shelter is oriented south-west and is 12 m in length, 4.8 m in width and 2.2 m in height. Of the 27 markings recorded at the site, 23 are figurative or indeterminate charcoal drawings, one is a multi-chromatic drawing and three are red ochre drawings. At the eastern end of the shelter, six grinding grooves are located averaging 30 cm in length. Thirty artefacts are present along the dripline including three shell fragments, two cores and several flakes. A chert geometric microlith is also present.

*FRC 76*

FRC 76 is an art shelter located approximately 50 m west of the Old Princes Highway under the first major cliff line down from the road. The shelter is oriented north-west and is 30 m in length, 3.5 m in width and 2.9 m in height. The shelter surface has been noted to vary between excellent and poor with case hardening and water seepage. The art at the site consisted of 27 charcoal figurative and indeterminate drawings and a series of red ochre lines.

*FRC 77*

FRC 77 is an art shelter with artefacts and deposit located mid-slope on the south side of a small drainage line running west into the stored water of Woronora Reservoir. It is located approximately 150 m west of the Princes Highway. The shelter is 8 m in length, 2.5 m in width, 1.8 m in height and is oriented north-west. Two charcoal drawings and two artefacts were originally recorded.

*FRC 78*

An art shelter is located mid-slope on the south side of a small drainage line, 20 m below FRC 77. The shelter is 10 m long, 4.5 m wide and 2 m in height. It faces north. Six charcoal drawings were originally recorded.

*FRC 85*

FRC 85 is an art shelter with artefacts and deposit located between the Old Princes Highway and an unnamed fire road immediately to the west of the highway, which runs in a north-south direction. It is midway between two drainage lines that flow into the Woronora Reservoir. The shelter is oriented south-west and is 16 m in length, 3.2 m wide and 5.5 m in height. The art at the site consisted of 31 charcoal figurative and indeterminate drawings. White ochre marks are no longer visible. In addition, eight artefacts are located along the dripline including two bipolar cores.

*FRC 86*

FRC 86 is an art shelter located below a ridgeline to the east of an unnamed fire road that runs parallel to the Princes Highway and 100 m south of FRC 90. The shelter is 6 m long, 2.2 m wide and 1.6 m in height. It is oriented west. Two charcoal indeterminate drawings were originally recorded. The condition of the art is considered poor.

*FRC 87*

The site is an art shelter with artefacts and deposit located mid-slope on the southern side of a drainage line that runs east of the Woronora Reservoir. The shelter is 10 m long, 3 m wide, 2.9 m in height and faces north-west. Ten charcoal drawings and two artefacts were originally recorded.

*FRC 90*

FRC 90 is a shelter with artefacts and deposit located below a ridgeline on the eastern side of an unnamed fire road running north-south parallel to the Princes Highway and under a small drainage line running west into the stored water. The shelter is 16 m in length, 5.8 m wide, 1.2 m in height and faces west. Four artefacts were originally recorded. During heavy rain, the drip line acts as a waterfall.

### *FRC 91*

FRC 91 is an art shelter with artefacts and deposit located below a ridgeline 30 m west of the Princes Highway south of the Garrawarra Centre. The shelter is 9 m long, 2.8 m wide, 1.2 m in height and faces south-west. Four charcoal indeterminate drawings and six artefacts were originally recorded. Tree roots were noted to be growing through the sandstone roof.

### *FRC 93*

FRC 93 is an art shelter located below the third ridgeline to the east of the Woronora Reservoir, west of the Garrawarra Centre and 350 m west of the unnamed fire road that runs parallel to the Princes Highway. The shelter is 7 m in length, 2.5 m wide and 1.1 m in height. It is oriented west. Four charcoal drawings were originally recorded. The art is in poor condition.

### *FRC 94*

FRC 94 is an art shelter located below a ridgeline directly above the eastern side of the Woronora Reservoir, approximately 1.1 km west of the Garrawarra Centre. The shelter is 26 m in length, 2 m wide, 2 m in height and is oriented south-west. A charcoal outline with infill bird was originally recorded on the lower rear wall.

### *FRC 95*

FRC 95 is a grinding site located on an outcrop of rock in a swamp approximately 80 m west of the unnamed fire road proximal to the Princes Highway and 700 m west of the Princes Highway. The site is 15 m long and 6 m wide. Five grinding grooves were originally recorded, averaging 30 cm in length, 4.5 cm in width and 0.5 cm in depth.

### *FRC 96*

FRC 96 is a single grinding groove site located on a single outcrop of sandstone oriented on a north-south alignment. The platform is 22 m long and 5 m wide. A discrete water flow is situated immediately to the east of the rock platform and is fed from diversion channels along the road margin. Water flows over the platform with no discernable pattern. The grinding groove is 35 cm in length, 3vcm wide and 0.5 cm in depth. Four grinding grooves had been previously recorded.

### *FRC 97*

FRC 97 is an art shelter located under the second cliff line, approximately 100 m west of the Woronora Reservoir, approximately 400 m south-east of the end of Fire Road 9E. The shelter is oriented north-east and is 7 m in length, 3.6 m in width and 2.5 m in height. Flaking, granular loss, chemical weathering and case hardening are present on the shelter surface. The art at the site consisted of two red ochre drawings and 11 charcoal figurative and indeterminate drawings. The art has been previously noted as fading.

### *FRC 101*

FRC 101 is a single grinding groove site located on a sandstone outcrop 40 m west of the unnamed fire road proximal to the Princes Highway. The site measured 12 m in length and 4m in width. The grinding groove is 30 cm long, 6 cm wide and 0.5 cm deep.

### *FRC 105*

FRC 105 is a shelter with artefacts and deposit and grinding grooves located under the first line of sandstone overhangs to the north of a small tributary to the main eastern drainage line that runs north into the Woronora Reservoir. The site is approximately 800 m south of the junction between Fire Roads 9G and 9J. Three grinding grooves averaging 25 cm in length, 7 cm in width and 2.5 cm in depth, are located on a slab of rock at the western end of the shelter. Two quartz bipolar flakes are located on the shelter floor.

### *FRC 113*

FRC 113 is an art shelter with artefacts and deposit and grinding grooves located near a drainage line that runs into the eastern tributary to the Woronora Reservoir, 550 m west of the F6 Southern Freeway. The shelter is 14 m long, 2.2 m wide, 1.5 m in height and faces north-east. The art consists of 20 motifs including two multi-chromatic drawings, two white drawings. The remainder are charcoal. The condition of the art is considered degraded.

### *FRC 114*

FRC 114 is located in the bed of a drainage line that flows into the eastern tributary to the Woronora Reservoir and consists of one clear grinding groove. The clear groove is across the water flow form a large pothole and during periods of heavy rain, the site experiences water flow.

A previously recorded grinding groove at site FRC 114 was reidentified as a natural depression within the water course. Bednarik (2007: 15-36) identifies a range of natural rock markings that are regularly misidentified. The act of creating a grinding groove should result in an elongated depression, symmetrical in shape and presenting with a smooth or polished finish. FRC 114 was discounted as being a utilitarian anthropioc marking as within the depression was an embedded inclusion of quartz that protruded some 5 mm. Had the depression been previously employed as a grinding groove, the small piece of quartz would have either been ground smooth to the level of the surrounding sandstone or been removed entirely.

### *FRC 115*

FRC 115 is an art shelter with deposit located on the second ridgeline above a drainage line approximately 30 m west of the F6 Southern Freeway. The shelter is 2.2 m wide and 1.4 m in height. It is oriented north-east. A single indeterminate charcoal drawing is originally recorded. A conjoined mussel shell is located and recorded in the recent site inspection. The art could not be identified.

### *FRC 117*

FRC 117 is an art shelter located under the first ridgeline above a waterfall and on a small drainage line to the west of the Woronora Reservoir. The shelter is 10.4 m in length, 2 m wide, 1.6 m in height and faces south-east. The art consists of three red ochre patches. The art is barely discernable and in generally poor condition.

### *FRC 119*

FRC 119 is a shelter with artefacts and deposit located on the first ridgeline just below the ridge top, 50 m north of Fire Road 9J and 250 m west of the 330 kilovolt (kV) powerlines. The shelter is 15 m long, 3.6 m wide, 2.2 m in height and faces south. Eight artefacts were originally recorded.

### *FRC 124*

FRC 124 is an art shelter with artefacts and deposit located under the first cliff line down from the ridge top approximately 250 m west of Fire Road 9G and 550 m south-west of the intersection of Fire Roads 9G and 9J. It is on the same contour and is approximately 30 m south of FRC 23. The shelter is 30 m in length, 3.3 m in width and 2.1 m in height, and oriented north by north-east. The surface of the shelter is poor with fungal growth and water damage. Three indeterminate charcoal drawings are located on the rear wall of the shelter and a single thumbnail scraper with use wear is located in the area of the drip line.

### *FRC 125*

FRC 125 is an art shelter with artefacts and deposit located 150 m above a drainage line, immediately below a ridgeline approximately 400 m south of the junction between Fire Roads 9G and 9J. The shelter is 14 m long, 2.2 m wide, 1.8 m high and faces north-east. Eleven charcoal drawings and 4 stone artefacts were originally recorded.

### *FRC 127*

The site is an art shelter located mid-slope between Fire Road 9G and the main eastern drainage line entering the Woronora Reservoir. The shelter is 15 m in length, 3.2 m wide and 2 m in height. It is oriented east. A single white hand stencil was originally recorded. Signs of recent natural rockfall are evident at the site. The rockfall is considered to be natural as the site is located some 2 km from the end of the closest extracted Longwall. An additional hand stencil is present, though both are barely discernable.

### *FRC 133*

FRC 133 contains nine grinding grooves located on a sandstone creek bed through a swamp at the head of an unnamed drainage line that flows into the Waratah Rivulet. The platform is 7 m in length and 5 m in width.

### *FRC 138*

FRC 138 contains two grinding grooves located on a sandstone creek bed on a small tributary running into Waratah Rivulet. The sandstone outcrop is approximately 8 m in length and 3 m in width. The grooves average 40 cm in length, 8 cm in width and 2 cm in depth.

### *FRC 139*

FRC 139 is a grinding groove site consisting of 37 grooves in eight groups located on a well defined sandstone shelf at the top of a plateau approximately 100 m from Fire Trail 9H. The platform is 30 m long and 23 m wide. The grinding grooves averaged between 10 to 40 cm in length, 2 to 5 cm in width and less than 1 cm in depth.

### *FRC 160*

FRC 160 is a shelter with deposit located under the first cliff line, 20 m up from a drainage line and 1 km south-east of the intersection of Fire Roads 9J and 9G. The shelter oriented south and is 6 m in length, 3 m in width and 1.4 m in height. A single limpet shell was previously identified on the shelter floor.

### *FRC 164*

FRC 164 is a grinding groove site located on a pan of sandstone 100 m from an overgrown track that runs east of Fire Road 9E, running east along the southern side of a large swamp. The site is approximately 32 m in length and 20 m wide. Four grinding grooves are located with an average length of 28 cm, width 7 cm and depth 1.5 cm. The card is accurate.

### *FRC 168*

FRC 168 is a single grinding groove site located on the western end of a sandstone outcrop 20 m east of Fire Road 9G and 850 m south of the intersection of Fire Roads 9G and 9J. It is 140 m north of FRC 304. The groove is approximately 30 cm in length, 4.5 cm in width and 1 cm in depth.

### *FRC 169*

FRC 169 is a grinding groove site with artefact scatter located just above the main eastern drainage line to the Woronora Rivulet, 400 m west of the F6 Southern Freeway. The site is approximately 14 m in length and 7 m wide. A single faint grinding groove and 20 artefacts were originally recorded. A grinding groove is present at the site.

### *FRC 171*

FRC 171 is an art shelter with artefacts and deposit located on the second line of sandstone overhangs up from the Waratah Rivulet approximately 300 m east by north-east from the end of Fire Raod 9J. The site is approximately 200 m downstream from a waterfall. The shelter is oriented north-west and is 23 m in length, 5 m in width and 2.8 m in height. The art is located on the central ceiling and front wall of the rear end of the shelter and consisted of eight charcoal figurative and indeterminate drawings. Three stone artefacts are located in the dripline.

### *FRC 172*

FRC 172 is an art shelter located midslope approximately 415 m east of Fire Road 9J and 300 m east of a pool and waterfall in the Waratah Rivulet. The shelter is oriented east and is 2.5 m in length, 1.8 m in width and 1.8 m in height. A single red ochre child's hand stencil is located on the centre of the rear wall.

### *FRC 176*

The site is an art shelter with artefact and deposit located immediately above the drainage line, south of Fire Road 9J and 250 m south by south-east of the junction between Fire Road 9G and 9J. The shelter is 16 m in length, 5 m wide and 1.5 m in height. Ten charcoal drawings were originally identified including a bandicoot and a human figure. A stone artefact is located at the site.

### *FRC 180*

FRC 180 is an art shelter located on the first cliff line up approximately 50 m south from a small drainage line, 200 m west of Fire Road 9G. The shelter is oriented east and is 7 m in length, 1.8 m in width and 1.6 m in height. A single indeterminate charcoal drawing is located on the rear wall of the northern end of the shelter.

### *FRC 184*

FRC 184 is located under the bottom sandstone outcrop on the west side of the Woronora Reservoir, west of the Garrawarra Centre. This rock shelter is 20 m in length, 2.5 m in width and 3.5 m in height. The previous site description is accurate apart from the chert flake artefact that is not present at the site.

### *FRC 185*

FRC 185 is located above the lowest sandstone outcrop on the slope west of the Woronora Reservoir. The site is a rock shelter 16 m in length, 5 m in width and 3 m in height. Three artefacts and twenty-three motifs are located at the site. Some are very faded and can not be identified as either single motifs or multiple although some are large and well preserved. Both ochre and charcoal are used in the drawings at this site. A possible fire pit is present at the site, its length is 3.20 m and the width is 1.10 m.

### *FRC 186*

FRC 186 is an art shelter located on the second ridgeline/ridgeline from the Woronora Reservoir 200 m east of the end of Fire Road 9E. The shelter is 10 m in length, 3.2 m wide, 1.5 m in height and faces north-east. An additional two charcoal drawings are located in the recent site inspection to the one originally recorded.

### *FRC 187*

The site is located under the second sandstone outcrop from the Woronora Reservoir. Rock shelter is 15 m in length, 3 m in width and 4.6 m in height. One large charcoal drawing is located on the rear wall at the open end of the rock shelter. The site card is accurate.

### *FRC 189*

FRC 189 is an art shelter located mid-slope on the western side of the Waratah Rivulet, approximately 500 m downstream from the start of the stored water. The shelter is 10.6 m in length, 3.7 m wide and 1 m in height. It faces south-east. The site contains a charcoal kangaroo drawing.

### *FRC 191*

FRC 191 is an art shelter located on the eastern side of a small gully above a drainage line. The shelter is 19 m long, 4.6 m wide, 2.2 m in height and is oriented north. Six charcoal drawings are present, including a snake and human figure. The site card is accurate.

### *FRC 193*

FRC 193 is a single grinding groove site located at the centre of a sandstone outcrop 10 m to the north of an unnamed fire trail road and 900 m from its junction with Fire Trail 9E. The groove is 28 cm in length, 4 cm in width and 0.5 cm in depth.

### *FRC 194*

FRC 194 is an art shelter located 100 m north of FRC 195 on the same contour, approximately 80 m from the Waratah Rivulet. The shelter is 66 m in length, 10.5 m wide, 10 m in height and is oriented east. Three charcoal drawings were originally recorded. Silica skins have caused severe deterioration of the art. Seven motifs are located at the site, with one considered to be deteriorating.

### *FRC 195*

The site is an art shelter located 80 m from the rivulet. The shelter is 14 m long, 2.2 m wide, 2.2 m in height and is oriented north-east. Ninety-two charcoal motifs have been recorded at this site with motifs predominately human. The site card is accurate.

*FRC 198*

The site is an art shelter located on the northern side of the Waratah Rivulet and 500 m from the start of the stored water. The shelter is 90 m long, 6 m wide, 1.4 m in height and is oriented south-east. One charcoal drawings is present at the site. Blackening on the shelter surface is located near a camp fire.

*FRC 199*

The site is an art shelter on the western side of the Waratah Rivulet, below the ridgeline directly above the stored water. The shelter is 14 m long, 2 m wide, 1.8 m in height and is oriented east. Three charcoal indeterminate drawings are located at the rear of the shelter. Water damage is present at the site. The condition of the art is poor.

*FRC 201*

FRC 201 is a shelter with deposit located under the second cliff line, approximately 300 m east of Fire Road 9 and 500 m north-east of the junction of Fire Roads 9 and 9H. The shelter is oriented south-east and is 19 m in length, 5 m in width and 0.9 m in height. Three artefacts are located along the dripline. Shell fragments have been previously recorded at the site.

*FRC 203*

FRC 203 contains two grinding grooves located on a long narrow ledge of sandstone above Fire Road 9H approximately 300 m east of the intersection of Fire Roads 9H and 9C. The platform is 50 m long and 4 m wide. The grooves averaged 37 cm in length, 7 cm in width and 1.5 cm in depth.

*FRC 208*

FRC 208 is an art shelter with deposit located midslope on the north-west face of an incline to the north of a drainage line flowing into the Waratah Rivulet. The shelter is oriented west and is 9.2 m in length, 3 m in width and 3 m in height. The art consists of an indeterminate charcoal drawing. A quartz bipolar core and flake are located in the dripline.

*FRC 253*

The site is a grinding groove site located midway down slope on a large area of sandstone between FRC 34 and FRC 32. It consisted of a single grinding groove on an open site of 45 m in length and 12 m width. The grinding groove is 35 cm in length, 3 cm wide and 0.5 cm in depth. The co-ordinates were updated for this site.

### *FRC 254*

FRC 254 is a shelter with artefacts and deposit located under the second cliff line down from a ridge top, approximately 300 m north-west of the end of Fire Trail 9G on the western side of the point between Waratah Rivulet and the eastern arm of the Woronora Reservoir. The shelter is oriented west and is 11.6 m in length, 4.8 m in width and 2.4 m in height. Five artefacts are located in the dripline including a petrified wood core and four flakes of chert, quartz and fossilised wood.

### *FRC 266*

FRC 266 is an art shelter with artefacts and deposit located under the first cliff line on the western side of Waratah Rivulet approximately 200 m north-east of Flat Rock Crossing. The shelter is oriented south-east and is 16 m in length, 5 m in width and 3.2 m in height. The surface of the shelter has been noted as poor with case hardening, fungal growth, water seepage through an open bedding plane. One charcoal indeterminate drawing is present on the rear wall of the shelter and two bipolar flakes are present in the dripline.

### *FRC 267*

FRC 267 contains two grinding grooves located 25 m apart on a single outcrop of sandstone with crazing approximately 100 m from a tributary to Forest Gully. Water flows down the western side of the platform. The platform is 30 m long and 15 m wide. The grooves average 34 cm in length, 6 cm in width and 1 cm in depth.

### *FRC 268*

FRC 268 contains four grinding grooves located on a sandstone creek bed running north-east to the north of Forest Gully. The site is 5 m long and 4 m wide. The grooves average 36 cm in length, 6 cm in width and 3 cm in depth.

### *FRC 269*

FRC 269 is an art shelter located 50 m north-east of a small drainage line that runs to the north-east towards Waratah Rivulet. The shelter is oriented west and is 7.4 m in length, 2.2 m in width and 3 m in height. The surface of the shelter has been observed to be case hardened with granular loss. A charcoal outline with infill figurative drawings is located on the rear wall of the shelter.

### *FRC 270*

FRC 270 is a grinding groove site located on a sandstone platform 30 m north of a drainage line and 500 m south of the junction of Fire Roads 9H and 9E.

### *FRC 271*

FRC 271 is located on a sandstone platform 250 m north of Fire Road 9H and 400 m east of the junction of Fire Roads 9H and 9E.

### *FRC 272*

FRC 272 is an art and artefact and deposit shelter located 50 m north of the small drainage line that flows across the unnamed track that runs north-west from Fire Road 9C. It is approximately 100 m west of the unnamed track and is under the first cliff line up from the small drainage line. The shelter is 9 m in length, 3.2 m in width and 2.2 m in height. The shelter contains numerous red ochre hand stencils and patches of red ochre, as well as a charcoal indeterminate drawing. Five artefacts are located at the site, including chert, quartz and silcrete.

### *FRC 273*

FRC 273 is a grinding groove site located approximately 100 m above the small drainage line that crosses the unnamed track that runs north-west from Fire Trail 9C. It is on open rock above FRC 272 and is on top of the first line of sandstone overhangs up from the drainage line. The site consists of two grinding grooves on an open area with seepage from a swampy area in wet weather. One of the grooves is particularly long.

### *FRC 274*

FRC 274 is an art and artefact and deposit shelter located under the second line of sandstone overhangs down from the ridge top on the northern side of the drainage line between Fire Roads 9C and 9E. It is towards the eastern end of the line of sandstone overhangs. The shelter is 16 m in length, 4 m in width and 3.6 m in height, and oriented south. Art at the site consists of three charcoal indeterminate drawings and two zoomorphic charcoal and infill drawings. This art is located on the rear wall and is in poor condition. An artefact is located at the site and is a grey chert flaked piece.

### *FRC 275*

FRC 275 is an art shelter located on the northern side of the drainage line between Fire Roads 9C and 9E approximately halfway between the large cliff line and the drainage line. It is about 900 m east of the intersection between Fire Roads 9 and 9E, and is under a cliff line 80 m up from the drainage line. The shelter is 7 m in length, 2.5 m in width and 1.2 m in height, and oriented east. Art is present on the lower ceiling and front wall, and consists of five charcoal and infill indeterminate drawings and two zoomorphic charcoal and infill drawings.

### *FRC 276*

FRC 276 is a rock shelter with artefacts and deposit located mid-slope above a drainage line, north-east of the end of Fire Road 9C and approximately 40 m south-west of FRC 26. The shelter is 16 m in length, 3.6 m wide, 4 m in height and faces south. Two artefacts are located at the site. Four artefacts previously unrecorded are located in the drip line.

### *FRC 277*

FRC 277 is an art and artefact and deposit shelter located on the southern side of a small drainage line approximately 250 m west of Waratah Rivulet that enters the rivulet approximately 200 m north of the end of Fire Road 9C. It is approximately 1 km south-east of the large bend on Fire Road 9E, and is located under an upper cliff line. The shelter is 6.5 m in length, 2.3 m in width and 2 m in height, and oriented east. Art is present on the lower rear wall, consisting of one charcoal indeterminate drawing. An artefact is located at the site consisting of one grey silcrete elouera, made from a flake and has retouch on the back, and use wear on the chord.

### *FRC 278*

FRC 278 is a grinding groove site located 200 m west of Fire Road 9G and 800 m south-west of the intersection of Fire Roads 9G and 9J. It is on a drainage line that flows to Waratah Rivulet, on a sandstone area in the creek bed. The site consists of six grooves, three of which are isolated grooves and three of which are grouped around a pothole.

### *FRC 279*

FRC 279 is an artefacts and deposit shelter located 550 m south-west of the intersection of Fire Roads 9G and 9J, and is under the first cliff line down from the ridge top. The shelter is 17 m in length, 8 m in width and 1.9 m in height, and oriented south-west. There is seepage at the back of the shelter and a red chemical weathering source of ochre is present on the floor. Artefacts located at the site included two white quartz bipolar cores, one grey fine grained igneous flake, one grey chert flake and one white quartz bipolar flake.

### *FRC 280*

FRC 280 is a grinding site located 250 m west of Fire Road 9G and 400 m south-west of the intersection of Fire Roads 9G and 9J. It is midway between the ridge top and the main drainage line. The site consists of three grinding grooves located alongside a small stream.

### *FRC 281*

FRC 281 is an art and artefact and deposit shelter located 600 m due west from the intersection of Fire Roads 9G and 9J and is located under the second cliff line up from a drainage line that flows north into Waratah Rivulet. The shelter is 10 m in length, 4 m in width and 2 m in height, and oriented west. Art present at the site includes three red ochre hand stencils, two figurative charcoal and infill drawings and one charcoal and infill indeterminate. One artefact, a white chert flake, is present at the site.

### *FRC 283*

FRC 283 is an art shelter located under the third sandstone outcrop up from the Waratah Rivulet, approximately 50 m south-east of Fire Road 9C and 400 m west of Fire Road 9J. The shelter is 22 m in length, 6 m in width and 2 m in height. It is oriented south-east. Two charcoal drawings were originally recorded and relocated in the recent site inspection. The art is in poor condition.

An ochre source is present from seepage from a bedding plane. The shelter surface contains cracking, which is not considered to affect the art.

### *FRC 284*

FRC 284 is an artefact and deposit shelter approximately 100 m south-east of Fire Road 9C and 750 m north-east of Flat Rock Crossing. It is 100 m south-west of FRC 283 and under the third line of sandstone overhang, approximately 80 m up from the rivulet. The shelter is 25 m in length, 5.8 m in width and 2.6 m in height, and oriented south-east. One artefact, a white quartz bipolar flake, is located at the site. There is an ochre source of orange chemical weathering present in the shelter. The deposit is disturbed due to digging and rubbish and graffiti are present.

### *FRC 285*

FRC 285 is an artefact and deposit shelter located 250 m west of Fire Road 9G and 300 m south west from the intersection of Fire Roads 9G and 9J. It is on the western side of a small gully and below a waterfall in the drainage line. The site is under the first cliff line down from the top of the ridge. The shelter is 20 m in length, 9 m in width and 1.9 m in height, and oriented west. Artefacts located at the site include one pink aplite flake, one grey chert bipolar core, two grey chert bipolar flakes, one white quartz bipolar flake and one potlid fractured grey chert flake. Shell is also present, and includes one small turban shell, two fragments of turban shell and three indeterminate shell fragments.

### *FRC 301*

FRC 301 is a grinding groove site located on a large, undulating sandstone outcrop at the top of a spur approximately 300 m from the main eastern tributary to the Woronora Reservoir. The site is approximately 60 m in length and 30 m wide. Two grinding grooves (one which measures 44 cm in length, 7 cm in width and 1 cm in depth) are present at the site. The grinding grooves appear to point towards FRC 113.

### *FRC 302*

FRC 302 is an artefact and deposit shelter located under a block beneath the top line of sandstone overhangs from the ridge top, 100 m west of the 330 kV transmission lines and 200 m south of the tributary drainage line that starts near the locked gate of Fire Road 9J. The shelter is 8.5 m in length, 2.2 m in width and 1.9 m in height, and oriented north-west. Eleven artefacts are located inside the shelter and include fossilised wood, chert, quartz and quartzite. Shell fragments, including one limpet, are located at the site.

### *FRC 304*

FRC 304 is a grinding site located on the ridge top alongside Fire Road 9G approximately 1 km south of the intersection of Fire Roads 9G and 9J. The site consists of three grinding grooves at the side of a pan.

*FRC 305*

FRC 305 is an art shelter with artefact and deposit located along a ridgeline directly above the eastern side of a drainage line, approximately 500 m west of the F6 Southern Freeway and 600 m north-east of the Fire Road 9J. The shelter is 4 m wide, 1 m wide and 1.5 m high and faces north-west. Five of the art motifs are white stencils and drawings. An artefact scatter is located at the site.

*FRC 306*

FRC 306 is an art shelter located approximately 500 m north-east of Fire Road 9J. It is 550 m west of the F6 Southern Freeway and on the eastern side of the main drainage line about 150 m south of the creek junction. FRC 306 is located 50 m south of FRC 305, and is under the second line of sandstone overhangs up from the drainage line. The shelter is 4 m in length, 1.2 m in width and 1.6 m in height, and oriented north-west. Art is located on the rear wall, consisting of two indeterminate charcoal drawings in poor condition from water damage.

*FRC 307*

FRC 307 is a grinding groove site located in the creek bed of the main eastern drainage line to the Woronora Reservoir. The platform on which the single grinding groove is located is 2 m long and 1 m wide.

*FRC 308*

FRC 308 is an art shelter located under the second sandstone outcrop up from a drainage line, 400 m west of the intersection of the Princes Highway and the F6 Southern Freeway. The shelter is 7 m long, 1.5 m wide, 2.5 m in height and faces north. The site contains a single red ochre hand stencil. The condition of the art is considered poor. Cracking and exfoliation is present on the shelter surface, though not near the stencil.

*FRC 309*

FRC 309 is an artefact and deposit shelter located 150 m east of the Woronora Reservoir. It is just south of the small drainage line that starts to the west of the Garrawarra cemetery and is approximately 250 m west of the Princes Highway. It is midway up the slope. The shelter is 10 m in length, 3.2 m in width and 1.5 m in height, and oriented west. Artefacts located at the site include one grey chert bipolar core, one dark grey silcrete bipolar flake, two white quartz bipolar flakes and one white quartz broken pebble.

*FRC 310*

FRC 310 is an art shelter located 300 m east of the Woronora Reservoir and 150 m west of the unnamed fire road that runs parallel to the Princes Highway. It is on the northern side of a drainage line under the first line of sandstone overhangs up from the drainage line and approximately 40 m east of FRC 87. The shelter is 7 m in length, 3 m in width and 1.6 m in height, and oriented south-west. Art is present on the rear wall in a concavity in a poor condition and consisted of one indeterminate charcoal drawing.

*FRC 311*

FRC 311 is an artefact and deposit shelter located east of the Woronora Reservoir. It is west of the Garrawarra Aged Care Centre and under the first line of sandstone outcrops up from the Woronora Reservoir. The shelter is 12 m in length, 2.2 m in width and 2.4 m in height, and oriented south-west. Artefacts present at the site included one pink chert bipolar core.

*FRC 312*

FRC 312 is an artefact and deposit shelter located on the north-western side of the drainage line that starts at the T intersection on the unnamed fire road that runs parallel to the Princes Highway and flows into the Woronora Reservoir. It is approximately 1.5 km from the Woronora Reservoir under the first major sandstone outcrop. The shelter is 28 m in length, 13 m in width and 7 m in height, and oriented south. Artefacts present at the site include one black chert flake and two quartz flakes.

*FRC 313*

FRC 313 is an artefact and deposit shelter located the second large sandstone outcrop from the ridge top, approximately 300 m east of the Woronora Reservoir. The shelter is 21 m in length, 9.8 m in width and 3.5 m in height, and oriented south-west. Artefacts located at the site include three buff chert bipolar flake and one black chalcedony bipolar flake.

*FRC 314*

FRC 314 is an art shelter with artefacts and deposit located under the second sandstone outcrop from the Woronora Reservoir and is 1.5 km west of the Princes Highway. The shelter is 7 m long, 5.2 m wide, 2 m high and faces north-west. Three charcoal indeterminate drawings and three artefacts were originally recorded. The art is in poor condition.

*FRC 315*

FRC 315 is a shelter with artefacts and deposit located on the third sandstone outcrop 1.5km west of the Princes Highway, 15m south of FRC 314. The shelter is 10m long, 3.2m wide, 1.2m in height and faces west. Two artefacts (cores) were originally recorded. The artefacts were not relocated in the current site inspection. A build up of leaf litter is present.

*FRC 316*

FRC 316 is a shelter with artefacts and deposit located below a mid ridgeline approximately 250 m west of the unnamed fire trail that runs parallel to the Princes Highway above two small drainage lines above a swampy area. The shelter is 8 m long, 3.2 m wide, 2.2 m high and faces west. Eight artefacts were originally recorded.

### *FRC 317*

FRC 317 is an art and artefacts and deposit shelter located on the western side of the long spur that runs north-west into the stored water from the intersection on the unnamed Fire Road that runs parallel to the Princes Highway, and is under the third line of sandstone outcrops down from the top. The shelter is recorded as being 1 m in length, 4 m in width and 3 m in height, although these dimensions may be incorrect. The site contains one charcoal indeterminate drawing.

### *FRC 319*

FRC 319 is an art shelter located 200 m west of the main eastern drainage line flowing to the Woronora Reservoir. It is on the northern side of the second drainage line to the north of Fire Road 9J that flows from the west. The shelter is located under the first cliff line up from the drainage line. The shelter is 9 m in length, 2.5 m in width and 1.8 m in height, and the site oriented south. The art consists of an indeterminate charcoal drawing on the lower back wall in the centre of the shelter, and is in poor condition.

### *FRC 320*

FRC 320 is a rock shelter with artefacts and deposit located 20 m from a drainage line under a large ridgeline approximately 200 m east of Fire Road 9G. The shelter is 10 m long, 4.6 m wide and 1.6 m in height, and faces south-east. Five stone artefacts are located at the site. The site card is accurate.

### *FRC 321*

The site is an art shelter with artefacts and deposit located beside a drainage line under a ridgeline, directly below FRC 320. The shelter is 13 m in length, 1.6 m wide, 3 m in height and faces south-east. Two indeterminate charcoal drawings are present and five stone artefacts. Of the five stone artefacts identified four are quartz bipolar flakes. The art location differed to that recorded on the site plan. The shelter had been used by animals, evidenced by large numbers of droppings.

### *FRC 322*

FRC 322 consists of a petroglyph located 50 m to the west of Fire Road 9G close to where it begins to drop towards its end. It is 1.2 km west of the intersection of the Princes Highway and the Southern Freeway, and is located on an area of open sandstone near the road, which is 12 x 8 m in area. The site consists of a single petroglyph of a zoomorph, which is approximately 3m long. The sandstone is spalling near part of the petroglyph.

### *FRC 323*

FRC 323 is an artefact and deposit shelter, located on the eastern side of Waratah Rivulet about 200 m before the beginning of the stored water. It is under the fourth cliff line up from the rivulet and is approximately 100 m north-east of FRC 254. The shelter is 7 m in length, 6 m in width and 1.8 m in height, and oriented south-west. One grey chert flake is located at the site.

*FRC 324*

FRC 324 is a shelter with artefacts and deposit located under the third cliff line up from Waratah Rivulet, about 250 m from the beginning of the stored water. It is on the eastern side of the rivulet, just after the 90 degree bend. The shelter is 20 m in length, 4.2 m in width and 2 m in height, and oriented south-west. Artefacts located at the site included one pink silcrete flake and two white quartz bipolar cores. Shells are also present on the floor and include two turban shells and one turban fragment.

*FRC 325*

FRC 325 is an art shelter located immediately above the stored water on the eastern side of the main eastern tributary drainage line. The shelter is 7 m long, 3 m wide, 1.5 m in height and faces west. Three charcoal drawings were originally recorded.

*FRC 338*

FRC 338 is a single grinding groove site located approximately 1.1 km south of the junction between Fire Road 9H and 9E and 200 m north of a drainage line.

*FRC 339*

FRC 339 contains two grinding grooves and is located approximately 1.1 km south of the junction between Fire Road 9H and 9 E and 200 m north of a creekline.

*FRC 340*

This site is located under the second sandstone outcrop west of the Woronora Reservoir. The site is a rock shelter 12 m in length, 2 m in height and 2 m in width. The original site card described 10 charcoal drawings found on the back wall of the shelter; eight discernable drawings are present at the site, although one is obscured due to water runoff.

*FRC 342*

FRC 342 is an open artefact scatter located approximately 400 m east of the Fire Road 9E right angle bend, approximately 1.4 km from the Fire Road 9 and 9E intersection. It is 950 m due south of the Fire Road 9E track and just west of a small drainage line running south into Waratah Rivulet. The site is 20 m out from a large cliff line running west-east, and is 1 m long and 1 m wide. The site consists of a silcrete pebble chopper with flakes removed.

*FRC 343*

FRC 343 is a shelter with artefacts and deposit located approximately 150 m north of the large tributary to Waratah Rivulet that is just north of Fire Road 9H, and under a small sandstone outcrop to the north side of the drainage line. The shelter is 6 m in length, 2 m in width and 1.2 m in height, and oriented south-east. Seventeen artefacts are located at the site, such as two dark grey chert flakes, and three white quartz bipolar flakes.

*FRC 344*

FRC 344 is a shelter with artefacts and deposit located 250 m south-east of Fire Trail 9E from a point 500 m from its end. It is at the edge of a large south-west protrusion, and is under the cliff line at the end of the protrusion. The shelter is 6 m in length, 3.8 m in width and 1.2 m in height, and oriented east. Artefacts located in this shelter included one pink silcrete flake, and one grey chert core, as well as a bone fragment found on the floor.

*FRC 345*

FRC 345 is a shelter with artefacts and deposit located beneath a ridgeline on the eastern side of Fire Road 9E and 150 m south-east of the road. The shelter is 7 m in length, 3 m in width, 1.1 m in height and is oriented south-east. Five artefacts were originally recorded.

*MET 1*

MET 1 is an art and artefact and deposit shelter, located approximately 500 m south-east of the intersection of Fire Trails 9J and 9G. The shelter is below a sandstone platform. The shelter contains red ochre hand stencils, and artefacts located included eight microliths on the surface of the shelter's floor deposit.

*MET 2*

MET 2 is a grinding site located on a sandstone platform 60m west of Fire Road 9C, 200 m north of the junction of Fire Roads 9C and 9G. MET 2 was identified and recorded as a new site during the August 2007 field work. MET2 contains two depressions that appear natural. These depressions appear to act to direct the water flow across the surface the rock platform in specific channels and may result in the affected areas being more suitable for grinding grooves. However the grinding grooves present on the rock platform are not situated within either of these depressions.

*NEW 1*

NEW 1 is a single grinding groove site located on the south-east end of a sandstone outcrop on a the ridge top approximately 300 m west by north-west of the unnamed fire road that runs west of the Princes Highway and 200 m south-south-east of NEW 2. The site is approximately 35 m in length and 20 m wide. The grinding groove is 25 cm in length, 8 cm wide and 1 cm in depth.

*NEW 2*

NEW 2 is an art shelter with artefacts and deposit and grinding grooves located on the highest sandstone outcrop on the slope down from the ridge top on the eastern side of the north-west running ridge that starts at the T-intersection of the unnamed fire roads west of the Princes Highway. The shelter is 40 m long, 7.2 m wide, 5.5 m high and faces north-east. The art consists of 156 motifs, five of which a red ochre. Ninety-four of the motifs are a single unidentified charcoal symbol. Three artefacts and nine grinding grooves are also located at the site. The condition of the art has deteriorated significantly (since originally recorded) with only a small percentage of the originally described art identifiable.

*NEW 9*

The site is an art shelter located below a ridgeline approximately 450 m south-west of Woronora Reservoir on the eastern side of a rock outcrop that runs north-south. The shelter is 6 m in length, 1.4 m wide and 1.4 m in height. It is oriented north-east. Nine charcoal drawings and a single artefact are located at the site. The site card is accurate.

*NEW 10*

NEW 10 is an art shelter located on the first ridgeline below the ridge top, 100 m west of the unnamed fire road west of the Princes Highway. The shelter is 20 m long, 1.6 m wide, 1 m in height and is oriented south-west. The art consists of five red ochre drawings and 13 charcoal drawings.

*NEW 15*

NEW 15 is an art shelter located below the second ridgeline down from the plateau approximately 45 m south-west of Woronora Dam Road and 20 m from of NEW 9. The shelter is 16 m long, 4.6 m wide, 4.6 m in height and faces east. A single charcoal indeterminate drawing was originally recorded. The condition of the art is considered very poor.

*NEW 16*

NEW 16 is a shelter with artefact and deposit located below the second ridgeline from the ridge top and 20 m south of NEW 15 along the same contour. The shelter is 7 m long, 2 m wide, 1.6 m in height and faces east. The site contains a single stone artefact.

*NEW 17*

NEW 17 is an art shelter with artefacts and deposit located under the third sandstone outcrop up from a small drainage line that runs north-east south-west. The shelter is 38 m long, 6 m wide and 4.6 m in height. It is oriented south. The art consists of 23 motifs including red ochre and multi-chromatic drawings. Thirty-one artefacts were also originally recorded. A build-up of leaf litter is present around the drip line. The site also contains an ochre deposit. In addition, it was noted that the back panel of the shelter was not recorded previously.

*NEW 18*

NEW 18 is a grinding site located in a gully 500 m south-west of the Woronora Dam Road, approximately 150 m from the top of the ridge. A single grinding groove is located below a small depression in the centre of the site.

*NEW 19*

NEW 19 is an art shelter with artefact and deposit located approximately 750 m south-east of the Woronora Dam Road. It is opposite a small inlet in the stored water, and is under the second cliff line up from the stored water. Art is present under a low ceiling in the centre of the shelter, consisting of three indeterminate charcoal drawings in poor condition. A pink quartz flake artefact is located at the site.

*NEW 20*

NEW 20 is an art shelter located on the west side of the Woronora Reservoir, approximately 900 m west of the Woronora Dam Road, under the lowest large sandstone outcrop up from the Woronora Reservoir. The shelter is 12 m in length, 2.7 m in width and 3.8 m in height, and oriented south-west. The art present consists of four outline and infill indeterminate drawings and one charcoal indeterminate, and the condition of the art is considered fair to poor.

*NEW 22*

The site is a shelter with artefacts and deposit located approximately 600 m north-east of the intersection of Woronora Dam Road and the Princes Highway under the first sandstone outcrop down from the drainage line. The shelter is 7 m in length, 2.1 m in width and 1.8 m in height, and faces north.

*NT 3*

This site is a shelter located at the end of Fire Road 9D down from the first small sandstone outcrop and contains both art and archaeological deposit. The shelter is 14.6 m long, 3.8 m wide and 1.4 m high, and faces north-east. The art consists of 10 areas of indeterminate charcoal drawings. Earlier survey had recorded 16 charcoal human figure drawings, none of which are now clear. Two artefacts are present along the drip line. There is potentially more art visible than that originally recorded. Aside from the potential for more art to be recorded, the original site card is accurate.

*NT 4*

2-0619 is an art shelter located 300m south-west of the end of Fire Road 9D under the second ledge down from the road. The shelter is 13 m in length, 3 m in width and 1.65 m in height, and oriented west. Water is available 30 m to the south. Artefacts of quartz and shell portions of Sydney cockle and a fresh water pippi 2 cm long are located at this site. A large boulder is present and runs nearly the whole length of the shelter. The site contains copious art, including 17 charcoal indeterminate drawings, white ochre hand stencils and red and white ochre drawings. This art is present on both the walls and the roof. Both the walls and roof are smoke blackened and art is located in areas where this blackening has flaked off.

*NT 5*

NT 5 is an art shelter with artefacts and deposit and is located approximately 350 m west of Fire Road 9D. The shelter is 13 m in length, 4.2 m in width, 3.5 m in height and faces north-west. Artefacts present include quartz and fossilised wood. This site contains charcoal and red ochre drawings.

*NT 6*

NT 6 is located 185 m west of NT 9. Four of the 10 indeterminate charcoal drawings recorded in the site card are located on a panel approximately 4.5m wide at the western end of a rock shelter. The shelter shows signs of exfoliation from a bushfire that has gone through area. Approximately 16 of the 35 artefacts recorded in the site card are located along the dripline, which is predominately covered in leaf litter. These included a grey silcrete core and a variety of silcrete, quartz and tuff flaked debitage.

*NT 7*

NT 7 is located approximately 185 m north-east of NT 6. Three grinding grooves are located on a rockcrop along the drainage line, approximately 13 m upstream from a larger outcrop. The site card is accurate.

*NT 8*

NT8 is located approximately 180 m north-east of NT 7. NT 8 is located on a rock outcrop in a flowing drainage line. An engraved zoomorph (recorded as a kangaroo) and over 20 grinding grooves are located at the site. Four rock petroglyphs are also present at the site. These petroglyphs included an extra indeterminate petroglyph on Panel 1 in close proximity to the zoomorph (kangaroo) and three anthropomorphic/zoomorphic figures on Panel 2. GPS readings have been taken for each of the site features and a GPS track log taken of the approximate rock outcrop extent. This site is listed on the Register of National Estate as Place ID 13683.

*NT 9*

NT 9 is a rockshelter overlooking the Woronora Reservoir with one indeterminate charcoal drawing on the roof of the shelter and multiple artefacts in the dripline. NT 9 is located approximately 80 m north-east on the eastern side of a drainage line, directly below the ridgeline. The site card details are accurate but not all of the artefacts have been relocated. The sandstone showed signs of chemical weathering and much of the back wall of the shelter is covered in a black micro-organism or moss that made identification of any charcoal drawings difficult.

*NT 10*

The site is an art shelter with artefacts and deposit located 200 m west of Fire Road 9D. It is 17 m in length, 3.5 m in width and 2.2 m in height, and oriented west. Forty-eight artefacts are present in an area 20 m square, and consisted of chert, quartz, petrified wood, and jasper. The art consisted of one charcoal drawing of semicircular lines.

### *NT 11*

NT 11 is an art shelter located under a ridgeline on the western side of a drainage line that runs from the junction of Fire Road 9D and 9E to the north-east of Fire Road 9E into the Woronora Reservoir. The shelter is 15 m long, 2.3 m wide and 1.8 m high. It is oriented east. The art consists of 24 motifs; 23 charcoal drawing and one white drawing.

### *NT 12*

NT 12 is an open site consisting of 33 grinding grooves and some well preserved petroglyphs located east of Honeysuckle Creek. This site is listed on the Register of National Estate.

### *NT 17*

NT 17 is a grinding groove site located on a sandstone outcrop in the bed of a small drainage line 400 m west of the end of Fire Road 9D. The site consists of 50 grinding grooves and a water channel around a pothole.

### *NT 18*

NT 18 is an art shelter located 300 m north-east of NT 3. The shelter is located 44 m from the previous co-ordinates recorded. The shelter is 22 m in length, 4 m in width, 4 m in height and is oriented north-west. One drawing is present at the site. The condition of the art is considered poor.

### *NT 19*

The site is an art shelter located in the first ridgeline to the west above the Woronora Reservoir. The shelter is 9 m in length, 2 m in width and 1.7 m in height, and faces north-east. The art present consists of charcoal drawings on the back wall, and includes one outline and infill kangaroo, three indeterminate drawings on the lower back wall and two indeterminate drawings on the upper back wall. The original site card is accurate.

### *NT 21*

The site is a grinding site located on a sandstone outcrop approximately 15 m above a pool. The site consists of ten grinding grooves in an area approximately 15 m by 4 m.

### *NT 22*

The site is a shelter located under a prominent sandstone outcrop near a large swamp between Honeysuckle Creek and a drainage line north of Fire Road 9D that flows north-east into Woronora Reservoir. The shelter is 3.5 m in length, 2.5 m in width and 2 m in height. It oriented south-west into a swamp. Artefacts present include a large quartzite core, which is 5 cm across.

*NT 23*

NT 23 is an art and artefact and deposit shelter located high up on the ridge. It is 4 m in length, 4 m in width and 4 m in height. Water drips from either end of the shelter and in heavy rain would flow over the floor from the northern end. Numerous artefacts located at the site, and the art consists of four charcoal figures in the middle of the back wall.

*NT 29*

NT 29 contains two grinding grooves and is located on a narrow winding sandstone drainage line formation through a thick scrub swamp. The size of the outcrop is 3 m by 5 m.

*NT 33*

The site is an art shelter with artefact and deposit located below a ridgeline 400 m south-west of the end of Fire Road 9E and 150 m south-east of a drainage line parallel to and north of Fire Road 9E. It is 50 m south-west of FRC 34. The shelter is 12 m in length, 3 m wide, 3 m in height and is oriented north-west. The art consists of one red ochre drawing and three charcoal indeterminate drawings. A single artefact was originally recorded. The condition of the art is considered poor with weathering noticeably affecting the motifs.

*NT 34*

NT 34 is an art shelter with artefacts and deposit located on the second ridgeline down from Fire Road 9E, 350m south-west of the end of Fire Road 9E and 150 m south-east of the drainage line that runs parallel and to the north of Fire Road 9E. It is 50 m north-east of FRC 33. The shelter is 14 m long, 3 m wide, 2.6 m in height and faces north-west. The art consists of five red hand stencils and six indeterminate charcoal drawings. Five artefacts were originally recorded. Four charcoal drawings are present at the site. In addition, eight grinding grooves are located on a boulder at the south-west end of the shelter.

*NT 35*

NT 35 is an art shelter with artefact and deposit located below a ridgeline, approximately 400 m south-west of the end of Fire Road 9E and 80m north-west of FRC 34. The shelter is 12 m long, 3.6 m wide, 1.7 m in height and faces north-west. Three charcoal drawings and a stone artefact were originally recorded. Two charcoal drawings and one artefact are present at the site. In addition, a grinding groove is present.

*NT 46*

NT 46 is located approximately 1 km south-west of the end of Fire Road 9D. Five grinding grooves and a permanent water hole are present as a PAD on a rock outcrop through which a drainage line flowed east to west. The site is located and described accurately on the site card but new measurements have been taken of the rock outcrop with grinding grooves.

*NT 52*

NT 52 contains grinding grooves in groups around potholes in an area of approximately 25 m by 20 m. This site also contains a water channel that directs water away from two of the potholes to a sandstone ledge below the site.

*NT 53*

NT 53 is located downstream from NT 51. This site contains grinding grooves and covers an area of approximately 15 m by 8 m.

*NT 54*

The site is an art shelter with artefact and deposit, and is located 200 m up from a bend in the drainage line on the left bank. The shelter is 14 m in length, 3 m in width and 2.25 m in height, and oriented south. The art consists of red ochre figures and some red ochre indeterminate drawings. Artefacts include a 2.5 cm thick black chert artefact found on the floor.

*NT 74*

NT 74 is a shelter with artefacts and deposit located 60 m from a small drainage line that flows over a small waterfall into the Woronora Reservoir. The shelter is 20 m in length, 3 m in width, 2.5 m in height and is oriented east. Two artefacts are located above the dripline on a rock edge and at the north-west entrance of the shelter.

*NT 75*

NT 75 is a shelter with artefacts and deposit located approximately 30 to 40 m north-east of NT 74, on the western side of the Woronora Reservoir. The shelter is 20 m long, 3 m wide, 2.5 m in height and faces south-east. Quartz fragments are located along the dripline concentrated at the south-west entrance, situated between two large rocks.

*NT 76*

The site is a shelter located approximately 450 m east of Honeysuckle Creek, and is approximately 100 m above the stored water on the first ledge. The shelter is 7 m in length, 3 m in width and 3 m in height, and oriented east. Artefacts located at the site included a quartzite artefact and some jasper chips on the floor.

*NT 78*

NT 78 is an art shelter located approximately 100 m north-west of the junction of the first drainage line north of Fire Road 9E with Waratah Rivulet. It is 100 m up from the stored water. The shelter is 5 m in length, 2.4 m in width and 1.3 m in height, and oriented east. The art consists of two charcoal indeterminate drawings at the rear of the sloping ceiling.

*NT 79*

NT 79 is an art shelter located on the western side of the Woronora Reservoir on the north side of Fire Road 9E. It is approximately 20 m above the high water mark, and is located under the bottom sandstone outcrop. The shelter is 7m in length, 1.9 m in height and 2.2 m in width, and oriented north-east. The art is in a fair condition and consists of two indeterminate charcoal drawings on the rear wall and four red ochre hand stencils on the ceiling, along with two patches of red ochre.

*NT 80*

NT 80 is a shelter with artefacts and deposit located approximately 150 m north-west of the large drainage line running north-east into the Woronora Reservoir south of Fire Road 9D. NT 80 is located under a sandstone outcrop 180 m from the stored water. The shelter is 17 m in length, 4 m in width and 1.8 m in height, and oriented north-east. The deposit is 35 cm in depth and is loamy sand. Two artefacts are present at this shelter, consisting of one quartz and one chert artefact.

*NT 81*

The site is a shelter located west of the Woronora Reservoir under the first ridgeline that contains artefacts and deposit. The shelter is 26 m in length, 10 m in width and 1.7 m in height, and faces east. The shelter contains evidence of a water channel flowing through the shelter. The original site card is accurate.

*NT 85*

NT 85 is an art shelter with potential archaeological deposit located approximately 50 m fro the Woronora Reservoir and 650 m north of the end of Fire Road 9D. The shelter is approximately 23 m in length, 3 m wide, 3.6 m high and faces south-east. NT 85 contains one charcoal drawing of a kangaroo.

*NT 86*

NT 86 is a shelter with artefacts and deposit. The site is located on the southern side of the second tributary to the east of where Honeysuckle Creek enters the Woronora Reservoir. The shelter is approximately 6 m in length, 3.4 m wide, 2.5 m high and faces north-west. Artefacts present include a black chert flake, a red-brown silcrete flake and a white quartz flake.

*PAD 2*

PAD 2 is a shelter with potential archaeological deposit located 90 m south of Fire Road 9C and 90 m north of a small drainage line that flows into the Waratah Rivulet. It is 770 m east by north-east of the junction of Fire Roads 9C and 9H. The shelter is 10 m in length, 4 m in width and 1.5 m in height.

*PAD 3*

PAD 3 is a shelter with potential archaeological deposit is located approximately 50 m north of Fire Road 9C and 200 m north of the junction of Fire Roads 9H and 9C.

*2-0346*

2-0346 is an art and artefacts shelter located approximately 350 m east of the Princes Highway to the south of the Garrawarra Centre. The site contains charcoal indeterminate drawings and artefacts. The shelter is oriented west.

*Other*

No Aboriginal heritage sites were recorded by the surveys undertaken in the Camp Creek emplacement area. During the August 2007 survey, a tree was identified with three horizontal markings of indeterminate origin. The Northern Illawarra Aboriginal Collective commented in the field that that the tree may be an Aboriginal birthing tree however has since indicated that it is in fact not a birthing tree. Comments received from the Northern Illawarra Aboriginal Collective on the draft version of this ACHA (extracts provided in Section 5 and a full version provided in Appendix 5) indicate that two other trees, one located near FRC 279 and one located at FRC 265, in the study area bear "likely birth-marks". The Northern Illawarra Aboriginal Collective further comment that:

> "*Jean Carriage, late mother of Allan Carriage, taught that cuts were made in trees when a child was born. A longer cut was made for male babies. As the tree grew and children were born these marks would indicate the number and gender of children born to a particular family*".

Based on the above, it is recommended in Sections 9.1 and 10 that the origin of these marks be further investigated (and recorded as required) as part of future field work (e.g. as part of existing and future Aboriginal monitoring programs, additional fieldwork undertaken as part of future SMP applications etc.). Should it be agreed (by a suitably qualified archaeologist and/or arborist in consultation with the Aboriginal community) that the trees contain markings of Aboriginal origin, they should be recorded appropriately and registered with the DECC.

The Northern Illawarra Aboriginal Collective also include in their comments on the draft version of this ACHA, a description of a potential new Aboriginal heritage site located proximal to NT 4 (2-0619) and NT 17 (2-0629). They describe this potential Aboriginal heritage site as a "*possible cairn, comprising a central large stone surrounded by smaller ones that may have been disturbed*".

Based on the above, it is suggested in Sections 9.1 and 10 that this stone arrangement be further investigated (and recorded as required) as part of future field work (e.g. as part of existing and future Aboriginal monitoring programs, additional fieldwork undertaken as part of future SMP applications etc.). Should it be determined (by a suitably qualified archaeologist in consultation with the Aboriginal community) that the trees contain markings of Aboriginal origin, they should be recorded and registered with the DECC.

## 6.2. Observed Condition of Aboriginal Heritage Sites

From a review of the AHIMS site cards against current condition, sites are constantly subject to natural deteriorating processes unrelated to mining, including impacts from trees roots, natural weathering, rapid deterioration, natural cracking of sandstone and inappropriate visitor behaviour (Lambert, 1989).

*Impacts from Tree Roots*

- Site FRC 91 was noted to have tree roots growing through the roof of the shelter forcing the sandstone shelf to crack. This may reduce its structural integrity of the overhang or have a direct physical effect on this site.

*Natural Weathering*

- Substantial deterioration (including rockfall) of rock surfaces and art was noted at many of the sites within the study area (with some sites located away from current or previous mining areas). These sites include FRC 32, FRC 97, FRC 185, FRC 117, FRC 340, FRC 31, FRC 28, FRC 199, FRC 29, FRC 113, FRC 198, NT33, NEW 9, NT 18, FRC 127 FRC 28 and FRC 113.

- Types of deterioration noted included the fading of motifs of charcoal and ochre pigments, cracking of the shelter surface, granulation of the surface, seepage across motifs, and an increase in fungal growth obscuring motifs.

- Some sites with white drawings and stencils are showing rapid signs of natural deterioration, including FRC 127, FRC 28, FRC 113.

- Cracking of a shelter rear wall through art was observed at site NT 35 located approximately 3 km north of previous and current mining activities and hence is not considered to be related to mining.

*Inappropriate Visitor Behaviour*

- Inappropriate visitor behaviour has been observed throughout the study area during the field work including camping in overhangs and litter and evidence of recent camp fires in overhangs. Inappropriate visitor behaviour can also threaten rock art due to an increase in dust deposition on art surfaces, touching of the rock surfaces, etc.

- High quantities of graffiti were noted at sites FRC 62 and FRC 70, both of which have previously been recorded with a moderate to high archaeological significance. A notable deterioration of the art at these sites was observed during inspections when compared with existing AHIMS site cards.

## 6.3. Other Sites

The findings of the Strategic Inquiry into Underground Coal Mining in the Southern Coalfield have recently been published *viz. Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield Strategic Review* (DoP, 2008). This report recommends that environmental assessments for projects lodged under Part 3A include identification and assessment of all natural features located within 600 m of the edge of proposed longwalls (*ibid*). To this end, an additional 61 Aboriginal heritage sites have been identified, assessed for their archaeological significance and assessed for potential impacts resulting from the Project. The abovementioned report was released on 10 July 2008 after this ACHA had been finalised. As such, the identification and assessment of these additional 61 sites is provided in Appendix 8 only.

# 7. ARCHAEOLOGICAL AND CULTURAL SIGNIFICANCE ASSESSMENT

## 7.1. Archaeological Significance

Some Aboriginal heritage sites within the study area consist of as little as one stone artefact or one charcoal marking in a sandstone overhang compared to an area where multiple artworks are present using multiple application techniques. Similarly, some sites consist of more than one type of archaeological evidence, for example, some sites contain artwork and artefacts, or painted artworks and grinding grooves. These sites are called multi-component sites, that is, they consist of more than one component or type of archaeological material. These site types represent a more diverse assemblage of archaeological material that has been taken into account in the archaeological significance assessment. Notwithstanding, sites may still be of high significance (based on other criteria) even if they are not multi-component sites.

The archaeological significance ratings for each of the 188 Aboriginal heritage sites within the study area are presented in Table 2[2], while Table 3 provides further information on Aboriginal heritage sites ranked as having a high archaeological significance. Appendix 7 provides the individual significance ratings for each of the four criterion (i.e. scientific, aesthetic, social and historical) for each Aboriginal heritage site within the study area that were used to determine the overall ratings provided in Table 2. As indicated in Section 6, all Aboriginal heritage site types recorded within the study area are represented elsewhere on the Woronora Plateau.

Five Aboriginal heritage sites within the study area, viz. FRC 12, FRC 24.1, FRC 24.2, FRC 31 and NT 8 are listed on the Register of the National Estate. Nine Aboriginal heritage sites are deemed to be of high archaeological significance (i.e. FRC 12, FRC 32, FRC 62, FRC 68, FRC 185, FRC 191, FRC 195, FRC 322 and NEW 2) with 23 and 156 deemed to be of moderate and low archaeological significance, respectively (Tables 2 and 3).

As provided on Figure 2, numerous Aboriginal heritage sites/places are located in areas surrounding the study area. Proximal Aboriginal heritage sites/places of particular note include nine that are listed on the Register of the National Estate with five of these located within protected areas (i.e. the Royal National Park and Dharawal State Conservation Area). These nine sites/places include Cobbong Creek Area (Place ID 13675) (Dharawal State Conservation Area), Cubbitch Barta National Estate Area (Place ID 100633), Curracurrang Area (Place ID 3333) (Royal National Park), East Woronora Area (Place ID 13686), Flat Rock Swamp Area (Place ID 13702), O'Sheas Crossing Area (Place ID 13676) (Dharawal State Conservation Area), Stokes Creek Area (Place ID 13673) (Dharawal State Conservation Area), Uloola Area (Place ID 13671) (Royal National Park) and the West Woronora Area (Place ID 13670) (Commonwealth Department of the Environment, Water, Heritage and the Arts, 2008).

[2] Following peer review of this ACHA in July 2008, Appendix 7 has been included to present the archaeological significance ratings for each of the criterion used to determine the overall archaeological significance of each site provided in Table 2.

| Archaeological Significance Rating | Site Code | Number of Sites |
|---|---|---|
| High | FRC 12, FRC 32, FRC 62, FRC 68, FRC 185, FRC 191, FRC 195, FRC 322, NEW 2 | 9 |
| Moderate | FRC 13, FRC 22, FRC 24.1, FRC 24.2, FRC 28, FRC 31, FRC 57, FRC 70, FRC 72, FRC 85, FRC 97, FRC 113, FRC 139, FRC 272, FRC 305, NEW 10, NEW 17, NT 5, NT 8, NT 11, NT 17, NT 34, NT 52 | 23 |
| Low | FRC 11, FRC 14, FRC 15, FRC 16.1, FRC 16.2, FRC 17, FRC 20, FRC 21, FRC 23, FRC 25, FRC 26, FRC 29, FRC 30, FRC 33, FRC 34, FRC 40, FRC 44, FRC 45, FRC 46, FRC 52, FRC 55, FRC 59, FRC 60, FRC 61, FRC 63, FRC 67, FRC 71, FRC 76, FRC 77, FRC 78, FRC 86, FRC 87, FRC 90, FRC 91, FRC 93, FRC 94, FRC 95, FRC 96, FRC 101, FRC 105, FRC 114, FRC 115, FRC 117, FRC 119, FRC 124, FRC 125, FRC 127, FRC 133, FRC 138, FRC 160, FRC 164, FRC 168, FRC 169, FRC 171, FRC 172, FRC 176, FRC 180, FRC 184, FRC 186, FRC 187, FRC 189, FRC 193, FRC 194, FRC 198, FRC 199, FRC 201, FRC 203, FRC 208, FRC 253, FRC 254, FRC 266, FRC 267, FRC 268, FRC 269, FRC 270, FRC 271, FRC 273, FRC 274, FRC 275, FRC 276, FRC 277, FRC 278, FRC 279, FRC 280, FRC 281, FRC 283, FRC 284, FRC 285, FRC 301, FRC 302, FRC 304, FRC 306, FRC 307, FRC 308, FRC 309, FRC 310, FRC 311, FRC 312, FRC 313, FRC 314, FRC 315, FRC 316, FRC 317, FRC 319, FRC 320, FRC 321, FRC 323, FRC 324, FRC 325, FRC 338, FRC 339, FRC 340, FRC 342, FRC 343, FRC 344, FRC 345, MET 1, MET 2, NEW 1, NEW 9, NEW 15, NEW 16, NEW 18, NEW 19, NEW 20, NEW 22, NT 3, NT 4, NT 6, NT 7, NT 9, NT 10, NT 12, NT 18, NT 19, NT 21, NT 22, NT 23, NT 29, NT 33, NT 35, NT 46, NT 53, NT 54, NT 74, NT 75, NT 76, NT 78, NT 79, NT 80, NT 81, NT 85, NT 86, PAD 2, PAD 3, 2-0346 | 156 |

Table 2: Archaeological Significance Ratings for Aboriginal Heritage Sites within the Study Area

| Site Name | Site Type | Reason for High Significance Assessment |
|---|---|---|
| FRC 12 | Open Site | The motif at this site is rare, visibility of abraded petroglyph is very good by comparison to others nearby |
| FRC 32 | Open Site | This site has an exceptionally high number of grinding grooves for the study area n=65. |
| FRC 62 | Sandstone Overhang | Art covers an area of about 11 x 3 m, with a number of motifs over 1 m. It is a multi-component site accompanied by seven grinding grooves and 5 flaked stone artefacts, of chert, silcrete and quartz materials. |
| FRC 68 | Sandstone Overhang | This art panel is of importance because it has a stencil of an axe head, which is rare in the study area; it is accompanied by 7 hand stencils as well as artefacts of quartz, silcrete and chert. |
| FRC 185 | Sandstone Overhang | This artwork has an extensive picture panel around 16 m long and 3 m high. Some motifs are large and fairly well preserved although some are very faded. |
| FRC 191 | Sandstone Overhang | This artwork has a motif that appears to be related to a creation myth, it therefore is of significant value on a mythological basis. |
| FRC 195 | Sandstone Overhang | This panel has images extending over 14 m long and around 2 m high. It has many (64) human figures and a variety of animals depicted. |
| FRC 322 | Open Site | This site is important because rock petroglyphs are relatively rare in the study area. |
| NEW 2 | Sandstone Overhang | Artwork extends over an area 7 m wide and around 5.5 m high, some unique motifs as well as large motifs (over 1 m high). Site also contains three artefacts and nine grinding grooves. Site is of high significance even though the artwork has deteriorated significantly since its original recording. |

Table 3: Aboriginal Heritage Sites of High Archaeological Significance within the Study Area

## 7.2. Cultural Significance

Consultation with representatives of the Aboriginal community regarding the cultural significance of the study area and known Aboriginal heritage sites with the study area has been undertaken during the various surveys and site inspections undertaken at Metropolitan Colliery (Sections 3.4 and 4).

Aboriginal heritage sites within the study area and surrounds that have previously been identified as being of specific cultural interest to some Aboriginal community representatives include FRC 3 and FRC 4 (both located outside the study area), FRC 12, FRC 22, FRC 24.1, FRC 24.2 and FRC 26 (located within the study area) (C. E. Sefton Pty Ltd, 2004; HCPL, 2006). During the various recent surveys and site inspections undertaken in 2006 and 2007 (Sections 3.4 and 4), FRC 12 was noted by members of the Aboriginal community (i.e. representatives of the Woronora Plateau Gundungara Elders Council, La Perouse Botany Bay Aboriginal Corporation, Wadi Wadi Coomaditchie Aboriginal Corporation, Northern Illawarra Aboriginal Collective, KEJ Tribal Elders Corporation, Tharawal Local Aboriginal Land Council, Cubbitch Barta, Illawarra Local Aboriginal Land Council and Mr Gary Caines) as being of particular cultural significance. It was indicated that all Aboriginal heritage sites (both known and unknown), when considered collectively as a 'bundle', are culturally significant.

The Illawarra Local Aboriginal Land Council previously commented (in regard to part of the study area) that: "*This Traditional Site is of great importance to Aboriginal people; this land that is visited by our Ancestors must be preserved and protected*".

The Northern Illawarra Aboriginal Collective previously commented indicated that "*more than fifty documented traditional stories of country (some from this exact place*)" had been recorded nearly a century ago, "*making it clear that the very landscape itself, its flora and fauna, its water and earth, are all Traditional Materials (as defined in S203FCA of the Native Title Act [Commonwealth] 1993) having spiritual cultural and heritage values for Traditional Owners*".

The Tharawal Local Aboriginal Land Council commented that "*Aboriginal heritage sites provide evidence of our ancestry and links to past occupation. TLALC considers all Aboriginal heritage to be important to our people*".

In addition, it has previously been noted by representatives of Northern Illawarra Aboriginal Collective that some of the motifs within Aboriginal heritage sites FRC 4 (located outside the area) and FRC 11 (located within the study area) were of fish, molluscs and shells that may indicate a relationship between the previous Aboriginal inhabitants and the ocean. Northern Illawarra Aboriginal Collective representatives previously indicated that this connection was further exampled by the presence of shells and shell fragments within sites FRC 7 and FRC 265 (both located outside the study area) (*ibid.*).

In relation to the cultural significance of specific Aboriginal heritage sites, the following comments were made by Aboriginal groups/parties during the 2007 surveys or in formal comments provided in regard to the draft version of this ACHA:

- Cubbitch Barta suggested that NT 8 is of particular cultural significance as it may have been used as a teaching site.
- A representative of Cubbitch Barta indicated that the kangaroo petroglyph at NT 48 is a 'pointer' and the ill-defined petroglyph depicts a 'clever man'.
- Mr Gary Caines commented that FRC 62 was of cultural significance as it was a large shelter suitable as a good teaching site and shelter.
- FRC 185, FRC 198 and FRC 340 were identified by some Aboriginal representatives (i.e. representatives of the Woronora Plateau Gundungara Elders Council, La Perouse Botany Bay Aboriginal Corporation and Mr Gary Caines) as desirable in terms of their proximity to waterways and NT 9 and FRC 340 were identified as having a desirable aspect.
- The Northern Illawarra Aboriginal Collective indicated *"that NT 8, NT 48[3], FRC 62, FRC 185, FRC 340, NT 9, NT 46, FRC 316, NEW 1, NEW 17, and NT 35 were of special significance for various reasons*.....and that ..... *All these sites are important because they collectively represent the lives and culture of past people – the material remains. Such evidence of the vibrant lives of these peoples is also important spiritually, culturally, and scientifically to any humane and progressive society – especially one that has apologised to its Aboriginal people*".
- The cultural significance of some sites (i.e. NT 46 and FRC 316) was noted by a representative of Cubbitch Barta due to the presence of "Bush tucker" in the vicinity of the sites.
- A representative of the Wadi Wadi Coomaditchie Aboriginal Corporation indicated that the linkages between rock pools at NEW 1 are of cultural significance as each pool represents a different stage in a particular task (e.g. washing).
- A representative of the Wadi Wadi Coomaditchie Aboriginal Corporation indicated that the sandstone overhang at NEW 2 was a spiritual shelter as it contained artwork depicting a spiritual man.
- A representative of the Wadi Wadi Coomaditchie Aboriginal Corporation indicated that NEW 17 was a possible men's site.
- The cultural significance of FRC 316 was noted by Mr Gary Caines as it contains "several square metres of living area" and 'furniture'.

[3] NT 48 is not located within the study area and will not be impacted by the Project. As such, this site is not discussed further.

- A representative of the Woronora Plateau Gundungara Elders Council indicated that the artwork at NT 35 depicting a large wallaby was of cultural interest.
- The Northern Illawarra Aboriginal Collective indicated that markings on a tree within the study area may be of Aboriginal origin and represent the birth of individual children.
- Mr Gary Caines indicated that grinding grooves are common in the area and are usually found near water.

Based on the above, the Aboriginal community consider all sites to be of some cultural significance. However, sites within the study area specifically identified by the Aboriginal community for their cultural significance include FRC 12, FRC 22, FRC 24.1, FRC 24.2, FRC 26, FRC 62, FRC 185, FRC 198, FRC 316, FRC 340, NT 8, NT 9, NT 35, NT 46, NEW 1, NEW 2 and NEW 17. Due to their particular cultural significance, these sites have been considered for the development and implementation of mitigation measures described in Section 9.3.

# 8. NATURE OF PREDICTED IMPACTS FROM THE PROJECT

The Project has the potential to impact Aboriginal heritage directly via general surface disturbance and indirectly via mining induced subsidence movements. The Project also has the potential to exacerbate some existing natural deterioration processes such as those observed during field surveys and described in Section 6.2 (e.g. cracking of sandstone and rockfall).

Project activities that may result in direct disturbance of Aboriginal heritage are further described in Section 2 of the Project Environmental Assessment and include:

- exploration works;
- installation of surface infrastructure (such as groundwater monitoring bores and ventilation systems);
- construction and/or management of access tracks required for the installation/maintenance of surface infrastructure;
- undertaking subsidence monitoring;
- undertaking subsidence remediation works; and
- undertaking surface rehabilitation works.

Potential subsidence impacts resulting from longwall mining in the study area have been assessed by MSEC (2007; 2008). MSEC (2007; 2008) has predicted the maximum potential subsidence effects within 20 m of the centre of each known Aboriginal heritage site. MSEC (2008) explains the conservative nature of these predictions as they are based on a conservative empirical methodology that takes into account a comprehensive data set of previously recorded subsidence magnitudes. Therefore, it is likely that subsidence effects will be less than the maximum predicted (MSEC, 2007; 2008). The predictions include subsidence resulting from the extraction of Longwalls 20 to 44, as well as the cumulative subsidence effect resulting from the previously extracted or approved longwalls (i.e. Longwalls 1 to 19A). A summary of the potential subsidence related impacts to Aboriginal heritage sites from the Project is provided below and a full description of the subsidence predictions and methods of calculation is provided in full in Appendix A of the Project Environmental Assessment.

Ground movements resulting from the extraction of longwalls are referred to as systematic subsidence movements. These movements are described by the following parameters (MSEC, 2008):

- Subsidence refers to vertical and/or horizontal movement of a specific location (i.e. how far down any point on the surface is expected to move). Subsidence is usually expressed in units of mm.
- Tilt is the change in the slope of the ground as a result of differential subsidence (i.e. how much any given area is expected to lean or tip). Tilt is usually expressed in units of millimetres per metre (mm/m). A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %.

- Strain is the change in horizontal distance between two points on the ground, divided by the original horizontal distance between them. Strain is dimensionless and is typically expressed in units of mm/m:
  - Tensile Strains occur where the distance between two points increases (i.e. stretching).
  - Compressive Strains occur where the distance between two points decreases (i.e. squashing).

Subsidence resulting from the proposed underground mining associated with the Project is expected to be similar in nature to the subsidence behaviour that has been experienced over previous longwall panels at Metropolitan Colliery (MSEC, 2007; 2008).

Table 4 provides the maximum potential subsidence, tilts and strains for Aboriginal heritage sites deemed to be of high archaeological significance (Section 7). Individual predictions for each known Aboriginal heritage site within the study area are provided in Appendix 6.

| Site No | Site Type | Maximum Predicted Subsidence (mm) | Maximum Predicted Tilt (mm/m) | Maximum Predicted Strain (mm/m) | |
|---|---|---|---|---|---|
| | | | | Tensile Strain (mm/m) | Compressive Strain (mm/m) |
| FRC 12 | Open Site | 701 | 6.0 | 0.6 | 0.4 |
| FRC 32 | Open Site | 413 | 2.5 | 0.4 | 0.5 |
| FRC 62 | Sandstone Overhang | 452 | 4.1 | 0.5 | 0.6 |
| FRC 68 | Sandstone Overhang | 382 | 2.2 | 0.4 | 0.5 |
| FRC 185 | Sandstone Overhang | 363 | 3.8 | 0.8 | 0.3 |
| FRC 191 | Sandstone Overhang | 360 | 4.3 | 0.8 | 0.3 |
| FRC 195 | Sandstone Overhang | 353 | 6.0 | 0.6 | 1.4 |
| FRC 322 | Open Site | 486 | 2.4 | 0.4 | 0.3 |
| NEW 2 | Sandstone Overhang | 385 | 3.6 | 0.6 | 0.2 |

Source: MSEC (2007; 2008).

**Table 4: Maximum Predicted Subsidence Impacts at Aboriginal Heritage Sites with High Archaeological Significance**

*Open Sites*

Open sites identified within the study areas (i.e. grinding grooves and petroglyphs) can potentially be impacted by the cracking of sandstone resulting from mine subsidence (MSEC, 2008). The cracking of sandstone from mining related subsidence can result from two mechanisms, namely systematic tensile and compressive strains due to systematic movements, and compressive strains due to due to valley closure movements (ibid).

In regard to open sites (i.e. grinding grooves and petroglyphs), MSEC (2008) indicate that maximum predicted tensile strains greater than 0.5 mm/m may result in the cracking of sandstone and that maximum predicted compressive strains greater than 2.0 mm/m may result in the underlying strata to buckle, potentially cracking sandstone.

No open sites have a maximum predicted compressive strain greater than 2.0 mm/m (refer Appendix 6 and MSEC, 2007; 2008). As provided in Appendix 6, MSEC (2007; 2008) indicate that 17 of the 46 open sites within the study area are predicted to experience maximum predicted tensile strains greater than 0.5 mm/m, including one open site with a high archaeological significance rating (i.e. FRC 12[4]).

MSEC (2008) further indicate that it is therefore possible that mining induced subsidence associated with the Project could result in some cracking of exposed sandstone associated with open sites, particularly those located in drainage lines. However, as outlined above, the subsidence predictions are based on a conservative empirical methodology and it is therefore likely that subsidence effects will be less than the maximum predicted (MSEC, 2008). The predictions include subsidence resulting from the extraction of Longwalls 20 to 44, as well as the cumulative subsidence effect resulting from the previously extracted or approved longwalls (i.e. Longwalls 1 to 19A). MSEC (2008) also indicates that:

> "*Any fracturing of the exposed sandstone is expected to be isolated and of a minor nature, due to the relatively low magnitudes of the predicted strains and the relatively high depth of cover. The incidence of fracturing with the grinding grooves would, therefore, be considered low.*"

[4] This site has an existing Section 90 Consent (*issued under the National Parks and Wildlife Act, 1974*) for the mining of Longwalls 14-17.

*Sandstone Overhangs*

Sandstone overhang sites within the study areas (i.e. shelters with art and/or deposit and/or PAD and/or artefacts and/or grinding grooves and/or petroglyphs) can potentially be impacted by the cracking of sandstone, rock falls (resulting from mine subsidence or natural weathering processes) or water seepage through joints (which may impact artwork) (MSEC, 2008). MSEC (2008) indicate that the mechanisms which can potentially result in these types of impacts are curvatures, systematic tensile and compressive strains due to systematic movements and compressive strains due to valley closure (if the sandstone overhang is located within an incised drainage line).

In regard to sandstone overhangs (and similar to open sites), MSEC (2008) indicate that maximum predicted tensile strains greater than 0.5 mm/m may result in the cracking of sandstone and where cracking coincides with a sandstone overhang, may result in an isolated rockfall. As outlined by MSEC (2007; 2008) and presented in Appendix 6, fifty-one of the 142 sandstone overhangs within the study area have maximum predicted tensile strains greater than 0.5mm/m including four overhang sites of high archaeological significance (i.e. FRC 185, FRC 191, FRC 195 and NEW 2) (refer Table 4).

Therefore, the Project may result in cracking of sandstone and where cracking coincides with a sandstone overhang, may result in an isolated rockfall. As outlined above, the subsidence predictions are based on a conservative empirical methodology and it is therefore likely that subsidence effects will be less than the maximum predicted (MSEC, 2008). The predictions include subsidence resulting from the extraction of Longwalls 20 to 44, as well as the cumulative subsidence effect resulting from the previously extracted or approved longwalls (i.e. Longwalls 1 to 19A). MSEC (2008) also note that although impact is possible, based on experience in the Southern Coalfield, the likelihood of significant impact on sandstone overhang sites as a result of mining induced subsidence is low.

*Previous Monitoring and Risk Assessments*

Monitoring of approximately 41 Aboriginal heritage sites (subject to longwall mine subsidence) undertaken between 1995 and 2008 (by representatives of the Aboriginal community, C. E. Sefton Pty Ltd and Kayandel Archaeological Services) at the Metropolitan Colliery has identified that the majority of Aboriginal heritage sites had no observable change following mine subsidence, with observable change identified in six Aboriginal heritage sites. Changes to monitored Aboriginal heritage sites include (C.E. Sefton Pty Ltd, 2006b; Kayandel Archaeological Services, unpublished):

- FRC 4 (sandstone overhang with art) – an existing open bedding plane located at the ceiling/rear wall interface was observed to have opened slightly with some small weathered pieces (up to 100 mm by 60 mm) detached from the rear wall. The possibility remained that the change observed was a natural change in an actively weathering area. The changes observed did not threaten the art or the stability of the overhang.

- FRC 10 (sandstone overhang with art) – two observed cracks in the rear wall. One of the cracks had the potential to impact on the art by allowing seepage to flow over the art. In accordance with recommendations made by the archaeologist following a monitoring round, an artificial dripline was installed to divert water away from the art. Subsequent monitoring undertaken in 2008 indicates that these cracks have notably closed resulting in reduced seepage.
- FRC 11 (sandstone overhang with art) – rear wall damage including acceleration of natural exfoliation and block fall processes. The exfoliation and block fall is not currently threatening the artwork associated with the site.
- FRC 49 (sandstone overhang with art) – rear wall damage and minor block fall from the rear wall and ceiling.
- FRC 57 (open site with petroglyph and grinding grooves) – crack in sandstone platform away from petroglyph and grinding grooves. No further change noted in subsequent monitoring.
- FRC 152 (sandstone overhang with art) – rear wall damage including cracking along a bedding plane and block fall from the rear wall. No further change noted in subsequent monitoring.

Previous risk assessments of the potential impact on Aboriginal heritage sites from longwall mining have indicated that the risk to Aboriginal heritage sites varies depending on the nature and location of the site. Monitoring of Aboriginal heritage sites over previously mined areas in the Illawarra region has shown that larger overhangs are at greater risk, particularly where water seepage is present (C. E. Sefton Pty Ltd, 1996a, 1996b and 2004). The extent to which Aboriginal heritage sites may be affected is influenced by several factors such as overhang shape and size, seepage through bedding planes, the location of the Aboriginal heritage site in the landscape and its location with respect to the longwall and direction of mining (ibid).

As detailed above, impacts that have been recorded at the Metropolitan Colliery primarily relate to damage of the rear wall (e.g. cracking), however, this has not always resulted in impacts to associated features (e.g. Aboriginal artwork) (C. E. Sefton Pty Ltd, 2004, 2006b; and Kayandel Archaeological Services, unpublished). Whilst not part of a specific monitoring program, Caryll Sefton reports that she has observed the collapse of two wet overhangs (with one being an Aboriginal heritage site [FRC 149] with artefacts and archaeological deposit although no artwork) located in drainage lines above previous longwalls at Metropolitan Colliery (C. E. Sefton Pty Ltd, 2004).

Based on the above, it is expected that the majority of identified Aboriginal heritage sites would experience no significant change, particularly when compared to natural deteriorating processes unrelated to mining (Section 6.2) and the conservative nature of the subsidence predictions (MSEC, 2008). Recommended measures for the management of Aboriginal heritage sites within the study area are outlined in Section 9.

# 9. MANAGEMENT AND MITIGATION MEASURES

It is recommended that any management and mitigation measures implemented as part of the Project be developed in consultation with the Aboriginal community and build on existing programs currently implemented at the Metropolitan Colliery.

Section 9.1 outlines general management measures, Section 9.2 outlines a proposed monitoring program to monitor for subsidence related impacts to Aboriginal heritage sites and validate the subsidence predictions provided by MSEC (2007; 2008) for specific Aboriginal heritage sites. Section 9.3 outlines proposed mitigation measures to be implemented (in consultation with the Aboriginal community) at sites of either high archaeological significance (Section 7.1) or at sites of particular cultural significance (Section 7.2) (i.e. FRC 12, FRC 22, FRC 24.1, FRC 24.2, FRC 26, FRC 32, FRC 62, FRC 68, FRC 185, FRC 191, FRC 195, FRC 198, FRC 316, FRC 322, FRC 340, NEW 1, NEW 2, NEW 17, NT 8, NT 9, NT 35 and NT 46), and Section 9.4 outlines an ACHMP that should be developed to assist in the overall management of Aboriginal heritage at the Metropolitan Colliery.

## 9.1. General Management Measures

The below management measures have been developed based on the findings of recent field surveys/inspections and through consultation with the Aboriginal community. It is recommended that these measures be considered for implementation in consultation with the Aboriginal community and DECC in conjunction with future field work requirements should the Project be approved.

- Representatives of the Woronora Plateau Gundungara Elders Council, the Illawarra Local Aboriginal Land Council and Cubbitch Barta indicated during recent field work that they disagreed with the site cards' description of artwork at sites FRC93 and FRC198. These Aboriginal representatives suggested that the artwork does not depict a kangaroo as stated on the AHIMS site card. Further investigation should be undertaken (via additional site inspection and Aboriginal community consultation) into the recorded artwork descriptions.

- Based on requests from the Aboriginal community, it is recommended that additional fieldwork be undertaken (in consultation with the Aboriginal community) on a progressive basis across the Project area as part of future SMP applications. It is recommended that the scope of this additional fieldwork be developed as part of the Aboriginal Cultural Heritage Management Plan (Section 9.4) in consultation with the Aboriginal community.

- The condition of 13 Aboriginal sites recently inspected (i.e. FRC 28, FRC 29, FRC 31, FRC 32, FRC 57, FRC 62, FRC 63, FRC 117, FRC 194, FRC 253, FRC 276, NT 8, NT 46, and NEW 17) was noted to be reduced when compared to the existing AHIMS site cards (i.e. the artwork has been subject to natural deterioration since the site card was last updated). Updated site cards (including site plans) should be developed for these sites.

- It is recommended that the site card for FRC 57 be updated to include a recent site plan.

- It is recommended that two trees, one located near FRC 279 and one located at FRC 265, identified by Northern Illawarra Aboriginal Collective as bearing "likely birth-marks" be further investigated (via additional site inspection and Aboriginal community consultation) to determine the origin of the markings and to record and register the trees with the DECC if appropriate. Until the origin of these two trees is determined (by a suitably qualified archaeologist and/or arborist) or if they are determined to be of Aboriginal origin, surface infrastructure required as part of the Project or existing operations should be designed to avoid impact to these trees.

- It is recommended that the stone arrangement identified by Northern Illawarra Aboriginal Collective in their comments on the draft version of this ACHA be further investigated (via additional site inspection and Aboriginal community consultation) prior to effects of subsidence on its location to determine if it is an Aboriginal heritage site and to record and register with the DECC if appropriate. Until this site is further investigated, surface infrastructure required as part of the Project or existing operations should be designed to avoid impact to this location.

- During the 2007 Aboriginal heritage surveys, Mr Gary Caines suggested that an ethnographic study be undertaken to investigate how sites may have been used and to add knowledge to the region. Section 3 of this ACHA has been developed to provide an overview of the archaeological context of the area including ethnographic history.

- During the 2007 supplementary Aboriginal heritage surveys, a representative of one group/party who wishes to remain anonymous raised the possibility of undertaking invasive investigations of select Aboriginal heritage sites throughout the study area to improve the knowledge of some sites, including:

  - brushing the floors of sandstone overhangs to locate artefacts;
  - further investigating the drip zone at the edges of select sandstone overhangs to locate artefacts;
  - undertaking test pits within select sandstone overhangs to locate deposited artefactual material;
  - moving exfoliated rock in select sandstone overhangs to locate deposited archaeological material; and
  - draining small natural water holes (located on open sandstone platforms adjacent to grinding grooves) to locate artefacts.

  Due to the disturbance that would result from such investigations, such investigations are not recommended unless consultation undertaken during development of an ACHMP (Section 9.4) indicates consensus between the Aboriginal community and the DECC.

- A preclearance inspection should be undertaken in areas above the proposed mining domain (in consultation with representatives of the Aboriginal community) to identify the most appropriate location for required Project surface infrastructure. Project surface infrastructure should be located so as to avoid or minimise potential impacts to Aboriginal heritage sites (including ground artefact scatters) of particular significance.
- In regard to surface disturbance (e.g. for exploration works, surface infrastructure, access tracks, monitoring, remediation and rehabilitation), known Aboriginal heritage sites should be avoided where practicable. Where avoidance is not practicable, the site(s) should be subject to baseline recording in consultation with representatives of the Aboriginal community prior to disturbance.
- Should monitoring (Section 9.2) identify increased moisture flow through cracks in a sandstone overhang that has the potential to impact an art panel, measures such as the installation of an artificial dripline could be implemented. This technique has been implemented previously at the Metropolitan Colliery and recent monitoring indicates that it has successfully diverted increased moisture flow away from an art panel.
- During peer review of this ACHA in July 2008, it was suggested that Aboriginal heritage sites containing only PAD be further investigated as part of future field activities to determine if they contain actual archaeological deposits or not. It is considered likely that this type of investigation would cause more disturbance to the potential sites than would the potential impacts of the Project and as such should only be undertaken following further consultation with the Aboriginal community as part of the proposed Aboriginal Cultural Heritage Management Plan (Section 9.4).

## 9.2. Monitoring Program

It is recommended that an Aboriginal heritage monitoring program be developed for the Project that builds on the existing monitoring and management programs described in the *Longwalls 14-17 Site Monitoring Plan* (R.G. Gunn & Kayandel Archaeological Services, 2007b) and proposed in the *Aboriginal Cultural Heritage Assessment for Longwalls 18-19A* (Kayandel Archaeological Services, 2007).

The monitoring program should aim to identify if subsidence has impacted Aboriginal heritage sites and to validate the subsidence movements predicted by MSEC (2007; 2008) for Aboriginal heritage sites of high and moderate archaeological significance and all sites specifically identified by the Aboriginal community as being of particular cultural significance within the study area (Section 7). It is recommended that the monitoring program be developed in consultation with the Aboriginal community (through the SMP process) and include the following:

- proposed monitoring team (including Aboriginal representation);
- particulars of any further recording of information prior to sites being subject to subsidence;
- tasks to be undertaken during each monitoring round, including:
  - comparison of the baseline record against the status of the site at the time of monitoring;

- inspections of rock surfaces for cracking and/or exfoliation and/or blockfall;
- inspection of art motifs for damage or deterioration;
- subsidence monitoring within and around each site;
- identification of natural deterioration process (such as fire, vegetation growth and water seepage); and
- detail and describe (including photos) any changes noted.

- proposed monitoring schedule;
- proposed reporting requirements; and
- a strategy to undertake on-going consultation with the Aboriginal community.

It is recommended that all known Aboriginal heritage sites of high and moderate archaeological significance and all sites specifically identified by the Aboriginal community as being of particular cultural significance (Section 7) within the study area be included in the monitoring program.

Should the above described monitoring or the MSEC (2007; 2008) subsidence predictions indicate that an Aboriginal heritage site of high archaeological significance (Section 7.1) or of particular cultural significance (Section 7.2) is likely to or has been subject to subsidence movements beyond the values at which MSEC (2008) indicate that sandstone has the potential to crack (Section 8), it is recommended that the measures outlined in Section 9.3 also be considered for this site. Development of the detailed design of the mitigation measures outlined in Section 9.3 should be undertaken in consultation with the Aboriginal community and the DECC as part of the preparation of the ACHMP.

## 9.3. Mitigation Measures

As outlined in Section 8 and Appendix 6, MSEC (2007; 2008) conservatively calculate that ten sites of either high archaeological significance or of particular cultural significance (i.e. FRC 12, FRC 22, FRC 24.2, FRC 26, FRC 185, FRC191, FRC 195, FRC 198, NEW 2 and NT 46) have subsidence predictions greater than the values at which sandstone has the potential to crack. As described in Section 8, although considered unlikely, these strains have the potential to lead to cracks in open sites and isolated rockfall where cracking coincides with a sandstone overhang.

These measures have been developed (and recommended in Section 10) to mitigate the potential impacts of Project on Aboriginal heritage sites of either high archaeological significance or particular cultural significance. Development of the mitigation measures should acknowledge that while the measures may reduce the risk of further decrease in integrity, it is important to recognise that the mitigation measures themselves also have a potential to cause damage to a particular Aboriginal site or its setting. Therefore, development of the detailed design of the mitigation measures should be undertaken in consultation with the Aboriginal community and the DECC as part of the ACHMP process.

Examples of mitigation measures are outlined below. These measures have been developed jointly by Kayandel Archaeological Services and HCPL's geotechnical engineers.

*Closed Sites – Sandstone Overhangs*

Strategies to reduce the potential impact of mine subsidence on overhangs are essentially based on maintaining the stability of the overhang. In general engineering terms, the overhang is a cantilever and the strength of the cantilever is dependent on a range of factors, including (HCPL, 2008):

1. the length of the cantilever (shorter is more stable);
2. the thickness of the cantilever (thicker is more stable);
3. the distribution of weight on the cantilever (weight distributed towards the edge of the overhang is less stable);
4. the presence of natural structural defects such as rock joints, bedding planes and moisture infiltration; and
5. the strength of the rock.

Methods currently available to maintain the stability of an overhang include establishing an artificial support between the roof and floor, known as standing supports. Standing supports can include a range of materials such as timber props, timber cogs, sandbags, and metal (hydraulic) props.

Standing supports can either be passive or active. Passive supports do not take any load from the overhang until some convergence occurs. Active supports apply some force between the roof and floor of the overhang. Standing supports can be installed as either active or passive e.g. timber wedges or a jack can be used to set a timber prop actively against the roof and/or floor.

The applicability of standing supports should be evaluated by a geotechnical engineer on a case by case basis. In circumstances where the roof and/or floor of an overhang is not level (or could not easily be made level without impacting the site), sand bags may be more suitable than attempting to set timber props.

In addition to the above, should monitoring identify increased moisture flow through cracks in a sandstone overhang that has the potential to impact an art panel, measures such as the installation of an artificial dripline could be implemented. This technique has been implemented previously at the Metropolitan Colliery and recent monitoring indicates that it has successfully diverted increased moisture flow away from an art panel.

*Open Sites – Grinding Grooves and Petroglyphs*

The principal strategy to reduce potential impact from subsidence on open rock platforms is to reduce strains or stresses at the feature of interest. The success of such a strategy depends on site specific features of the open rock platform including the aerial extent of the rock platform, rock platform thickness, presence of structural defects in the rock platform and rock strength.

Strategies currently available that may reduce potential impacts from ground movement include:

- the installation of a stress relief slot; and
- the installation of a stress focus notch.

Both the stress relief slot and stress focus slot aim to relieve stress over a certain area (e.g. proximal to grinding grooves and/or petroglyphs) by increasing or focusing stress in another area (e.g. an area on the same rock platform away from grinding grooves and/or petroglyphs).

Stress relief slots are generally deeper than stress focus notches and both techniques essentially work in the same way i.e. both techniques involve cutting into the rock platform to concentrate stress at the base of the cut and at the ends of the cut. The deeper and longer the cut, the greater the area of stress relief adjacent to the slot and the greater the amount of stress concentration at the ends and base of the slot (HCPL, 2008).

The applicability of each technique would depend on various site specific factors such as: accessibility; cost; size of the area to be protected; size and extent of the rock platform within which the feature is located; nature of the mining induced movement; and level of damage or disturbance (to the site or its setting) associated with installing available measures.

As outlined above, the development of specific mitigation measures for open sites of either high archaeological significance or of particular cultural significance should acknowledge that while the measures may reduce the risk of further decrease in integrity, it is important to recognise that they also have a potential to cause damage to a particular Aboriginal site or its setting. Development of the detailed design of the mitigation measures should be undertaken in consultation with the Aboriginal community and the DECC as part of the ACHMP process.

*General Reinforcement – Open and Closed Sites*

Where the structural integrity of a particular feature (whether an overhang or rock platform) is low due to presence of rock joints, bedding planes or other discontinuity, artificial reinforcement may reduce the risk of further decrease in integrity. Examples of artificial reinforcement that could be implemented include rock bolts, cement sprays (shotcrete) and injection of a binding agent into cracks or joints (e.g. polyurethane or similar).

As described above, the implementation of mitigation measures may in some cases result in disturbance to the site and/or its setting and therefore their applicability should be acknowledged during development of the detailed design as part of the ACHMP process. In particular, rock bolts would have a high potential to impact sites if installed within an Aboriginal heritage site.

## 9.4. Aboriginal Cultural Heritage Management Plan

The development of an ACHMP for the Project would greatly assist with the overall management of Aboriginal heritage at the Metropolitan Colliery.

Any ACHMP should be flexible and active throughout the Project's lifespan and incorporate on-going outcomes as a result of monitoring, survey and fieldwork, analysis and consultation. The following outlines the basic scope of an ACHMP and suggests various protocols/programs to be included:

- A protocol for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, further recording, monitoring and implementation of mitigation measures).
- A protocol for Aboriginal community members to access known Aboriginal sites (e.g. for personal reasons or as part of scheduled field activities).
- A program to increase cultural awareness of staff and contractors (e.g. through augmentation of existing induction programs).
- A protocol for the registering of any new sites identified within the study area as well as updating and maintaining the existing record of Aboriginal heritage sites.
- A program for the monitoring of Aboriginal heritage sites of moderate or high archaeological significance or of particular cultural significance at the Metropolitan Colliery as a component of future SMP Applications.
- A protocol for managing Aboriginal heritage during the installation/construction of required ancillary surface infrastructure (e.g. boreholes, access track maintenance, installation of monitoring equipment etc.). Such a protocol may include: avoidance of all known Aboriginal sites and demarcation of known Aboriginal sites where works are required in close proximity to avoid accidental damage and preclearance surveys.
- A protocol for determining the most appropriate management measure(s) at sites of moderate or high archaeological significance (Sections 9.1 and 9.2) and/or mitigation measure(s) at sites of high archaeological significance (Section 9.3) and for presenting guiding principles for managing Aboriginal heritage, for example:
  - Avoidance

    According to Article 15.1 of the Burra Charter, "Change may be necessary to retain cultural significance, but is undesirable where it reduces cultural significance" (Marquis-Kyle and Walker, 2004: 54). Avoidance of impact should be the first consideration e.g. selecting the location for surface infrastructure and monitoring equipment to avoid interaction with known Aboriginal sites.

- Temporary Changes

  In line with Article 15.2 and 15.3 of the Burra Charter, any change that does reduce cultural significance should aim to be reversible and be reversed when circumstances allow (Marquis-Kyle and Walker, 2004: 54). For example, a measure that may involve temporary changes includes supporting a highly significant overhang site whilst subsidence effects are experienced in an area and the removal of the supports once subsidence movements have ceased.

- Stabilisation

  Stabilisation is considered a preservation technique appropriate to the conservation and management of Aboriginal indigenous places (Marquis-Kyle and Walker, 2004: 58). Stabilisation, in the case of rock art sites, may involve changing the hydrology of the shelter. For example, cracking of the shelter surface at FRC 10 (Sandstone overhang with art) had the potential to impact on the art by allowing seepage to flow over the art. In accordance with recommendations, an artificial dripline was installed to divert water away from the art. The method allowed for the retention of the primary aspect of cultural significance (i.e. the rock art pigments).

This protocol should acknowledge that while the measures may reduce the risk of further decrease in integrity, it is important to recognise that the measures themselves also have a potential to cause damage to a particular Aboriginal site or its setting. Development of the detailed design of the measures should be undertaken in consultation with the Aboriginal community and the DECC as part of the ACHMP process.

- A protocol to be initiated in the event that human skeletal material is identified within the study area (e.g. stop immediate works, notification of relevant authorities and the Aboriginal community and the development of appropriate management measures).

# 10. RECOMMENDATIONS

Based on the known and predicted Aboriginal heritage values within the study area, it is concluded that impacts to Aboriginal heritage as a result of the Project can be effectively managed or mitigated through the following actions and strategies.

1. An ACHMP should be developed for the Project that identifies statutory requirements and presents the details of monitoring requirements and management techniques to be undertaken over the life of the Project based on the principles presented in this report.
2. The ACHMP should be developed in consultation with representatives of the Aboriginal community and incorporate the recommendations outlined in this section.
3. The ACHMP should include the following:
4. A protocol/program for HCPL to sponsor existing or new projects that benefit the wider Aboriginal community. These may include (for example): Aboriginal community field days; restoration of culturally significant buildings; rehabilitation/protection of areas with high cultural values; and/or potential employment/skill development opportunities. Any such sponsorship should be made available to the wider Aboriginal community with submissions presented to HCPL and projects selected by HCPL based on their individual merit and benefit to the wider Aboriginal community.
5. A program for developing updated site cards and plans for sites that have been subject to natural deterioration since their original recording up to 37 years ago. Sites include FRC 28, FRC 29, FRC 31, FRC 32, FRC 57, FRC 62, FRC 63, FRC 117, FRC 194, FRC 253, FRC 276, NT 8, NT 46, and NEW 17.
6. A program for undertaking further recording of information from known Aboriginal heritage sites throughout the study area, including:
   - brushing the floors of sandstone overhangs to locate artefacts;
   - further investigating the drip zone at the edges of select sandstone overhangs to locate artefacts;
   - undertaking test pits within select sandstone overhangs to locate deposited artefactual material;
   - moving exfoliated rock in select sandstone overhangs to locate deposited archaeological material; and
   - draining small natural water holes (located on open sandstone platforms adjacent to grinding grooves) to locate artefacts.

   Due to the disturbance that would result from such investigations, such investigations are not recommended unless consultation undertaken during development of an ACHMP (Section 9.4) indicates consensus between the Aboriginal community and the DECC. Such investigations would be undertaken by, or under the supervision of, a qualified archaeologist and would be fully documented and reported.

7. A preclearance inspection program for areas above the proposed mining domain (in consultation with representatives of the Aboriginal community) to identify the most appropriate location for required Project surface infrastructure. Project surface infrastructure should be located so as to avoid or minimise potential impacts to Aboriginal heritage sites (including ground artefact scatters) of particular significance.

8. A program and scope for undertaking of additional fieldwork (on a progressive basis across) the Project area as part of future SMP applications. The fieldwork should be designed to identify additional sites, to inform the detailed design of management measures, to monitor the effects of subsidence and to validate subsidence predictions and/or inform adaptive management.

9. A protocol for managing Aboriginal heritage sites in areas above the mining domain located proximal to required surface disturbance works (e.g. exploration works, installation/ operation/maintenance of surface infrastructure, construction/maintenance of access tracks, monitoring, remediation and rehabilitation). Such a protocol should include:

   - avoidance of impacts to Aboriginal heritage sites where practicable;
   - demarcation of Aboriginal heritage sites where proximal surface works are required; and
   - developing a comprehensive baseline record in consultation with representatives of the Aboriginal community prior to disturbance where avoidance is not practicable.

10. A program for further investigation (via additional site inspection and Aboriginal community consultation) of the artwork in sites FRC93 and FRC198 against the description of art provided on the AHIMS site card (i.e. whether the art depicts a kangaroo).

11. A program for the further investigation of Aboriginal heritage sites within the study area containing PAD only to determine if they are Aboriginal heritage sites or not. Such investigations may cause more damage than the potential impacts of the Project and consultation with the Aboriginal community should be undertaken during development of the ACHMP to consider the need for these investigations.

12. A program for regular monitoring to identify if subsidence has impacted Aboriginal heritage sites (of moderate or high archaeological significance or of particular cultural significance within the study area) and to validate the subsidence movements predicted by MSEC (2007; 2008) for Aboriginal heritage sites of high or moderate archaeological significance or sites of particular cultural significance within the study area (Section 7). It is recommended that the monitoring program be developed in consultation with the Aboriginal community (through the SMP process) and include the following:

   - proposed monitoring team (including Aboriginal representation);
   - particulars of any further recording of information prior to sites being subject to subsidence;
   - tasks to be undertaken during each monitoring round, including:
     - comparison of the baseline record against the status of the site at the time of monitoring;
     - inspections of rock surfaces for cracking and/or exfoliation and/or blockfall;

- inspection of art motifs for damage or deterioration;
- subsidence monitoring within and around each site;
- identification of natural deterioration process (such as fire, vegetation growth and water seepage); and
- detail and describe (including photos) any changes noted.

– proposed monitoring schedule;

– proposed reporting requirements; and

– a strategy to undertake on-going consultation with the Aboriginal community.

It is recommended that all known Aboriginal heritage sites of high and moderate archaeological significance and all sites specifically identified by the Aboriginal community as being of particular cultural significance (Section 7) within the study area be included in the monitoring program.

13. A protocol for determining the most appropriate management measure(s) at sites of moderate or high archaeological significance (Sections 9.1 and 9.2) and/or mitigation measure(s) at sites of either high archaeological significance or sites of particular cultural significance (Section 9.3) and for presenting guiding principles for managing Aboriginal heritage.

    This protocol should acknowledge that while the measures may reduce the risk of further decrease in integrity, it is important to recognise that the measures themselves have a potential to cause damage to a particular Aboriginal site or its setting. Development of the detailed design of the measures should be undertaken in consultation with the Aboriginal community and the DECC as part of the ACHMP process.

14. A protocol for the development and implementation of management measure(s) at sites of moderate or high archaeological significance (Sections 9.1 and 9.2) and/or mitigation measure(s) at sites of high archaeological significance or sites of particular cultural significance (Section 9.3). These measures should be site specific and dependant on the nature and extent of the observed/predicted subsidence effect. Potential measures include:

    - Installing standing supports in sandstone overhangs (e.g. timber props, timber cogs, sandbags, and metal (hydraulic) props).
    - Installing a stress relief slot or stress focus notch adjacent to an open site.
    - Installing an artificial dripline to direct increased moisture/water seepage away from art panels.
    - Implementation of general reinforcement techniques (e.g. rock bolts, cement sprays [shotcrete] and injection [with polyurethane or similar]).

    Development of these measures should acknowledge that while the measures may reduce the risk of further decrease in integrity, it is important to recognise that they also have a potential to cause damage to a particular Aboriginal site or its setting.

15. The ACHMP should be flexible and active throughout the Project's lifespan and incorporate on-going outcomes as a result of monitoring, survey and fieldwork, analysis and consultation.

16. A protocol for consultation with the Aboriginal community over the lifespan of the project including a course of action to be undertaken in determining appropriate Aboriginal representation during fieldwork (e.g. preclearance surveys, baseline recording, monitoring and implementation of mitigation measures).

17. A protocol for Aboriginal community members to access known Aboriginal sites (e.g. for personal reasons or as part of scheduled field activities).

18. A program to increase cultural awareness of staff and contractors (e.g. through augmentation of existing induction programs).

19. A protocol for the registering of any new sites identified within the study area as well as updating and maintaining the existing record of Aboriginal heritage sites.

20. A protocol to be initiated in the event that human skeletal material is identified within the study area (e.g. stop immediate works, notification of relevant authorities and the Aboriginal community and the development of appropriate management systems).

21. A program for further investigation (via additional site inspection and Aboriginal community consultation) of the two trees, one located near FRC 279 and one located at FRC 265, identified by Northern Illawarra Aboriginal Collective as bearing "likely birth-marks" (i.e. whether they bear markings of Aboriginal origin or not).

22. A program for the further investigation (via additional site inspection and Aboriginal community consultation) of the stone arrangement identified by the Northern Illawarra Aboriginal Collective in their comments on the draft version of the ACHA as a "*possible cairn*" to identify if it is an Aboriginal heritage site or not.

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# APPENDIX 1:

# DETAILED INFORMATION ON KNOWN ABORIGINAL HERITAGE SITES WITHIN THE STUDY AREA

- This appendix contains culturally sensitive material and access is restricted to the Proponent, Aboriginal stakeholder groups, statutory authorities, and other parties with the consent of the Department of Environment and Climate Change.

# APPENDIX 2

# ABORIGINAL CULTURAL HERITAGE ASSESSMENT – LONGWALLS 18–19A ABORIGINAL CULTURAL HERITAGE ASSESSMENT METROPOLITAN COLLIERY

- This appendix contains culturally sensitive material and access is restricted to the Proponent, Aboriginal stakeholder groups, statutory authorities, and other parties with the consent of the Department of Environment and Climate Change.

# APPENDIX 3

# RECORD OF ABORIGINAL PARTICIPATION IN ABORIGINAL HERITAGE SURVEY AND SITE INSPECTIONS –AUGUST AND DECEMBER 2007

# Record of Aboriginal Participation in the August and December 2007 Aboriginal Heritage Survey and Site Inspections

| Aboriginal Party/Group | Representative | Participation in August and December 2007 Aboriginal Heritage Survey Site/Inspections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 28 August 2007 | 29 August 2007 | 30 August 2007 | 4 December 2007 | 5 December 2007 | 6 December 2007 | 7 December 2007 | 10 December 2007 | 11 December 2007 | 12 December 2007 | 14 December 2007 |
| Cubbitch Barta | Alfred Fazldeen | ✓ | ✓ | | | | | | ✓ | | ✓ | |
| | Daniel Chalker | | | | | | | ✓ | | | | |
| | Glenda Chalker | | | | ✓ | ✓ | ✓ | | | ✓ | | |
| Northern Illawarra Aboriginal Collective | Daniela Reverberi | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Darlene Jones | | | | | ✓ | | | | | | |
| | Shannon Wakeman | | | | | ✓ | | | | | | |
| Northern Illawarra Aboriginal Collective - Wadi Wadi Coomaditchie Aboriginal Corporation | Allan Carriage | ✓ | | ✓ | | | | | | ✓ | | |
| | Josephine Ball | | ✓ | | | | | | | | | |
| Northern Illawarra Aboriginal Collective – La Perouse Botany Bay Aboriginal Corporation | Keith Simms | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| Northern Illawarra Aboriginal Collective -Woronora Plateau Gundungara Elders Council | Paul Cummins | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | |
| Tharawal Local Aboriginal Land Council | Cliff Foley | | ✓ | ✓ | | | | | | | | |
| - | Gary Caines | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Wodi Wodi Elders Corporation | Kim Davis | ✓ | | | | | | | | ✓ | ✓ | |
| | Rosina Davis | | | | ✓ | ✓ | | ✓ | ✓ | | | |
| | Sue Heycox | ✓ | | | | | | | | | | |
| Illawarra Local Aboriginal Land Council | Neville Maher | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | |
| KEJ Tribal Elders Corporation | Bart Brown | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

✓ Denotes participation in Aboriginal heritage survey/site inspections on the specified date.

Note: A representative of HCPL and a suitably qualified archaeologist(s) from Kayandel Archaeological Services were also present on all days of Aboriginal heritage survey and site inspections.

# APPENDIX 4

# ADVERTISEMENT PUBLISHED IN THE ILLAWARRA MERCURY – REQUEST FOR REGISTRATION OF INTERESTED PARTIES

**Public Notice**

***Environmental Planning and Assessment Act 1979* (NSW) – Part 3A**

***National Parks and Wildlife Act 1974* (NSW) – Sections 87 and 90**

Helensburgh Coal Pty Ltd (HCPL) owns and operates the Metropolitan Colliery, an underground mining operation located approximately 30 kilometres north of Wollongong in NSW.

HCPL proposes to seek approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) for further development of the Metropolitan Colliery. The further development includes the continuation and expansion of underground mining and related surface activities.

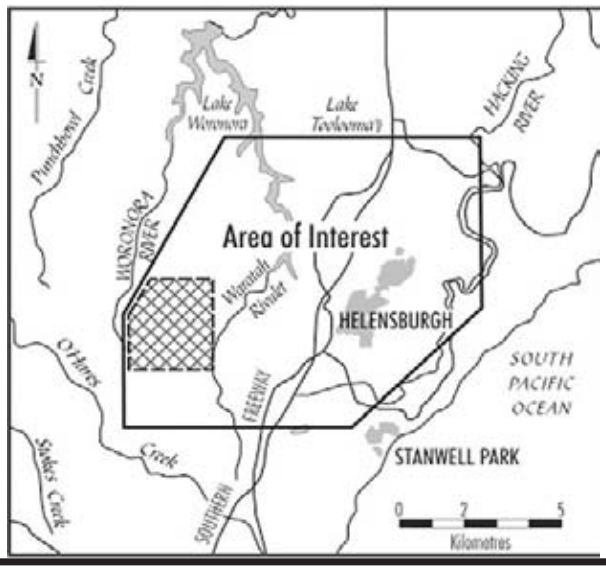
As part of the Part 3A application process, HCPL will be preparing an Aboriginal Cultural Heritage Impact Assessment in respect of the area described as the "Area of Interest" in the map below.

In addition, HCPL may also seek a section 87 permit and/or a section 90 consent under the *National Parks and Wildlife Act 1974* (NSW) to move and/or destroy Aboriginal objects in the course of the continuation of certain underground mining at the Metropolitan Colliery. The area the subject of any such application has been cross hatched on the map below.

Aboriginal persons or groups who wish to be consulted in relation to either process are invited to contact HCPL by 7 May 2007 to register their interest.

**Contact details are as follows:**

Scott Lowe
(General Manager, Metropolitan Colliery)
PO Box 402 Helensburgh NSW 2508
Ph: (02) 4294 7201
Fax: (02) 4294 2064
Email: scott.lowe@southcoal.com.au



# APPENDIX 5:

# FORMAL CORRESPONDENCE FROM

# ABORIGINAL STAKEHOLDER GROUPS

Dear Neville
General Manager
Metropolitan Colliery

Comments on Aboriginal Cultural Heritage Assessment

In regard to the draft Aboriginal Cultural Heritage Assessment, the KEJ Elouera has the following comments:

1. KEJ Elouera supports the project only on the basis that the recommendations outlined in the report are implemented.

2. KEJ Elouera considers that the precontact history provided in the report to be incorrect and will provide a true description of the history by 13 July 2008 for inclusion into the report.

3. KEJ Elouera considers it essential that we are included in the development and implementation of the Aboriginal Management Plan proposed in the report and also in the management and monitoring of sites and artefacts.

4. KEJ Elouera is pleased to have been involved in the assessment on an ongoing basis and would like to be involved in the project into the future once approved.

R. Brown
Reuben Brown
Chairperson KEJ Elouera

5-6-08

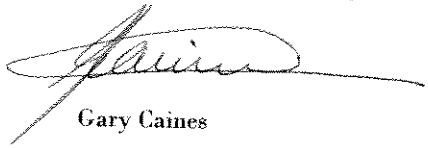
6 June 2008

Dear Neville McAlary
General Manager
Metropolitan Coal Project

Please find below some comments in addition to the draft Aboriginal Cultural Heritage Assessment (dated May 2008) for the Metropolitan Coal Project. The draft ACHA is adequate following consideration of the comments provided in the previous consultation as noted in Attachment 1. These comments are provided without prejudice, besides any perceived fear or favour from any party.

- My in-principle position in regard to coal mining is to leave all coal in the ground – as stated in person, among other items, to the previous General Manager (Tony DeSantis) at McCauleys Beach, Thirroul in 2006.
- If the project goes ahead I would appreciate being involved in the management of our cultural interests on this project in the context of patterning throughout a broader regional landscape scale.
- Involvement of the Aboriginal stakeholdings in assessment processes in the Illawarra in general is currently incoherent and unjustifiable. The DECC and NSW government need to work closely with development proponents to achieve processes whereby only determined or de-facto indigenous propriety/proprietors as holders have authority among stakeholders.
- The Aboriginal Cultural Heritage Management Plan proposed in the report would be good and should include discussions and involvement with the determined or de-facto indigenous propriety/proprietors.
- I have been involved in the Metropolitan Colliery since 2006 and would appreciate being involved for the life of the project if and when approved. I feel that I may be able to assist in management of cross cultural management and associated issues (i.e. management of Aboriginal culture as part of the management of all aspects of the project e.g. noise, air quality, flora and fauna and other). I would like this project to be an example/pilot project for cultural, recognition, engagement and conciliation.
- I have appreciated the cultural engagement/consultation between myself and the company's agents throughout the assessment processes to date and would be honoured to be involved in project investigation/continuation by personal engagement between myself and Peabody Energy.
- I believe that the outcomes/report from the independent expert panel for mining in the southern coalfields should be thoroughly and rigorously reviewed and agreed upon by government and its community in NSW before any further determinations are made in regard to mining in the southern coalfields. If a determination is required before this, perhaps an interim approval can be used to allow execution of pre-extraction (including first workings) activities e.g. development of the Aboriginal Cultural Heritage Management Plan.
- The supremacy of the Cubbitch Barta claimants could be established by non indigenous stakeholders and if so should be underpinned by the current project Aboriginal stakeholders having any individual or united positions on the matter.

The above are my thoughts and my thoughts only at this stage and I am open to consultation in regard to perceived or actual gaps. The draft ACHA as presented



(080606)

Gary Caines

Illawarra Local Aboriginal Land Council

3 Ellen Street WOLLONGONG NSW 2500 Ph: 42263338 Fax: 42263360

10 June 2008

Neville Mc Alary
General Manager
Helensburgh Coal Pty Ltd
PO Box 402
HELENSBURGH NSW 2508

Dear Neville

**METROPOLITAN COAL PROJECT**
**ABORIGINAL CULTURAL HERITAGE ASSESSMENT**

In regard to the Metropolitan Coal Project, the Illawarra Local Aboriginal Land Council has received and reviewed the draft Aboriginal Cultural Heritage Assessment (dated May 2008).

The Illawarra local Aboriginal Land Council objects to all longwall mining projects that impacts on Aboriginal heritage and culture. It has clearly been identified that longwall mining causes subsidence and movement; it is therefore imperative that all Aboriginal sites be preserved for future generations. These sites are the history of this country, maintaining links with country; we must do whatever we can to protect them.

If the Minister gives consent under a part 3A The Illawarra Local Aboriginal Land Council would have no option then to support the proposed management and mitigation measures including the development of the Aboriginal Management Plan in consultation with the Illawarra Local Aboriginal Land Council.

As part of the development of the Aboriginal Management Plan, site representatives should be able to further discuss and develop the proposed management measures with Helensburgh Coal Pty Ltd representatives both in the office and on-site. Final decisions regarding management of Aboriginal heritage should be undertaken through the development of the Aboriginal Management Plan (in consultation with the Illawarra Local Aboriginal Land Council) which should include time in the field (at select sites to ensure appropriateness of measures).

Also we would like to express the Illawarra Local Aboriginal Land Council's objection to the involvement of the Northern Illawarra Aboriginal Collective in all matters relating to Aboriginal heritage in the Illawarra. In an Illawarra Local Aboriginal Land Council Ordinary Meeting on 16 October 2007, a motion was passed indicating that the Northern Illawarra Aboriginal Collective does not represent and is not accepted by the Illawarra Local Aboriginal Community. All Members present at the meeting agreed with this Motion. While the Illawarra Local Aboriginal Land Council acknowledges some of the people and groups that are involved in NIAC, we do not recognise or support the involvement of the umbrella corporation NIAC.

As part of the development of the Aboriginal Management Plan, site representatives should be able to further discuss and develop the proposed management measures with Helensburgh Coal Pty Ltd representatives both in the office and on-site. Final decisions regarding management of Aboriginal heritage should be undertaken through the development of the Aboriginal Management Plan (in consultation with the Illawarra Local Aboriginal Land Council) which should include time in the field (at select sites to ensure appropriateness of measures).

Illawarra Local Aboriginal Land Council

3 Ellen Street WOLLONGONG NSW 2500 Ph: 42263338 Fax: 42263360

The Illawarra Local Aboriginal Land Council does not support invasive survey techniques at Aboriginal sites. Such techniques (brushing of floors, test pits, moving rocks, draining waterholes) can greatly impact the sites both physically and culturally and should not be undertaken unless agreed by the Illawarra Local Aboriginal Land Council with site representatives present.

In regard to further investigating the motifs on some Aboriginal sites and collecting updated information on some Aboriginal sites, Illawarra Local Aboriginal Land Council supports this proposal as part of the project on the condition that Illawarra Local Aboriginal Land Council site officers are present.

As a representative body for Aboriginal people in the Illawarra, we would like to further engage with Helensburgh Coal in regard to potential employment and/or skill development opportunities. We have many able persons who could provide many valuable services including administration, construction, landscaping, rehabilitation projects and general land management. The Illawarra Local Aboriginal Land Council hopes that we can discuss these opportunities further and work in partnership to provide such opportunities to our people. We would expect and appreciate further discussion and development of such opportunities through the development of the Aboriginal Management Plan.

As stated above, the Illawarra Local Aboriginal Land Council is opposed to the involvement of NIAC in regard to Aboriginal heritage in the Illawarra region. As part of the development of the Aboriginal Management Plan, we support the proposal in the report to develop a protocol for involvement of Aboriginal representatives to ensure that fair and appropriate representation is included in Aboriginal heritage management.

We also support as part of the project, the proposal in the report to develop a protocol for access to the area for personal or cultural reasons. Such access would be beneficial to the Aboriginal community and allow us to assist the Aboriginal community to utilise a cultural and educational resource not currently utilised.

The Illawarra Local Aboriginal Land Council looks forward to continuing and strengthening our relationship with Helensburgh Coal Pty Ltd into the future and being involved in all aspects of Aboriginal cultural heritage management.

If you require any further information regarding this matter, please don't hesitate to contact me on the number listed below.

Yours in UNITY

S Rob

Sharralyn Robinson
CEO
Ph: 42 263338
M: 0410125463

Cubbitch Barta Native Title Claimants
Aboriginal Corporation,
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574.
12th June, 2008.

Mr. Greg Tarrant,
Manager Technical Services
Helensburgh Coal Pty Ltd.
P.O. Box 402,
HELENSBURGH. N.S.W. 2508

Dear Greg,

METROPOLITAN COAL
HELENSBURGH

I would like to take this opportunity of commenting on the DRAFT Aboriginal Heritage Assessment prepared by Kayandel Archaeological Services. Cubbitch Barta Native Title Claimants Aboriginal Corporation assisted in the fieldwork, however I feel I cannot comment on individual sites, as the fieldwork process did not allow for all sites to be inspected. I did have the opportunity to inspect some of the particular ones that I requested, but not all, due to the fieldwork methodology. There are still several sites that I would still like to inspect. However I have been assured by Josh Peters, that I will be given an opportunity to inspect any sites that I have not been inspected as part of the development of the Aboriginal Cultural Heritage Management Plan, prior to subsidence movements from the project.

I would just like to clear up a matter on Page 14, where a statement in reference to Cubbitch Barta, states that they are not on Tindales map. Cubbitch Barta are a clan of the Dharawal, and were also known to the colonists as the Cowpastures Tribe.

I would like to comment on the statement on page 74, in reference to deterioration (including rockfall) of rock surfaces and art. Some of this may be attributed to natural occurrences and or fires, however I would like to bring to your attention that this natural or unnatural process will be exacerbated by mine subsidence, if and when it occurs within the area of these sites that are listed.

I am concerned by some of the comments and recommendations that have been made by other unnamed groups in the report on Page 90, which would destroy these sites, as they exist today. I do believe in detailed baseline recordings of the sites and regular monitoring, but I do not support any recommendations or works that would partially or fully destroy any site , based purely on scientific, or even cultural curiosity.

I would like to participate in developing a protocol for consultation for the project, but would also like to say that I believe that there are some organisations, such as NIAC, that have no business in speaking for this country. I think it is insulting that Daniela Reverberi participates in the fieldwork, who is non-Aboriginal, has so much to say about Aboriginal heritage and culture, when it is none of her business. I am also annoyed that she continued to take photographs, during the fieldwork, when a condition for her being able to stay, that she was not to take photographs. She continued to do so anyway. We all know what Chris Illert does with this sort of material, which he has no right to exploit.

This protocol should also include surface infrastructure, because during the fieldwork, attention is paid only to shelters and rock platforms, which may contain engravings and or grinding grooves, not the ground surfaces within the catchment lands. Therefore all surface infrastructure development should be checked for ground artefact scatters.

We have been involved at the Metropolitan Colliery since early 2006, and we would like to ensure that we are included in all aspects of Aboriginal Cultural Management at the Colliery in the future. We have always been consulted, even though this means that we have not always been in agreeance with proposals that have taken place in the past.

On page 82, the statement that says "Monitoring of Aboriginal heritage sites to date indicates that subsidence has not resulted in the collapse of any Aboriginal heritage site at the Metropolitan Colliery". Please do not take this as factual, it could mean that sites that have not been monitored, and not all have, could have been damaged. It could also mean that it just simply has not happened yet. There has been the collapse recently of a shelter in the Cataract catchment, even though there has been a report prepared absolving the Colliery of blame, I believe that it was caused by mine subsidence damage, not just simply the wet weather and natural disturbance, when the longwall is so close.

I agree with most of the recommendations that have been made, except for the proposed destruction, involving test pits and moving rocks from shelters and draining water holes. I am not sure of some of the mitigation measures that are made in the recommendations, as to the how , whys and whens such measures would be implemented. Perhaps this would need developing with consultation further. Monitoring does not, unfortunately prevent damage from occurring, and I believe that there is no accurate way, at this point in time of accurately predicting any damage into the future. Technology has moved so fast in removing the coal from underground, but the technology to protect the environment on the ground and subsurface, has not advanced enough to prevent the mine subsidence damage occurring.

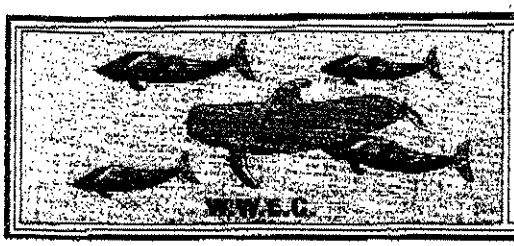
The report which currently includes accurate coordinates of Aboriginal sites, should not be part of the public document for commenting. This information should not be available to the public, and I request that all coordinate data is removed from any reports that are to be made public.

Yours faithfully.

G. Chalker

Glenda Chalker
Hon. Chairperson
Phone/Fax 02 46841129
0427218425

PS. Alfreds surname is spelt FAZLDEEN, not Fasildean




**Wodi Wodi Elders Corporation,**
484 North Cliffe Drive,
Berkeley, N.S.W. 2506

**Phone: (02) 4272 9290**

**Attention:** **Neville McAlary,**
**General Manager,**
**Helensburgh Coal Pty Limited,**
**PO Box 402,**
**Helensburgh, N.S.W., 2508.**

**Re: Draft Aboriginal Heritage Assessment – Metropolitan Coal Project**

Dear Neville,

The following issues were raised at the meeting with the Wodi Wodi Elders Council regarding comments on the draft Aboriginal Cultural Heritage Assessment for the Metropolitan Colliery.

The following recommendations and submissions were decided:-

1. All sites are significant to the WWEC people irrespective of their archaeological significance.
2. The WWEC do not approve of the involvement of some other groups whose boundaries are not within the Wodi Wodi Traditional boundary area.
3. The WWEC support the project **only** if the management meaures are undertaken and **only** if those Aboriginal persons involved can prove their genealogy. That all genealogical documentation such as death, marriage and birth certificates be presented in its original form when proving traditional custodianship. This process should be undertaken as part of the development of the Management Plan and with the DEC.
4. We need to ensure that there is a comprehensive record of all sites across the area.
5. The WWEC would appreciate being involved in the selection of archaeologists who undertake management and monitoring.
6. The WWEC would appreciate Helensburgh Coal Pty Ltd considering an Indigenous Liaison Officer to undertake day to day inspections of the area to help reduce potential unauthorised access or graffiti to Aboriginal sites. This action "will" ensure the protection and preservation of Aboriginal sites.
7. Concerns were raised by the WWEC to Metropolitan Coal and DECC regarding the involvement of some participants during the site surveys. It is important that the DEC Guidelines be implemented at all times by Helensburgh Coal and the Archaeologists.
8. The WWEC is satisfied with consultation undertaken in regard to the Draft Aboriginal Heritage Assessment.

If you require any further information please do not hesitate in contacting me at the WWEC.

Yours Sincerely,

S. Fulcher

**S. Fulcher,**
**President,**
**Wod Wodi Elders Council.**

**16th June, 2008.**

N.I.A.C. ABN 80475697297

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# NIAC comment on Kayandel's report *"Aboriginal Cultural Heritage Assessment, Metropolitan Coal Project, Helensburgh, NSW (May 2008)"* dealing with the proposed longwalls 18-44


June 2008

# EXECUTIVE SUMMARY (11th June 2008)

The elders from NIAC's Traditional Owner member groups gain the impression, from the latest Kayandel report, that Metropolitan Colliery seeks in-principle approval for no less than 27 longwalls in this single application from which, ultimately, would flow bulk Section 90 consents to destroy hundreds of AHIMS-listed sites over about 25 square kilometres of highest conservation water-catchment containing Register of National Estate listed Aboriginal rock art, with almost all of the proposed longwalls passing underneath the Waratah Rivulet and Woronora Reservoir, in an area recently encircled by National Heritage Listing of the Royal National Park and Garrawarra SRA, prior to the immanent release of findings by the NSW government's *Inquiry into The Southern Coalfields* which would, presumably, have some relevant findings about appropriate management practices.

Final approvals are generally sought for longwalls up to four at a time, via an SMP process based upon feedback from fieldwork, once this initial in-principle approval is granted. This region's Aboriginal communities, through their peak Traditional Owner body NIAC, invested time and precious resources contributing to the Inquiry into the Southern Coalfields, as did all the coal-mining companies operating on and about the Woronora Plateau, thus it is unfortunate that mining companies throughout the Woronora Plateau, from Metropolitan Colliery to BHP-Billiton at Douglas Park and Dendrobium, have all sought such momentous in-principle decisions by the NSW state government prior to the release of those Inquiry findings which we believe were ready for release six months ago, but are being withheld by the Minister for Planning.

This region's Aboriginal elders also feel that they have been involved in too little fieldwork to date, having seen only a fraction of the thousands of AHIMS-listed sites already damaged or at risk within and about the present study area, given the known damage from the first 18 longwalls and the scale and sensitivity of the present mining proposal. However sufficient fieldwork has occurred to gain informed initial impressions for the purposes of this Aboriginal cultural heritage assessment, and to begin compiling our own reference materials, as part of the broader environmental assessment for the presently proposed longwalls 18-44. The general public also need to be given an opportunity to comment and, if any subsequent Aboriginal cultural heritage related fieldwork is undertaken within or about the area of this present mining proposal, either as part of an SMP process or otherwise, then elders from NIAC's traditional Owner member groups wish to be far more extensively involved at all stages.

Also given that Metropolitan Colliery is producing over 4,000 tonnes per day of coal, with record sale prices near $300 per ton, hence $1.2 million per day, the elders wish Peabody to know that Aboriginal children are living in condemned, leaky, cockroach-infested asbestos homes on the Old La Perouse mission, and that last year Aboriginal families were living in tents in the Bellambi Sewage Works in which unsanitary third-world circumstances one teenage girl would have given birth had NIAC not intervened. Additionally NIAC has recently contributed to the funerals of several Aboriginal children in our region and three Illawarra Aboriginal people have recently burnt to death living in unsafe tin shacks and caravans with kerosene heaters and candles. One wonders how this is, when NIAC's Traditional Owner member groups should for years have been receiving at least $1 per ton royalties for exploitation of their Traditional Material, coal, being mined on Crown Lands where Native Title has never been extinguished. The funds allocated to date, for Aboriginal involvement in fieldwork, have been a pittance compared to the $1.2 million per day being extracted by Metropolitan Colliery. Aboriginal elders from NIAC's Traditional Owner member groups are simply too disadvantaged to make demands, but they do request fair compensation for mining to date, funding for a range of important projects in the region's Aboriginal communities, and more extensive professional involvement in all future fieldwork.

NIAC also suggests that in an age where both the Canadian and Australian Governments have apologised to their indigenous peoples, and where the NSW state government is merely a

steward (not the owner) of relevant Crown Lands, Peabody should withhold a percentage of its coalmining royalties from the NSW state government, keeping these funds in trust for Traditional Owners, in order to encourage the NSW state government to live up to its basic human rights obligations to Aboriginal people - which they could begin to address by

1) getting the Aboriginal Land-rights Registrar, Steve Wright, to open his Register of Traditional Owners that has remained closed to Aboriginal groups on and about the Woronora Plateau for 25 years ever since *the Aboriginal Land Rights Act 1983* came into force, thereby enabling a succession of NSW state governments to greedily and selfishly pocketed windfall royalties that were not entirely theirs,
2) finally instructing Warren Mundine to fund native Title Claims that NIAC's Traditional Owner groups are happy with, using lawyers of our own choosing,
3) finally dealing with NIAC's Schedule 14 proposal that has been before Steve Wright for nearly 7 years now,
4) finally making funds available for NIAC to obtain legal assistance of our own choice to pursue the region's Coal Compensation Claim in the Federal Court, given that the NSW state government hurriedly abolished the NSW Coal Compensation Board and also the Coal Compensation Review Tribunal last year, giving them insufficient time and resources to properly deal with Aboriginal claims formally lodged with them – yet another dirty trick for cheating Traditional Owners of any equity, condemning them to live in tents and leaky unsanitary Asbestos houses whilst NSW politicians grant themselves $80,000 per year pay rises. Clearly the windfall royalties, arising from record world coal prices, are not going to this region's underprivileged and disadvantaged Traditional Owners, though it is at the expense of their Register of the National Estate listed rock art and Traditional Materials, on lands that should be protected and preserved.

Additionally, some NIAC projects that Peabody could consider for funding are

1) the NIAC dairy at Menangle which supplies free A2 milk on a weekly basis to needy families throughout the region (note: one family alone, with eight or more children living in a tent, can need in excess of 30 litres a week) whilst politicians dine in style at restaurants.
2) The Bellambi Lagoon Landcare group which wins Wollongong City Council Awards each year training and involving Aboriginal people in building pine log walkways, planting trees, and litter cleanups.
3) Aboriginal language books and CDs for use in cultural revival in communities and schools throughout the region, some telling Traditional Stories and songs of the Woronora Plateau, which might be sold as a commercial product to raise funds. Also we want to produce a video clip of a choir of Aboriginal children singing a Xmas carol, in their traditional language, for broadcast on local television by year's end.
4) Restoring the historic UAM Colebrook Memorial Church on the Old la Perouse Mission as a functioning church, community meeting place and craft centre, and possibly a day-care centre for Aboriginal children.
5) Restoring the Old Menangle Primary School which has fallen into disuse and disrepair. Aboriginal people have connection here dating back to the time of the Macarthurs and would like to use it for Aboriginal children from La Perouse, Illawarra, Macarthur and the Southern Highlands, to come together once or twice a month to play sport, and perhaps also as an Aboriginal language school, and as a craft centre/shop selling Aboriginal wares at other times.
6) Developing picnic and bushwalking facilities for the region's Aboriginal children, using the caves and rock art, on and about Elladale Homestead.

As NIAC is a registered charity, recognised by the Australian Taxation Office, any donations for community projects would be deductible.


**Figure 2:** *Map of the region that was, in February 2005, nominated by NIAC for national heritage listing. A more precise description of the boundaries, and statement of significance, is supplied in Appendix 1. In response, on 15th December 2006, the northern portion of this nominated area, including the Royal National Park and Garrawarra SRA, was formally Gazetted. NIAC continues arguing the case for national heritage listing of the remaining areas.*

# NATIONAL HERITAGE LISTING

In February 2005, NIAC nominated the entire Woronora Plateau for National Heritage Listing under the federal EPBC Act - see Fig 2 (opposite). After millions of words of documentary (including transcribed oral) evidence supplied by NIAC, and a two year deliberation, the then federal heritage minister, Senator Ian Campbell, ruled that we had made our case for National Heritage Listing toward the northern area of the Woronora Plateau hence, on 15th December 2006, the Royal National Park and Garrawarra SRA were duly Gazetted - see the summary in Appendix 1, adapted from the Australian Heritage Database (Place ID 105810).

In obtaining this initial Gazettal, NIAC had argued that the whole region including and surrounding present-day Metropolitan Colliery is collectively rich in Aboriginal cultural heritage (including hundreds of AHIMS-listed sites) of national significance. Additionally that this countryside, including its plants and animals, is the subject of numerous documented Aboriginal stories and traditions (refs [11] & [12], also Appendix 2) that remain part of the unbroken cultural connection to this country, surviving today in surrounding Aboriginal missions and communities, passed down intergenerationally through known provable Traditional Owner bloodlines (refs [2], [3], [6] & [13]).

# APICAL ABORIGINAL ANCESTORS

There are two apical ancestors that Aboriginal communities surrounding Metropolitan Colliery mostly derive from - one was *bayarung* (1820 - 1888/9), also known as "Biddy Coolamin", whilst another was her elder brother *dhaymbayal* (1813 - 1887) known as "Joey". In about 1858 Biddy married the Englishman Billy Giles (thereafter being called "Granny Giles") and living with him on Dr. Alexander Cuthill's property, "Mill Creek", on the Georges River. An insight into life there was provided by The Saint Georges Call (14 May 1904, page 1) which observed that:

> *"the means of subsistence of the Giles family was wild honey and oysters. They also had a pack of dogs, and a well known Port Hacking resident who remembers the old girl, declares that on one of his occasional visits, the dogs were so poor that they had to lean up against a tree to bark".*

After Billy Giles died, Biddy though *"... quite old, married a young white man (also very kind to her); lived him out"*. This young white-man was Mr Holdsworth who, along with Biddy's brother Joey, managed Thomas Holt's property at Sylvania Waters up to about 1885 where oystering was a main industry on and about Sandy Point near the entrance to Gawley Bay. The Saint Georges Call published a labelled photograph of this historic *"Sans Souci Blacks Camp"*, dating to the early 1880's, commenting

> *" the oldest of the group - Joey ... was an elder brother of Biddy Giles, and latterly lived about Sans Souci. He was an inoffensive man, preferring to fish and hunt rather than following his usual occupation of gathering oysters. He*

"SANS SOUCI CELEBRITIES"

photograph by J. Robinson of Carlton, early 1880's,
published in "the St. Georges Call", Saturday 14th May 1904, page 1.

On the far left is "Biddy Giles". Her eldest brother "Joey" Tahamool is on the bottom right, with bare feet, wearing a white shirt and hat. In the top row, on the left, is "Jimmy Lowndes".

**Figure 3**

*was the most intelligent of the group, and approached nearer the habits of civilisation than the others of the tribe. Many of the old Sydney sports who visited the district - but a waste at the time - fairly well stocked with game - contributed to the support of old Joey, who was a general favourite"* (see Figure 4; also ref [4], photograph opposite page 24).

One of Joey's clients was the Sydney solicitor Joseph Carruthers who became Premiere of NSW in 1904 and was later knighted. Carruthers kept a careful tally of "game" shot on his regular weekend hunting expeditions either side of the Hacking River. In 1883 this "old sport" alone shot 256 animals and birds including quail, hawks, parrots, wattle birds and snakes. Such weekenders also typically shot koalas and kangaroos. This was not how Aboriginal people traditionally managed their lands, nor how they wanted to, they simply had no choice at the time. Old Sports like Carruthers had no interest in the fact that Koalas, for example, were traditionally considered sacred by the Gundungara and protected. They wouldn't have even cared that senior women elders such as Ellen Anderson in 1925 then 1933 published two versions of a traditional Aboriginal story of *"the clinging Koala"* (ref [11]) or that A.W. Howitt in 1904 recorded Kurburu's Aboriginal-language lament at having accidentally *"killed a native bear"* (see Appendix 4).

Fortunately counter balancing forces within government had moved to dedicate the Royal National Park in 1879 for preservation of native flora and fauna and, in 2006, the descendants of Biddy and Joey (through their regional peak Traditional Owner body NIAC) have finally managed to obtain National Heritage Listing at least for the Royal National Park and Garrawarra SRA.

When Mr Holdsworth died in 1885, Biddy and her elder brother Joey moved round the Bay to found the La Perouse Aboriginal community as it exists today. With the deaths at Kogarah Bay of Joey in 1887, and Biddy in 1888/9, the La Perouse Aboriginal community lost two of its most senior foundation members, and the Illawarra Tribe lost its "northern" mother and uncle.

## BLOODLINES AND TRIBAL BOUNDARIES

Granny Giles gave birth at Liverpool to a famous daughter, Queen Emma (1840-1916), who was described by one contemporary as *"the last Dharug Princess"*. Most of today's D'harug, Korewal, Guriwayal, and D'harawal peoples - still residing on the old La Perouse Mission as well as throughout Sutherland and south western Sydney - generally trace their ancestry from Queen Emma.

Granny Giles also had two daughters in the Illawarra, Queen Rosy (1842-1931) and Ellen (1855-1933), from whom today's Wadi Wadi people (at Coomaditchie Reserve, Bellambi and elsewhere) generally trace their ancestry (ref [2]). The death certificate # 07672, of Biddy's daughter Ellen, specifically lists her father *"Paddy Davis, Wollongong fisherman"* and her mother *"Biddy Giles"*. Biddy's older daughter Rosie, claiming to be *"in her 88th year"*, told the Illawarra Mercury (4th July 1930) that she

was born on the shores of *"Lake Illawarra, and comes of Royal blood through her father, King Paddy, who died without a son to inherit the throne"*.

In the Macarthur Region and Southern Highlands, the Shepherd and Simms bloodlines can be demonstrated all the way back to the Nulla Nulla Camp on the upper Wollondilly River (ref [12]), with Shepherd bloodline descendants still living on Gundungara country in their heritage-listed Elladale Homestead which is the oldest building in Appin surrounded by ancient Aboriginal caves and rock art that Aboriginal children come to visit and see during NIAC's inter-tribal picnics and meetings. Additionally NIAC, which is a registered charity recognised by the ATO, operates an Aboriginal Dairy at Menangle on the opposite side of the Nepean River supplying free A2 milk on a weekly basis to needy families throughout the region.

> [*NOTE: Both Elladale Homestead and the NIAC dairy have been or are soon to be mined directly underneath, by BHP Billiton, causing severe damage not just to the caves and rock-art and buildings on these properties, but also to the frail cultural and economic basis of this region's Aboriginal organisations*].

The tribal boundaries between these traditional bloodline groups are roughly known. Two centuries ago D'harawal people existed from Botany Bay south to the Royal National Park, and a short distance inland along the Georges River. We know this because in about 1835 Mr. R. Longfield interviewed the then teenaged Aboriginal girl named *bayaroong* (1820 - 1888/9), later known as "Biddy" or "Granny Giles", who was part of the Kurnell Peninsula mob. He recorded that she spoke a mixture of English and *"pure Botany Bay Turruwul (or Tdthurruwal)"* (ref [1(c)]) telling how, when Captain Cook landed in 1770,

> *"her uncle was a little boy ... some blacks went down to meet him and then they all ran away, two fellows stand, Cook shoot them in the legs, and they run away too ... her father was killed at Kurnell by the bite of a rock scorpion on his thumb, so the traditions [stories] did not come to her through him but through her uncle, who told her about the landing of Captain Cook."* (ref [6]).

Somewhere in the vicinity of Helensburgh the territory of these coastal D'harawals joined up with Illawarra's coastal Wadi Wadi people. Ellen Anderson, a daughter of Granny Giles and the Chief of the Lake Illawarra Tribe, in later life living at the Peakhurst Salt Pan Aboriginal settlement, explained *"my father came from the South and my mother from the North. His language was not the same as my mother's. I speak between the two"* (ref [11], pages 15-16), attesting to the fact that Botany Bay D'harawal and Illawarra Wadi-Wadi were indeed different languages.

To their west, most of the Woronora Plateau and today's Macarthur Region were traditionally occupied by Gundungara people who marked their territory with distinctive tree glyphs that never existed on lands occupied by coastal tribes. In *"the Great Walk"* of 1890 the last three Aboriginal children, still living a Traditional Lifestyle in accordance with Gundungara Law and Custom, were finally walked off the Woronora Plateau to the safety of La Perouse by Queen Emma Timbery. A decade later, one of these "Simms" children, gave a fluent account of traditional Gundungara

language as spoken on their Plateau (refs [1] & [3(a)]) and it was published by the Royal Society of NSW in their journal in December 1900. People in the Macarthur Region today claiming to be D'harawal or Thurrawal are simply "off-country" descendants of a "Native Police" contingent amassed on the Macarthur Estate, on Gundungara Traditional Lands, during the first half of the 19th century.

## THE GREAT WALK OF 1890

"Queen Emma" was born at Liverpool in 1840 and described in the early 1900's as *"the last Dharug Princess"*. Her grandmother, "Granny Giles", lived on Mill Creek in the mid 19th century. The Georges River, through Appin Campbelltown and Liverpool, is believed to have roughly been the route taken by Queen Emma in 1890 when she walked *"the littlest Gundungaras"* - the last children still living a traditional lifestyle in accordance with Gundungara Law and Custom - off the Wara-N'hayara Plateau to the safety of La Perouse.

Ellen Anderson's version of the stories told during this *"Great Walk"*, recorded by C.W. Peck at the Peakhurst Salt Pan Aboriginal settlement in the 1920's, relate in many instances to native plants and animals unique to this landscape; plants whose cultural and medicinal value was being explained to the Gundungara children by Queen Emma as they walked along, albeit pursued by Dhuligayal "Banksia-Men" who hurried dawdling toddlers along on their onerous and historic journey - providing a basis for the better known May Gibbs "Snugglepot and Cuddlepie" stories.

Along the way they may have rested for a while with the Everitt family who had 40 acres within the thirteen homestead "Cobrakall" settlement that was founded in 1884, between Georges River and Punchbowl Creek, only to be compulsorily acquired for the Holsworthy Military Reserve in 1913, the ruins of which were rediscovered in 1983 by the Sydney Prehistory Group. It is recorded that the Everitt children *"used to ride, three to a horse, to school in Campbelltown, via the Woolwash and up the old cattle track just to the south-west of the present road. When George Everitt died, the family stayed on for several years before leaving the district"*.

In December 1900 Mary Everitt published an account of Gundungara Aboriginal language in the *Journal and Proceedings of the Royal Society of NSW*. This fine account of Gundungara language, was obtained *"from Bessy Simms alone"*, one of the children from the 1890 Great Walk, who gave a series of language lessons to Mary Everitt at La Perouse more than a century ago. Today there are Simms family descendants, including the oldest Aboriginal woman in the state, still in residence on the Mission at La Perouse and quite able to relate detailed oral traditions of how her father came to La Perouse with Queen Emma on the Great Walk of 1890.

Albert "Harry" Etchells, who was born in Appin on 14th April 1862, was the third settler at "Cobrakall", east of the river, on the Old Coach Road which went on for about five miles before turning into a bridle track through Darkes Forest and on to Bulli. Harry and his elder brother Frank made rum that they sold to thirsty Bulli miners. Some time prior to WW1 a young C.W. Peck (Ellen Anderson's biographer), who was born and raised at Bulli, set out with *"Harry"* from *"a real old fashioned farm ... at Macquarie Fields"* on a cross-country shandradan buggy journey *"all the*

**Figure 4:** *A three wall mural in Campbelltown Hospital's old entrance, circa 1980's, featured Jean Carriage (in red dress) of 1/72 Dan Street, Campbelltown North. She was a great niece of Ellen Anderson who published many traditional local Aboriginal stories.*

*The giant Gymea Lilies, in the background of the above wall panel, were the subject of one of Ellen Anderson's Traditional stories of the Glenfield Minto area and, also, Gymea Bay in the Hacking River - as named by Granny Giles in the 1850's.*

*way to Colong [in the Upper Wollondilly River Valley], and perhaps the Kowmung and Millnigang ... and Bullnigang"* – evidently attempting to retrace the epic 1901 expedition of Mary Everitt and her young niece who, together, successfully descended 2000 foot cliffs into an icy Burrogorang Valley, traversing 15 foot snow-drifts during the coldest winter in recorded history, riding on top of a frozen Wollondilly River, on two massive powerful draft horses, in order to meet Gundungara people at their Nulla Nulla camp and record their traditional songs. By comparison, Peck and Etchells were clowns, their buggy fell apart and they got into all sorts of difficulties, saved only by fine weather and other people.

The present Metropolitan Colliery occurs on this historic and culturally significant landscape - of *"the Great Walk"* oral traditions involving Liverpool's *"last D'harug Princess"* - not far from the forgotten "Cobrakall" township in the Holsworthy Military Reserve, which may have played an important role in post-contact Aboriginal history.

In any event Ellen Anderson's (1925) story of *"the first Gymea or Gigantic Lily"*, the subject of a civic mural in the old entrance to Campbelltown hospital thirty years ago (see Figure 4), is a documented hence "provable" traditional story of country, specifically *"from the Glenfield-Minto area"*, clearly telling of cultural values of the landscape and of the traditional tribal boundary between Botany Bay Turruwal (Dharawal) and Wara-N'hayaran Plateau Gundungara peoples - clearly today's Gundungara and Thurrawal Local Aboriginal Land Councils need to swap their names in accordance with the facts of history.

A number of flora and fauna species mentioned in the Ellen Anderson stories, hence clearly of traditional cultural significance to Aboriginal people (including Simms family descendants at the La Perouse Aboriginal Mission), are unique-to or characteristic-of *Upper Georges River Sandstone Woodland* (which itself is unique on the planet) or *Cumberland Plain Woodland* and *Shale Sandstone Transition Forest* - both of which are **Endangered Ecological Communities** protected by the *NSW Threatened Species Conservation Act 1995* (TSC Act) and by the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).

Some of these culturally significant species and ecological communities, Traditional Materials the subject of documented "stories of country", protected under both state and federal laws, occur in and about the proposed mining area (see Appendix 4)

# COMMENTS ON DRAFT REPORT

Kayandel's report was received just after 19 May 2008 and comments were requested by 11 June 2008. This was too little time for under-resourced Aboriginal communities and their organizations to fully assess a report totalling 1,911 pages, seeking in-principle approval by the NSW state government for no less than 27 longwalls, on highest conservation water catchment containing rock art listed on the Register of the National Estate, encircled by the National heritage Listed Royal National Park and Garrawarra SRA. In addition to being underprivileged and resource starved, many

people have commitments to jobs, family, and various community activities. However NIAC and its member communities will do their best to meaningfully respond.

The first 120 pages of the CD was the written section, also supplied in hard copy (thankyou). This written section has an appendix on engineering aspects. The engineering appendix is not generally clear at an older high school or general community level. What is clear, is the fact that longwall mining is predictably going to cause ground subsidence, therefore damage to Aboriginal sites some of which are listed on the Register of the National Estate. This section was placed in the appendix as a table, with columns listing predicted amounts of subsidence, stress, etc. Whilst the units of subsidence, stress, etc are all defined, there is no plain English explanation of how longwall mining is done and what is going to happen afterwards. Some groups may have difficulty understanding this section for which a realistic visual pamphlet could have been produced, for the Aboriginal and general community use, perhaps drafted by the NSW Scientific Committee.

The engineering predictions claim to be conservative, and that subsidence will be less than predicted, but we argue that the variables are too great and that the science is not good enough. There are numerous great cracks in the Waratah Rivulet, and other places, suggesting that the science underestimates potential damage. The proposed school of thought that river-water flowing down into a crack will re-emerge again downstream is flawed. Even if this were partially so, the emerging water will carry with it dissolved toxic chemicals which have been *"sleeping under the ground for millions of years since the Dream Time"*, and people are going to drink it.

FRC 10, FRC 265, FRC 263, FRC 264, FRC 36, PAD 2, FRC 21, FRC 11, FRC 268, FRC 208, and FRC 269 and possibly more shelter sites were visited in February 2008. To our knowledge, all or most of these shelters had pink marks made on their walls, in groups of three or four, so that surveyors can measure and monitor the relative change in position of these groups of marks, in order to measure rock movement. This methodology can only work if marks are put on different rock panels.

The archaeological section with sites cards and photographs of Aboriginal sites is 1,800 pages on the CD file. This section is good. Some photographs have deteriorated with age but putting the material in electronic form helps document it. This also makes information inexpensively and easily available. We understand that the broader community will also have access to all reports pertaining to the study area within the longwall mining project, and be able to comment. We consider this to be to be important, and it is good that the report is also an educational resource, however we would like all GPS coordinates of cultural heritage sites erased so as not to facilitate vandalism. Approximate Google style maps are probably sufficient for the general public's use.

The 120 or so page written section is generally in plain English. However there are some literacy problems within the general community, and the engineering appendix would not be easy for the general reader. The site cards are also not visually clear for the general reader. They need to be redesigned.

Section 2 "Environment Context" is an educational summary suitable for teaching.

Section 3 "Archaeological Context", subsections 3.1 to 3.3 is a summary of the historical context, using popular known sources but contains some error bars.

Section 3.4 mentions that the field surveys undertaken recorded two Aboriginal heritage sites within the study area. Presumably this is referring to MET 1 and MET 2. The site card for MET 1 and MET 2 falsely describes Allan Carriage as being from the *"Wodi Wodi Elders"* but he is in fact a member of the *Wadi Wadi Coomaditchie Aboriginal Corporation* (a member group of NIAC). This is a culturally offensive serial error, particularly in DECC documentation requiring that the site cards be corrected forthwith, replacing the wrong organization name with the correct one, and making sure to replace the impossible vowel "**o**" (which occurs in no Aboriginal language in Australia) with the correct Aboriginal language vowel "**a**" as in WADI WADI.

In the methodology section 4.1.1, it is stated that, *" prior to the commencement of supplementary fieldwork, all community groups were provided with several comprehensive documents ... Each community group was encouraged to review the provided information and advise the archaeologist of any particular sites/areas that they wished to survey/inspect. All such requests raised by the community groups/parties were incorporated into the survey design and undertaken during the supplementary fieldwork."* This is true but it is difficult for groups to know what sites they would like to see before they have actually physically seen them, and it is difficult for some groups to actually study the documentation in detail due to illiteracy. It is suggested that it would be useful to indicate a list of potential sites to be inspected at least one week prior so that groups can prepare, or at least on the day prior to commencing inspections. Certainly Register of the National Estate listed sites should all be on the itinerary. And time needs to be available for elders to find new sites.

If supplementary Aboriginal cultural heritage related surveys are undertaken, whether as part of an SMP process or otherwise, then NIAC's Traditional owner member groups need to be involved and it would be better that an appropriate amount of time be allocated for this activity, especially in swamp areas. Proper observation can't happen unless the care and time is taken to look. The swamp areas we explored had some very dense vegetation, in some places it was almost impenetrable, in some cases the hard needled *Hakea sp.*, made ground visibility very poor. Time and care was required to find clear patches where observations could be meaningfully made.

Section 6, "Survey Results" is useful. It lists tables of AHIMS listed sites within and around the study area, followed by section with brief paragraph descriptions of each site. The AHIMS tables in section 6.1 are useful. We note that in the tables, the reference to site MET 2 did not mention the directed water channels carved onto the rock platform. These directed water channels are a significant feature. Sites FRC 1 to FRC 10 seem to have been left out of the paragraph description section. Of course FRC 10 is of particular interest because it had examples of cracks from longwall mining, one crack being vertically and over an art panel. In October 2006 this crack was about 1 cm in width. In February 2008 this crack-width had closed to around 1 mm indicating rock movement in the intervening period.

Section 6.2, at the end of the paragraph descriptions notes that, *"during the August 2007 survey, a tree was identified with three horizontal markings of indeterminate origin. One of the Aboriginal community groups has commented that that the tree may be an Aboriginal birthing tree. Archaeologists and the other Aboriginal community representative present consider the markings to be naturally occurring lesions common to the type of tree."* NIAC's previous report explained that this particular tree near the gate of Fire 9H was not a tree bearing birth marks. However there is a tree bearing likely birth-marks near FRC 279, and possibly at FRC 265. Jean Carriage, late mother of Allan Carriage, taught that cuts were made in trees when a child was born. A longer cut was made for male babies. As the tree grew and children were born these marks would indicate the number and gender of children born to a particular family.

This section, 6.2, also briefly mentions inappropriate behaviour by visitors camping in the area, presumably illegally. Mention is made of the dust and graffiti caused by inappropriate levels of access. Visitor access should be restricted and the area policed. There is a clear recognition that damaging sites is inappropriate. But mining clearly causes far more damage to sites than visitors, which is the reason that this ACHA is being conducted.

Section 7 *"Archaeological and Cultural Significance Assessment"*, has a table with archaeological significance ratings of the sites within the study area. **The sites FRC 12, FRC 24.1, FRC 24.2, FRC 31, and NT 8 are all listed on the Register of the National Estate. Nine other sites are rated as having High Archaeological Significance Rating, namely sites FRC 12, FRC 32, FRC 62, FRC 68, FRC 185, FRC 191, FRC 195, FRC 322, and NEW 2.** Twenty-two sites are listed having Moderate Archaeological Significance Rating, and one hundred and fifty seven as having Low Archaeological Significance. **Interestingly NT 8 is given a Moderate Archaeological Significance Rating, despite being listed on the Register of the National Estate.**

The Aboriginal groups suggested that NT 8, NT 48, FRC 62, FRC 185, FRC 340, NT 9, NT 46, FRC 316, NEW 1, NEW 17, and NT 35 were of special significance for various reasons.

Even if there are specific criteria and tests, which are applied to rate the archaeological significance of a site, value judgment is still involved, possibly different observers would yield different results. The elders believe that far more sites should be assigned High and Moderate Archaeological Significance Rating. NT 8 for example should be rated as High.

The attitude that a site is of *"low significance because it is represented by other similar sites"* in the area, implies that only unique sites should be preserved. Taken to extremes this implies that only one example of each particular type should be preserved. All these sites are important because they collectively represent the lives and culture of past people – the material remains. Such evidence of the vibrant lives of these peoples is also important spiritually, culturally, and scientifically to any

humane and progressive society – especially one that has apologised to its Aboriginal people.

Section 8, *"Nature of Predicted Impacts from the Project"*, states that *"The Project has the potential to impact Aboriginal heritage directly via general surface disturbance and indirectly via mining induced subsidence movements."* This may subtly suggest that *"direct"* disturbance may somehow have a greater impact than *"indirect"* disturbance. "Direct" disturbances such as exploration works, ground water monitoring bores, undertaking subsidence monitoring, undertaking surface rehabilitation, etc, would not be necessary if "indirect" disturbances like longwall mining did not occur. One could therefore argue that longwall mining will cause both "direct" and "indirect" disturbance.

The table below from page 79, of the ACHA draft report May 2008, lists "indirect" impacts from longwall mining, on Aboriginal sites listed on the Register of the National Estate.

| Site No | Site Type | Maximum Predicted Subsidence (mm) | Maximum Predicted Tilt (mm/m) | Maximum Predicted Strain (mm/m) | |
|---|---|---|---|---|---|
| | | | | Tensile Strain (mm/m) | Compressive Strain (mm/m) |
| FRC 12 | Open Site | 705 | 6.1 | 0.6 | 0.4 |
| FRC 32 | Open Site | 413 | 2.5 | 0.4 | 0.5 |
| FRC 62 | Sandstone Overhang | 452 | 4.1 | 0.5 | 0.6 |
| FRC 68 | Sandstone Overhang | 382 | 2.2 | 0.4 | 0.5 |
| FRC 185 | Sandstone Overhang | 363 | 3.8 | 0.8 | 0.3 |
| FRC 191 | Sandstone Overhang | 360 | 4.3 | 0.8 | 0.3 |
| FRC 195 | Sandstone Overhang | 353 | 6.0 | 0.6 | 1.4 |
| FRC 322 | Open Site | 486 | 2.4 | 0.4 | 0.3 |
| NEW 2 | Sandstone Overhang | 385 | 3.6 | 0.6 | 0.2 |

Table 4: Source: MSEC (2008).
Maximum Predicted Subsidence Impacts at Aboriginal Heritage Sites with High Archaeological Significance

Source: ACHA Draft 2008, page 79

Even if the engineering science were adequate, these maximum predicted subsidence numbers of around half a centimeter are enough to cause huge cracks in the Waratah Rivulet, Aboriginal sites, and elsewhere. Even a small rock movement could be enough to release compressive forces that cause rocks on river beds or cave walls to crack and "explode", throwing huge slabs into the air. Even small cracks can introduce damaging water seepage into a shelter. We predict that the Woronora Reservoir, providing drinking water for millions of people, including Traditional Bloodline Owners, will also crack and drain as did Cordeaux, and the Cataract, and the Georges, and the Nepean, as well as the upper Waratah Rivulet. Weather this will

ultimately be permitted is for the broader community and the NSW state government to decide – a government that was put into power with a sixteen seat majority by the NSW Greens, who preferenced them in 24 marginal seats in exchange for an upper-house seat. Aboriginal Traditional Owners are also concerned that significant damage will occur to numerous Aboriginal sites listed on the Register of the National Estate. It is important that the broader community also has access to information, and the opportunity to make their comments, based upon their expertise.

To the credit of Helensburgh Coal, they have involved Traditional Owners in some preliminary field-work throughout their Colliery to date, and have not attempted to obstruct or prevent Aboriginal access, or the taking of GPS readings and photographs, but far more fieldwork needs to be done here, even if just following up existing damage and remediation arising from previous longwalls. Certainly if any subsequent Aboriginal cultural heritage related fieldwork is undertaken within the area of this present mining proposal, either as part of an SMP process or otherwise, then elders form NIAC's traditional Owner member groups wish to be professionally involved at all stages.

In stating this, it does not mean that Traditional Owners from NIAC's member groups agree with the longwall mining project. In fact, they oppose longwall mining with in 1 km of major rivers and dams and Aboriginal Sites of High and Moderate Archaeological Rating, and it needs to be emphasised that more sites should have been rated as High and Moderate (recall that NT 8 which is on the Register of the National Estate but was only assigned a Moderate rating).

# SELECTED FIELD OBSERVATIONS

## *NEW 2 – Register of the National Estate listed shelter*

The site NEW 2, listed on the Register of the National Estate, is a shelter with about 156 charcoal artworks, concave ground rock depressions, grinding grooves, and deposits. Its art motifs range from bands of numerous 2cm long triangular shapes (which Wadi Wadi elder Mr Allan Carriage recognized as Bogong Moths), on an upper wall panel (Fig. 5A), to a 10 cm depiction of a man painted with V-shaped stripes and maybe two wombats (Fig. 6). The charcoal Bogong moth artwork possibly dates to, or was subsequently done afterward to commemorate, an atypical historic event in 1868-9 that was independently recorded by numerous European sources such as Reverend Clark whose church, at St Leonards in Sydney, was filled with moths from such an enormous freak swarm that they could be heard flying en-mass overhead. Other contemporaries state that so many moths flew on beyond Sydney, drowning at sea, that they littered the beaches for 150 miles. Surprisingly the reason for this once-off event (the last great flight of the Bogongs) was the begrudging passage, through an almost bankrupt NSW Parliament, of the Manhood Suffrage Act which finally recognized that vast monopolistic landholdings of English and Scottish


**Figure 5A:** *Outlined by a red rectangle (top right) we see horizontal bands of Bogong moths, depicted on an upper wall panel, toward the darker roof-portion of the shelter NEW 2, which is now listed on the Register of the National Estate. The red rectangle (bottom left) is an enlargement showing the moths in more detail. NIAC suggests that this artwork may date to the years 1868-9.*




**Figure 5B**: *Wayal-bayar, typical hemispherical mortar depressions, in which to mash Bogong Moths, stained black by charcoal and Bogong grease.*

**Figure 5C**: *Bul-i-bayar, a typical pestle for mashing Bogong Moths.*

**Figure 5D**: *for comparison, some actual grinding grooves at NEW 2.*

lairds were unsustainable without the white slavery of NSW's beloved "convict system". This NSW Act finally allowed small farmer-settlers to own land throughout NSW under the Torrens Title system that had been pioneered in South Australia. Accordingly convoys, 200 wagons at a time, trekked overland supported by River Murray paddle-steamers, bringing entire farming communities from South Australia's Barossa Valley to places like Walla Walla, Albury, and Wiradjuri lands generally throughout western NSW and southern Queensland. Unfortunately their agricultural practices, involving extensive land-clearance ploughing and cultivation of Steinwedel Wheat, fundamentally disturbed broad leafed dicotyledon plants throughout the vast western plains from whence Bogong caterpillars hatch each June (see Appendix 4). This independently corroborated last great flight of the Bogongs in 1868-9, corresponding to the birth of the wheat industry in NSW, provides a likely date for the charcoal artwork in NEW 2. In addition to the Bogong Moth pictures in NEW 2, we also found likely "mortars" for mashing pre-charred Bogong Moths into a butter type meal (Fig 5 B). The hemispherical depressions of these rock mortars were a dark colour, suggesting charcoal and oily residue, arising from pre-cooking of the moths. It would be interesting to take a chemical sample. For the sake of comparison, Figure 5D shows some of the more familiar long thin grinding grooves that also occur at NEW 2.

**Figure 6:** *Motif of a man with painted V shaped stripes and two wombats, also at site NEW 2.*

## *Irrigation Channels near New 1*

The Wadi Wadi elder, Mr Allan Carriage, also discovered the system of directed irrigation channels near NEW 1 (see Figure 7). These channels were engraved on the rock platform, directing water into natural basins that may have been enhanced for water storage. Allan also previously found another significant system of directed irrigation channels at MET 2 where there was also a system of improved basin like depressions, for water storage, that may have been designed for staged washing. Allan's tells how his late, mother Jean Carriage, used sequential basins in sand by the sea-shore to wash fish in stages.


**Figure 7:** *Paul Cummins studies the directed water channels at NEW 1.*

## *FRC 3, Possums and Wombat, Charcoal Art*

FRC 3 is just one example of a site that should be given a higher archaeological significance rating. Whilst it only has a few art motifs (in comparison to NEW 2 which has 156, or FRC 195 which has 92) it does have particularly beautiful and well preserved depictions of a wombat and two possums (Figure 8). This motif is about half a meter in height and located on the floor panel.


**Figure 8:** *A well preserved and clear motif in FRC 3, depicting a wombat, a possum, and another possum or wallaby.*

## *FRC 12, Register of the National Estate listed engraving of "Dharamulin" with implement*

FRC 12 has 33 grinding grooves in groups, and a striking engraving of "Dharamulin" with an implement (Kayanel Archaeological Services, Report September 2007). The engraving is approximately 5.5m by 4.5m.


**Figure 9:** *Spectacular depiction of Dharamulin with an implement at site FRC 12.*

## *FRC 265*

The site FRC 265 has a good selection of artefacts (shown below in Figure 10) including a mudstone which looks like it has been knapped into a scraper, igneous material knapped into and axe shape, several smaller flakes, and other mudstone and igneous materials that look like they were knapped to be small scrapers. In the vicinity of this shelter is a tree with birth-marks (Fig 11) found by Wadi Wadi elder Mr Allan Carriage. Such marks are common on trees in that area. When a child is born to a particular woman, a cut is made in a nearby tree. A longer cut is made for a male child, and with time the tree grows, and one can determine the umber, gender, an age of the children born. Clearly people spent a lot of time in this cave, knapping tools, and therefore would have been settled enough to have children there. Allan Carriage has also previously found a "birth mark tree" at FRC 179. For comparison the tree found on Fire Road 9H, near the gate, does not bear birth-marks (Figure 12).


Fig 10

Fig 11

Fig 12

**Figure 10**: *Tools and other artefacts found at FRC 265.*

**Figure 11**: *Wadi Wadi elder Mr Allan Carriage points out actual birth-marks cut into a tree in the vicinity of FRC 265 to signify the birth of children.*

**Figure 12**: *For comparison these marks, on a tree near the gate of Fire Road 9H, are not birth-marks.*

## *Possible Cairn in the vicinity of 2-0629 and 2-0619*

A cairn is a specially positioned pattern of stones, a bigger stone surrounded by smaller ones. The odd stone in Figure 13 was noticed by Gundungara elder, Mr Keith Simms, who noted that there was no place from which it could have fallen into the immediate area. The surrounding rock platforms did not have such stones on them, and it appeared that drainage was not so steep as to wash stones down from adjoining areas. Also the larger stone is close to a short precipice but has not been washed over the edge, indicating that water velocity is low, hence that it may have been purposefully placed there. Keith thinks it likely that even the smaller surrounding stones have been placed here about the central large stone, and that the entire assemblage is a cairn. Figure 13B, is a long distance photo, showing the surrounding context.


(ABOVE) **Figure 13A:** *A possible cairn, comprising a central large stone surrounded by smaller ones that may have been disturbed.*
(BELOW) **Figure 13B:** *A photo from further away, showing the oddness of the rock location and its surrounding context.*

## *MET 1*
## *shelter with Red Ochre Hand Stencils, and Artefacts*

In a previous survey during August 2007, Wadi Wadi elder Mr Allan Carriage found this new shelter which has subsequently been given the name MET 1. It contains a number of red ochre hand stencils, that could potentially be thousands of years old, as well as flake artefacts. Figure 14 shows Gundungara elder, Mr Keith Simms, in front of the red hands on one side of the shelter wall panel.

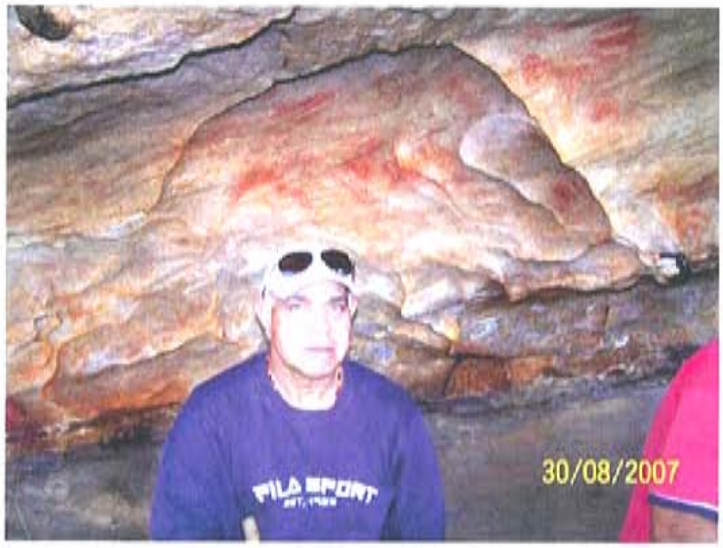


**Figure 14:** *Red ochre hand stencils at MET 1, with Gundungara elder, Mr Keith Simms, indicating scale.*

## ILLUSTRATIVE EXAMPLES OF CRACKING CAUSED BY MINING

Elders from NIAC's Traditional owner member groups have observed many shelters with cracks in them. NIAC's previous report (Oct 2007) showed a photograph of as single-groove site, FRC 168, which had a cracks in the rock platform. We include this again as Figure 15A.

Figure 15B is a rough sketch showing the various locations, of the following examples.

**Figure 15A:** *Cracked rock platform at groove site FRC 168.*

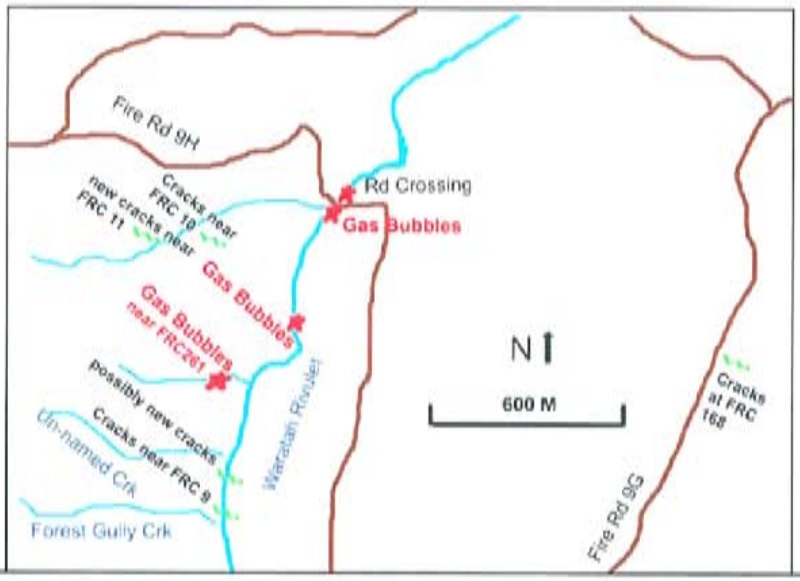


**Figure 15B:** *The locations of some cracks observed in the field by elders from NIAC's member groups. The red star shapes represent gas bubbles, whilst green jagged lines represents cracks*

Figure 16A, shows an almost vertical crack on a charcoal drawing (possibly a possum) on the lower panel of FRC 10, as it was October 2006, and as it was February 2008. In October 2006 the crack was 1 to 1.5 cm wide but, by February 2008, this gap had closed indicating significant rock movement. In the FRC 10 shelter there are also hairline cracks allowing water to enter and damage the art. A strip of silicone has been placed over the motif on the left of the lower panel, to direct water flow away, and four pink marks have been made for study purposes (Fig 16B). These pink marks are circled in red as they are not visible in the photograph. The red arrow shoes the relative position of the motif with the crack. The panorama is of course not accurate in scale or perspective. The pink marks are being made to measure the amount of rock movement. As far as we know, shelters FRC 10, FRC 11, FRC 21, FRC 36, FRC 208, FRC 263, FRC 264, FRC 265, FRC 209, and PAD 2, possibly more, are having groups of pink marks made on plain wall surfaces (not on art motifs of course) so that surveyors can measure the change in their relative positions between one another and thus determine the amount of rock movement over time.

Figures 17, shows examples of cracks in river-beds whilst gas, most likely methane, bubbles up. Subsidence is predicted to be of the order of centimetre dimensions and, though we doubt that the science is accurate enough, the elders point out that even a few centimetres still results in substantial cracking of river beds and caves, and methane gas bubbling up into the river - in 2006 we saw dead frogs at the river crossing. Allan Carriage tells a story about when he worked with pit-ponies in a coal mine near Mt Nebo, *"I used to come out may back all wet from water leaking in from the Cataract Dam above. One part of the mine had to be closed down because it got flooded."*

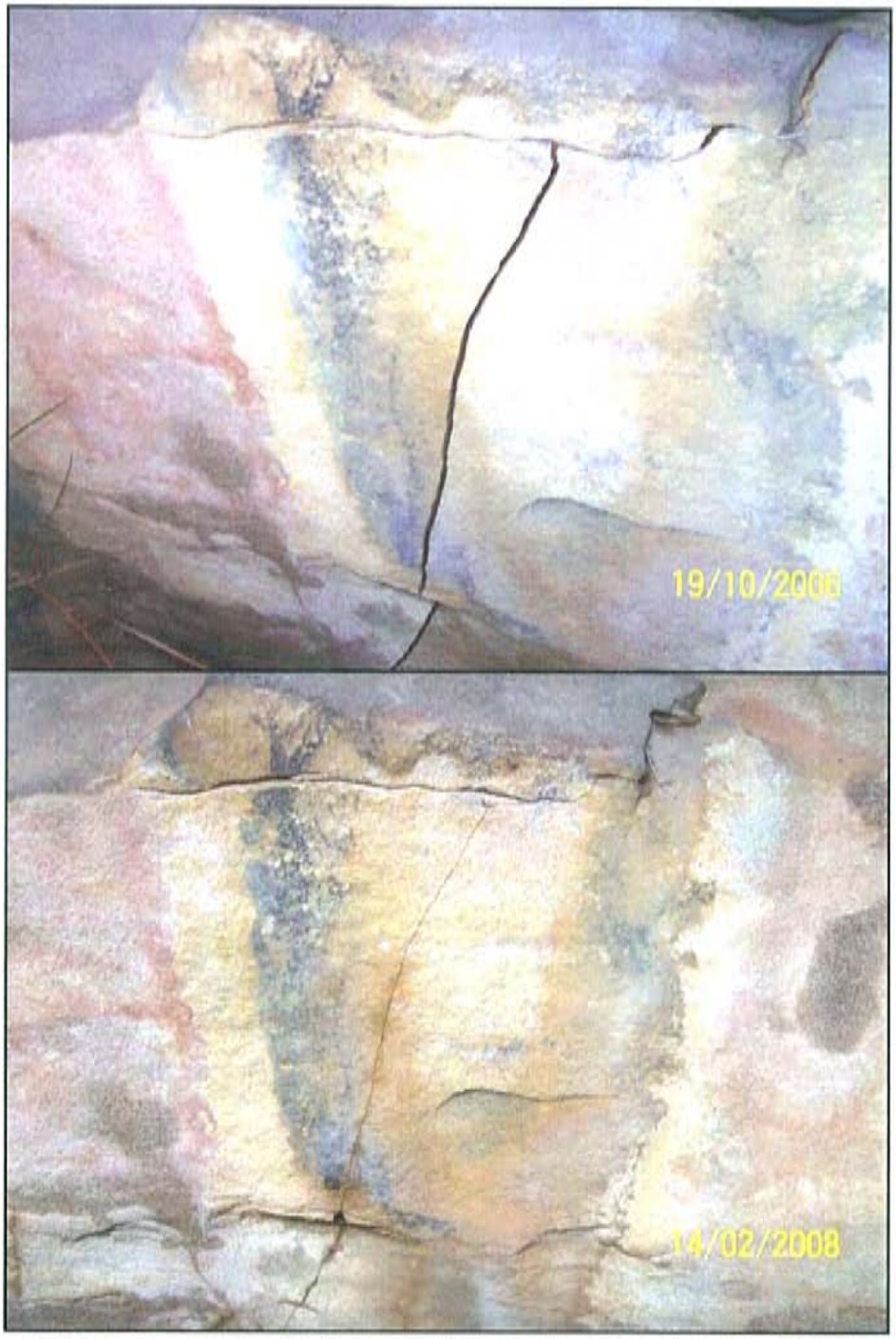


**Figure 16A:** *A vertically inclined crack on the right side of an art panel in FRC10, caused by longwall mining. On 19th October 2006 (top) the crack was about 1.5 cm wide but by 14th February 2008 the two sides of the crack had been pushed together. Despite rock movement the crack remains letting water in to damage the artwork.*

**Figure 16B:** *A distorted perspective panorama of FRC 10 wall panels showing their relative location. The red arrow shows the motif with the crack in it. A strip of silicon has been put over the top of the motif on the left to channel away water which has been entering through cracks caused by longwall mining. In these pictures we have placed red circles around the pink marks actually placed on the rocks by surveyors to measure the relative change in positions over time and thus extrapolate the amount of rock movement. In all there are 11 pink test marks placed in FRC 10.*


Figure 17A:

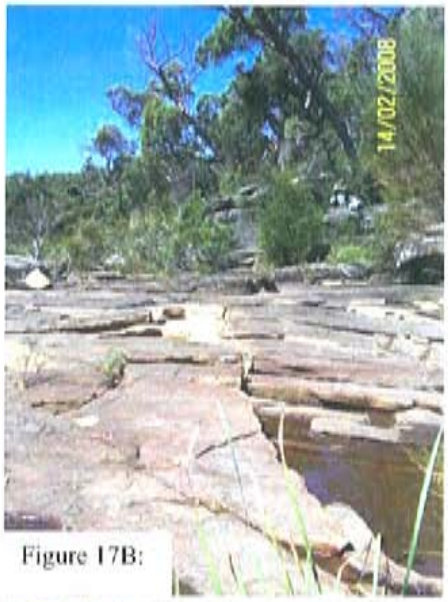


Figure 17B:

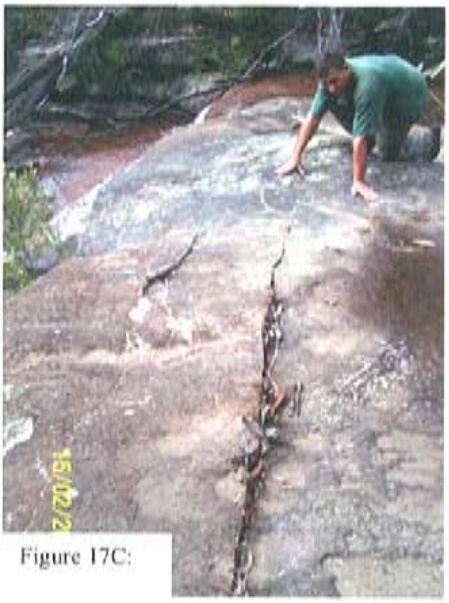


Figure 17C:


Figure 17D:


Figure 17E:

*Cracks shown in Figures 17A and 17B, are below FRC 9 and FRC 10 in the Waratah Rivulet.*
*Cracks shown in Figures 17C and 17D are at approximately the same place, near FRC 11, in a creek. These may be new cracks. The (methane) gas bubbles shown in Figure 17E were observed on the western side of the Waratah Rivulet road crossing.*

# DISCUSSION

The elders from NIAC's respective Traditional Owner member groups have not changed their views since the last report (ref [8] page 6) which stated

> *"... in principle the elders oppose longwall mining underneath major waterways such as the Waratah Rivulet. They support a one kilometre buffer either-side of the centreline of the river - based upon the findings of the NSW Scientific Committee which declared longwall mining 'a Key Threatening Process' and ruled that cracks from longwall blocks of about the proposed size travel more than a kilometre. The elders ...wish it known that they in no way endorse or give consent for the proposed longwall blocks and they assume no responsibility for the likely damage if approvals are given - especially from longwalls ... which undermine the Register of the National Estate listed site FRC 12; and also from longwall 20 and its successors proposed perpendicular to, and underneath, the Waratah Rivulet".*

Whilst the fieldwork to date with Resource Strategies and Kayandel has been friendly and professional, and the reports produced by Kayandel are responsive to issues raised, the elders from NIAC's respective Traditional Owner member groups have not to date been involved in anywhere near enough fieldwork visiting, and seeing first-hand, all of the AHIMS-listed sites within the project area even once. They have only been involved in a week or two's fieldwork once every year or six months, enabling them to study a sample of interesting sites, some more than once over a period of years, gradually developing a worthwhile database and some degree of continuity of knowledge, allowing some degree of informed feedback.

However the present Metropolitan Colliery application seems to be seeking an important "in principle" decision amounting to, or leading to, First Workings Approval of 27 or so longwalls all at once - which is a problem given that Second Workings Approval is largely automatic (as mining companies argue that they have heavily invested in underground roads etc, based upon First Working approval, and that "continuity of supply is at stake"). Any company seeking such a sweeping approval whilst making $1.2 million per day, at the expense of heritage listed Aboriginal caves rock art and Traditional Materials, can reasonably be expected to have funded Aboriginal elders from NIAC's Traditional Owner groups to comprehensively assessed all Aboriginal heritage in the field, and should have done so over the last three years, prior to this present monster application. The fieldwork to date should have involved studying flora and fauna, as well as verifying known sites, finding new ones, and monitoring previously visited sites that were seen to have been cracked or damaged. Having only infrequently been involved in relevant fieldwork, annually or six-monthly, the elders from NIAC's respective member groups repeat what was said in their August 2006 report (ref [7], pages 3 & 4):

> *"... the destruction of Aboriginal caves and rock art is occurring at an accelerating rate throughout the entire Wara-N'hayara Plateau - as measured by the unprecedented number (in the thousands) of 'consents to destroy' granted in recent years and currently being sought. It is becoming a serious question just how many sites will ultimately be left ... for future generations, even ten years from now, if Aboriginal Traditional Owners are not soon given some real say in the management and control of their country.*

*So many of these sites, in such a state of preservation, being located in uneven country directly over or within the likely zone of influence of current and proposed longwalls is a very real concern to Aboriginal Traditional Owners ... given the heritage that is at stake, throughout and adjoining the application area, at such risk of collapsing that numerous 'permits to destroy have already been recommended by expert consultants ... the sheer number of fragile irreplaceable Aboriginal heritage sites within the zone of influence, in the context of the known cracking and damage to sites from previous longwalls, requires at least weekly (perhaps twice weekly) inspections by a NIAC team of no less than three Aboriginal Traditional Owner site workers (given the size and ruggedness of the terrain), over the next few years, for the duration of the proposed mining. Only in this way can cracking and damage to the giant rock art panels and sites be detected in time for any sort of remediation to be attempted in a meaningful way'"*

These misgivings were repeated in NIAC's October 2007 report (ref [8], page 5) which stated

*"... there are potentially serious problems with continuity of memory and knowledge due to the infrequency of professional employment (once per year) ... of fieldworkers from NIAC's member groups by Metropolitan Colliery ... This ... makes it harder for senior knowledge-holders from the respective Aboriginal communities to participate on an ongoing professional basis, meaningfully remembering observing and comparing changes that occur over time, for DECC purposes. ".*

During fieldwork the elders have begun to study culturally important flora and fauna, finding marked and scarred trees (see Fig 4 on page 11 of ref [8]) and other interesting things (see Figs 5, 6 & 7 on pages 12-13 of ref [8]), but there has been insufficient fieldwork to do this to their satisfaction. This is a shame because human impact in and about Metropolitan Colliery has caused loss of the Grey Kangaroo, Wallaroo, Potaroo, Eastern Quoll, Tiger Quoll, Koala, Rock Wallaby, Platypus and Brown Phascogale, the Powerful and Sooty Owls are endangered, there are concerns for the Greater Glider and the Mountain Brushtail Possum, whilst amphibians and fish stocks in the Waratah Rivulet and Woronora Reservoir appear to be reducing or at least changing in nature.

All this in addition to the large-scale destruction of AHIMS and Register of the National Estate listed rock art, for which the Aboriginal communities represented by NIAC's Traditional owner member groups have never received any compensation whatsoever - despite NIAC having clearly flagged concern by lodging a formal claim with the NSW Coal Compensation Board most of a decade ago, and a Schedule 14 hand-back with NSW NPWS seven years ago, and despite NIAC's member groups individually attempting several Native title Claims in the Federal Court with no funding and no legal help, and despite NIAC seeking and getting National Heritage Listing of surrounding countryside - only to find that NIAC's Traditional Owner member groups are expected to continue living and dying in poverty and disadvantage whilst NSW politicians grant themselves $80,000 per year pay-rises and eating in classy restaurants on ill-gotten coal royalties, whilst Metropolitan Colliery extracts $1.2 million per day enjoying world record prices of $300 per ton, earned by

destroying in bulk our Register of the National Estate and AHIMS-listed rock art and other cultural heritage over vast areas.

Even from just a business perspective, the only share of the "economic miracle" at Helensburgh that the region's Aboriginal communities seem to have ever obtained is a week or two's paid work once a year – quite different to the $1 per ton royalties which NIAC believes they should have been receiving over decadal timescales. None of NIAC's community projects have ever been funded. Aboriginal people are still living in tents, and burning to death about the region in kerosene and candle powered tin or asbestos shanty's and caravans. Even the NIAC Dairy has for several years relied upon a crippled old dairyman hand milking the cows, on bare mud, in an open paddock, in often freezing cold weather, whilst volunteers scour recycling bins for used bottles that are washed and disinfected by hand.

It is unreasonable to expect Aboriginal communities throughout this region of Australia, in which a quarter of all Aboriginal people actually live (more than in the entire Northern territory), to support any activity which destroys their cultural heritage without compensation or equity, giving them little real say in the decision-making process which disrespects provable historic Traditional Aboriginal bloodlines and connections to country.

The elders from NIAC's Traditional owner member groups would also like to say that dealing with 27 or so longwall blocks in one go, based on the limited payed fieldwork to date, has been a big strain on the resources of their respective Aboriginal communities. They have collectively made a big effort to produce this report, at short notice, because of what is at stake and the scale of it all. The elders from NIAC's Traditional Owner groups throughout the region all oppose Metropolitan Colliery's present application proposing mining underneath

1) the Waratah Rivulet,
2) the Woronora Reservoir, and
3) scores of Aboriginal heritage sites, listed under both state and federal laws.

The NSW Scientific Committee recently determined longwall mining to be a **Key Threatening Process** on and about the Woronora Plateau, generating **cracks that could extend for more than a kilometre.** Additionally Figure 18 shows that most of the Aboriginal art-sites listed on the Register of The National Estate, and also most of the AHIMS-listed sites deemed by Kayandel to be of *"the highest conservation value"*, lie approximately within a corridor extending one kilometre either-side of the centreline of the Waratah Rivulet. The elders require that the Waratah Rivulet, the reservoir, and their highest conservation sites as shown in Figure 18, should not be mined underneath. They suggest a compromise that would not interrupt continuity of supply, but may meet some basic conservation criteria.

Under stringent conditions, outlined below, the elders of NIAC's Traditional Owner member groups might not object to First Working Approval being given to Metropolitan Colliery if they observe a one kilometre buffer either-side of the whole remaining length of the Waratah Rivulet, and about the Woronora Reservoir, in accordance with the NSW Scientific Committee's findings. It is a generous compromise on the Aboriginal community's part because, although the proposed one

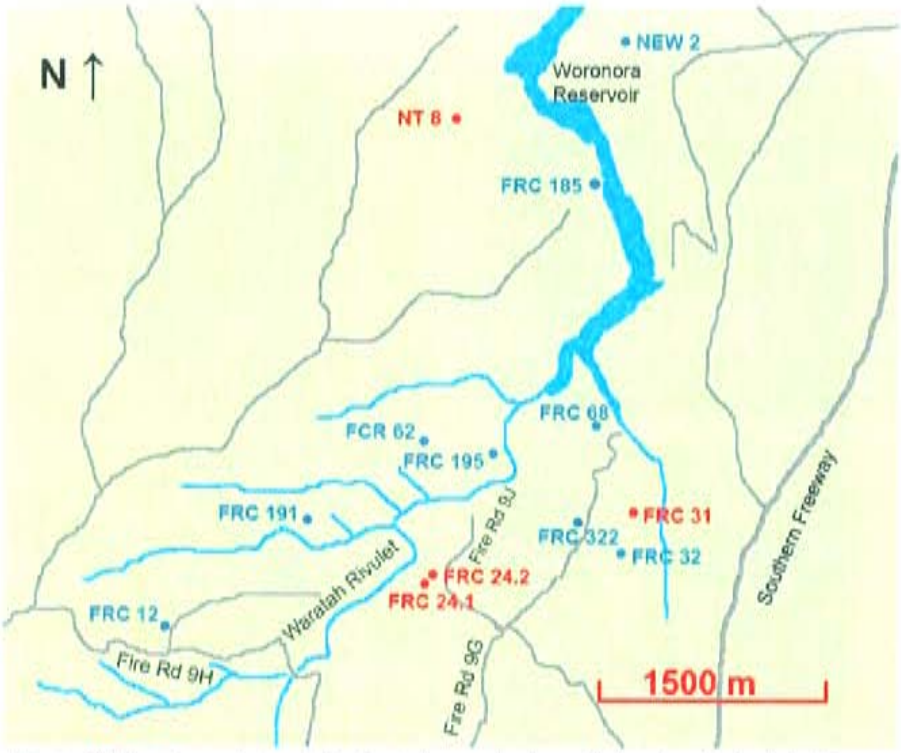


**Figure 18:** *Locations of sites within the study area having a high archaeological significance rating, are shown in blue (FRC 12, 32,62,185,191,195, FRC 322, and NEW 2) and those listed on the Register of the National Estate are shown in red (FRC 12, 24.1, 24.1, 31, and NT 8) .*

kilometre buffer would probably maintain the integrity of the remainder of the waterway and reservoir, some of the highest conservation value Aboriginal cultural heritage sights still lie toward the edge of the proposed buffer zone, within the zone of likely adverse influence - but at least they would not be mined directly underneath.

The elders feel that First Workings approval should be refused for Metropolitan Colliery's presently proposed longwalls 18-44. However if, and in whatever form, First Workings approval may ultimately be given to Metropolitan Colliery – the federal DEH would need to be fully informed and it would need to be part of the terms of any approval that the Metropolitan Colliery would have to undertake far more extensive fieldwork, specifically involving elders from NIAC's respective Traditional Owner member groups on a significantly more frequent professional basis, as part of all SMP and other related fieldwork throughout and about the study area, to identify additional sites, to inform the detailed design of management measures, to monitor the effects of subsidence (from proposed and past longwalls) and to test predictions/or inform adaptive management. Additionally, as part of the terms of any approval, the NSW state government would need to address some of NIAC's concerns outlined in the Executive Summary, whilst Metropolitan Colliery would need to agree to significantly fund a range of NIAC's broader Aboriginal community projects (as also indicated in the Executive Summary) on a level comparable to some percentage of royalties.

The 16th Dec 2007 children's Christmas party, at La Perouse Mission, in which several thousand people participated—many with Traditional connections to Woronora Plateau. The La Perouse Mission community committee received sponsorship and assistance from NIAC and others to hold this very successful Christmas party

The Illawarra has more than seven thousand Aboriginal people, many with Traditional Connection to the Woronora Plateau. The Wadi Wadi community's landcare work recently won a prestigious civic award at Wollongong City Council's 13th Dec 2007 Rise and Shine ceremony— picture at top shows Wollongong's Lord Mayor, Alex Darling, publicly presenting this award to Wadi Wadi elder Allan Carriage.

The Gundungara Aboriginal community in the Macarthur and Southern Highlands regions operates a dairy farm at Menangle and also the heritage listed Elladale homestead at Appin. Their dairy supplies free A2 milk on a weekly basis to needy Aboriginal communities in Sydney, the Illawarra, and south-west Sydney regions.


NAIDOC 2005 festival, organised by NIAC on Bellambi Oval, attended by almost one thousand Aboriginal people from different regions about the Woronora Plateau. There were traditional dancers, musicians, bouncy castles and amusements, Aboriginal arts and crafts, and face painting. A barbeque, cups of tea, milkshakes and ice-cream from the NIAC dairy, were provided.





NAIDOC 2005, organized by NIAC, on Bellambi Oval. Musicians, traditional art, billboards.

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# APPENDIX 1

Condensed version of NIAC's Australian Heritage Database nomination, including Metropolitan Colliery's presently proposed mining area

*Australian Heritage Database*

Place Details

## Wara-n'hayara Plateau Area, NSW, Australia

**Photographs:** None
**List:** National Heritage List
**Class:** Indigenous
**Place ID:** 105810
**Place File No:** 1/11/092/0064
**Summary Statement of Significance:**

The Wara-n'hayara Plateau Area provides an unusual combination of a narrow coastal plain, rugged escarpment and rich forest and pasture land and constitutes a landscape of considerable grandeur. Cliffs of the escarpment are generally sheer and spectacular, extending in relatively unbroken lines for many kilometres. The varying colours of their sandstone exposures contrast with the mixed heath vegetation and low forest at the plateau edge, and the mature eucalypt forest and pockets of lush remnant rainforest near the cliff base and on deeper soils on the slopes. The place supports an interesting and varied flora and fauna.

Wara-n'hayara provides evidence of Aboriginal occupation and use dating from at least 7 400 years ago. It contains thousands of recorded Aboriginal sites, including rock shelters, artefact sites, middens, scarred trees, pigment art, engraved art, grinding grooves, stone arrangements and burials. The rock art forms a small component of the broader Sydney Basin regional art style, yet shows stylistic variability. There are several Indigenous stories and place names relating to Wara-n'hayara and traditional beliefs associated with certain places, such as Mt Kembla and Mt Keira and a sacred waterhole at Appin.

**Official Values:** Not Available

**Description:**

The Wara-N'hayara Plateau Area covers a large portion of the Woronora Plateau and the Illawarra Escarpment, includes a corridor along the Nepean river from west of Wilton to Wallacia, and runs south from the Royal National Park to west of Lake Illawarra. **The place includes Royal National Park and Garrawarra State Conservation Area. It supports large areas of natural vegetation, the largest of which are the Sydney Water catchment areas in its western and south-western portion, which is predominantly heath and eucalypt woodland. It also includes the Holsworthy defence training area**

**in its north-western portion, Heathcote National Park on the immediate western border of Royal National Park, and other reserves, including Dharawhal and Illawarra Escarpment State Conservation Areas and Macquarie National Park. The Wara-N'hayara Plateau Area contains the Royal National Park and Garrawarra State Conservation Area within its north-eastern border.**

The plateau is drained, and in areas deeply dissected, by a series of rivers including the Woronora River system in its north-eastern portion, the Georges River system in its northern portion and the Nepean River system along its western flank. The Nepean and Woronora River systems have large pondage areas that provide drinking water to Sydney and the Illawarra, and include the Cataract, Cordeaux, Avon, Nepean and Woronora Dams.

**Location:**

About 150,000ha, west of Wollongong, comprising an area bounded by a line commencing at the intersection of the 50m contour and the eastern boundary of Macquarie Pass National Park, then northerly via the 50m contour to its intersection with the southern boundary of Royal National Park, **then northerly and westerly via the western boundaries of the park and Garrawarra State Recreation Area to the Old Princes Highway, then northerly via the western sides of that highway and the Southern Freeway to Bundarra Street, Waterfall, then westerly via Grid west to its intersection with the eastern boundary of Heathcote National Park, then northerly via the park boundary to its intersection with Heathcote Road (approximate AMG point 315440mE 6227800mN), then north westerly via the southern side of Heathcote Road to its intersection with the railway line (approximate AMG point 311600mE 6239820mN), then westerly via the southern railway reserve boundary to its intersection with Georges River (approximate AMG point 307080mE 6239560mN),** then southerly via the left bank of Georges River to its intersection with Wedderburn Road, then southerly via a 500m offset to the west of the middle thread of the Georges River extending from its intersection with Wedderburn Road in the north to its intersection with the Sydney Water Catchment Lands boundary in the south, then southerly via the western boundary of the Sydney Water Catchment Lands to its intersection with Tourist Road, then easterly via the northern side of Tourist Road to its intersection with the Illawarra Highway, then easterly via the northern side of the Illawarra Highway to its intersection with the western boundary of Macquarie Pass National Park, then southerly and easterly via the park boundary to the point of commencement.

Also included are the following: 1. An area comprising a 1 kilometre offset either side of the middle thread of the Nepean River extending from its intersection with the western boundary of the Sydney Water Catchment Lands to its confluence with the Warragamba River. 2. An area comprising a 1 kilometre offset either side of the middle thread of the Cataract River extending from its intersection with the western boundary of the Sydney Water Catchment Lands to its confluence with the Nepean River.

**That portion of NIAC's originally nominated area (the Royal National Park and Garrawarra State Recreation Area) which has already been included in the National Heritage List (as from 15 December 2006).**

Report Produced: Tue Dec 4 13:09:36 2007

# APPENDIX 2

## *Ellen's legacy*

fifty two traditional stories of country

| *TITLE* | *SOURCE* | *LOCATION* |
|---|---|---|
| the first waratah | *Australian Legends* (1925), pages 9-13<br>*Australian Legends* (1933), pages 17-23 | Burrogorang Valley, NSW |
| the first gymea or gigantic lilly | *Australian Legends* (1925), pages 14-21<br>*Australian Legends* (1933), pages 24-32 | Glenfield-Minto area, NSW |
| how the waratah got its honey | *Australian Legends* (1925), pages 22-25<br>*Australian Legends* (1933), pages 51-54 | Burrogorang, NSW |
| how the white waratah became red | *Australian Legends* (1925), pages 26-29<br>*Australian Legends* (1933), pages 70-74 | Sherbrooke = Bulli Tops, and Mittagong, NSW |
| how the sky was lifted up | *Australian Legends* (1925), pages 30-37<br>*Australian Legends* (1933), pages 75-83 | Murrumbidgee River, NSW |
| the first kangaroo (story 1) | *Australian Legends* (1925), pages 38-42<br>*Australian Legends* (1933), pages 84-88 | south eastern Australia |
| the struggle for supremacy between birds and animals | *Australian Legends* (1925), pages 43-47<br>*Australian Legends* (1933), pages 93-98 | Megalong Valley, NSW |
| how the pistils of the waratah became firm | *Australian Legends* (1925), pages 48-51<br>*Australian Legends* (1933), pages 103-107 | Burrogorang Valley, NSW |
| why the waratah is firm | *Australian Legends* (1925), pages 52-55<br>*Australian Legends* (1933), pages 177-181 | George's River, NSW |
| the first bushfire | *Australian Legends* (1925), pages 56-61<br>*Australian Legends* (1933), pages 122-128 | Hunter River |
| the first Kangeroo (story 2) | *Australian Legends* (1925), pages 62-65<br>*Australian Legends* (1933), pages 89-92 | Yerranderrie, NSW |
| the bubbling spring | *Australian Legends* (1925), pages 66-73<br>*Australian Legends* (1933), pages 144-153 | Mount Gambier, SA |
| the salt lakes | *Australian Legends* (1925), pages 74-78<br>*Australian Legends* (1933), pages 154-159 | Burrogorang Valley, NSW |
| shooting stars | *Australian Legends* (1925), pages 79-86<br>*Australian Legends* (1933), pages 160-169 | "basalt country", the Burrogorang Valley, NSW |
| why the petiole of a waratah grew long | *Australian Legends* (1925), pages 87-92<br>*Australian Legends* (1933), pages 170-176 | Hartley & Mt Wilson, NSW |
| the first crayfish | *Australian Legends* (1925), pages 93-96<br>*Australian Legends* (1933), pages 182-186 | Shoalhaven, NSW |
| the clinging koala (& bunyip) | *Australian Legends* (1925), pages 97-99<br>*Australian Legends* (1933), pages 187-190 | Wollondilly River, NSW |

| | | |
|---|---|---|
| the white man's boots | *Australian Legends* (1925), pages 100-103 | Nattai-Wollondilly, NSW |
| the hand that tried to draw the waratah | *Australian Legends* (1925), pages 103-106 | Burrogorang Valley, NSW |
| why trees have bark | *Australian Legends* (1925), pages 107-109 | eastern Australia |
| the lyrebird and the kookaburra | *Australian Legends* (1925), pages 110-116 | Illawarra, NSW |
| the blood of the bloodwood tree, the christmas bush and waratah | *Australian Legends* (1925), pages 117-120 | Burrogorang Valley, NSW |
| the blowing down of the mountains of the west | *Australian Legends* (1925), pages 121-125 | eastern Australia |
| the fight of the ants for a waratah | *Australian Legends* (1925), pages 126-131 | Australia |
| when the tables were turned | *Australian Legends* (1925), pages 132-142 | Lachlan River, NSW |
| the Dianella berry | *Sydney Mail*, 4 Jan 1928, page 18<br>*Australian Legends* (1933), pages 99-102 | east coast |
| the Smilax | *Sydney Mail*, 11 Jan 1928<br>*Australian Legends* (1933), pages 191-193 | Tuggarah Lakes, NSW |
| the story of the Pitchi | *Sydney Mail*, 18 Jan 1928 | Darling River, NSW |
| the Epacris | *Sydney Mail*, 25 Jan 1928 | Australia |
| a star legend | *Sydney Mail*, 1 Feb. 1928<br>*Australian Legends* (1933), pages 194-196 | Kamilaroi territory, NSW |
| a bird legend | *Sydney Mail*, 8 Feb 1928<br>*Australian Legends* (1933), pages 197-198 | Illawarra, NSW |
| the erring maidens | *Sydney Mail*, 15 Feb 1928 | Lake Illawarra, NSW |
| a waratah legend (story 1) | *Sydney Mail*, 22 Feb 1928<br>*Australian Legends* (1933), pages 199-201 | Burrogorang Valley, NSW |
| a waratah legend (story 2) | *Sydney Mail*, 29 Feb 1928, page 60<br>*Australian Legends* (1933), pages 202-203 | Western Australia |
| the mist and a fringe flower | *Sydney Mail*, 7 March 1928, page 58<br>*Australian Legends* (1933), pages 204-207 | Appin Creek, Georges River, Maddens Plains, NSW |
| stone throwers | *Sydney Mail*, 14 March 1928, page 58 | Georges River, NSW |
| a sanctuary legend | *Sydney Mail*, 21 March 1928, page 65 | Australia |
| what the moon is (plus bunyip) | *Sydney Mail*, 28 March 1928<br>*Australian Legends* (1933), pages 65-69 | Burryjaa Station, Murray River, NSW |
| the umbels and stamens of the Eucalyptus blossom | *Sydney Mail*, 9 May 1928, page 58 | Australia |
| vicious birds | *Sydney Mail*, 23 May 1928 | Shoalhaven River, NSW |
| the tail-less tortoise, or why the turtle [sic] has no tail | *Sydney Mail*, 18 July 1928<br>*Australian Legends* (1933), pages 33-36 | Illawarra |
| a legend of mists | *Sydney Mail*, 1 August 1928 | Murray River, NSW |

| | | |
|---|---|---|
| the legend of the shadow | *Sydney Mail*, 3 Oct 1928 | south eastern SA |
| winged Lomatia seeds | *Sydney Mail*, 23 January 1929 | Nepean River, NSW |
| the flood | *Australian Legends* (1933), pages 37-50 | south eastern Australia |
| why the sun sets | *Australian Legends* (1933), pages 55-64 | Murrimbidgee River, NSW |
| what makes the waves | *Australian Legends* (1933), pages 108-121 | Coaleliff, Illawarra, NSW |
| why leaves fall | *Australian Legends* (1933), pages 129-135 | Riverina, NSW |
| at low tide (the coming of whitemen) | *Australian Legends* (1933), pages 136-143 | Bellambi, Illawarra, NSW |
| another legend | *Australian Legends* (1933), pages 202-203 | Burrogorang & Illawarra NSW |
| Mulgani | *Australian Legends* (1933), pages 208-214 | Thirroul, Illawarra, NSW |
| the black Satin | *Australian Legends* (1933), pages 225-232 | Curockbilly Range, NSW |

# APPENDIX 3
# SUMMARY OF SITES VISITED

Wednesday 26 July 2006:
Brief visits to FRC 2, FRC 3, FRC 12 (heritage listed site).

Friday 28 July 2006:
General look at FRC 261, FRC 262, FRC 10, and two other shelters.

Tuesday 19 October 2006:
FRC 3, FRC 4, FRC 9, FRC 10, FRC 13, FRC 19, FRC 36 - shelters

Monday 23 October 2006:
FRC 261, FRC 262, FRC 36, FRC 263, FRC 264 – shelters.

Tuesday 24 October 2006:
FRC 263, FRC 264, FRC 265, FRC 10 revisited, FRC 208, FRC 269, FRC 11 – shelters. FRC 12 heritage listed rock engraving site.

Wednesday 25 October 2006:
FRC 12 revisited, single groove site maybe FRC 203, FRC 96 groove site, FRC 63, FRC 55 groove site, FRC 139 groove site, PAD 3.

Monday 30 October 2006:
FRC 59 groove site, FRC 267 groove site. FRC 2.

Tuesday 28 August 2007:
FRC 266 , FRC 17, FRC 16-2 , FRC 16-1 , FRC 13 revisited - shelters. FRC304. groove site , FRC 23 shelter, FRC 124 shelter, FRC 168 groove site – didn't find groove – see Thurs 30/12/07 found it.

Wednesday 29 August 2007:
Unexplored swamp/heath near fire road 9H. FRC 272 shelter , FRC 273 groove site, FRC 21 shelter, FRC 125 shelter.

Thursday 30 August 2007 :
FRC 279 shelter, **unrecorded shelter found by Allan** Carriage – named it **MET1**, FRC 285 shelter, FRC 280 groove site, new directed **irrigation site found by Allan** – named it **MET 2** – adjoins FRC 12, FRC 168 groove site (ie we found the groove which we looked for but didn't find on Tuesday).

Tuesday 4 December 2007:
NT 3 shelter, NT 81 shelter, NT 19 shelter.

Wednesday 5 December 2007:
NT 46 grooves + pool, NT 7 grooves, NT 8 heritage listed engraving and groove site, NT 9 shelter – artefacts, NT 6 shelter with charcoal.

Thursday 6 December 2007 :
FRC 340, FRC 184, FCR 185, FRC 187, FRC 186, FRC 97 - shelters, FRC 193 sharpening groove, FRC 61, FRC 62 - shelters.

Friday 7 December 2007:
FRC 62 shelter revisited, FRC 164 groove site, FRC 195 shelter, FRC 194 shelter, FRC 199 shelter.

Monday 10 December 2007:
NT 34, NT 33, NT 35, NT 11, FRC 191, FRC 198, FRC 189 - shelters.

Tuesday 11 December 2007:
NEW 9, NEW 16, NEW 15, NEW 17 - shelters, NEW 2 grooves, NEW 315 shelter, NEW 314 shelter, NEW 1 grooves, **new terraced directed irrigation discovered** by Allan Carriage near New 1.

Wednesday 12 December 2007:
Unexplored heath/ swamp, **found** possible shelter 2-0753, site 2-0749 multiple grinding grooves, Paul Cummins **found unlisted grinding groove**.

Friday 14 December 2007:
2-0751, 2-0658, 2-0659 - . shelters

Thursday 13 February 2008 :
FRC 10, FRC 265, FRC 263, FRC 264, FRC 36 shelters.
Pink marks were made in groups of three or four so that surveyors could monitor changes in their relative position to extrapolate amount of rock movement resulting from long wall mining. Cracks on an art panel in FRC 10, have gotten got closer together since last October 2006, indicating rock movement. All these shelters were **previously visited** by NIAC and others.

Friday 14 February 2008:
PAD 2, FRC 21, FRC 11 – shelters. FRC 268 groove site. FRC 208, FRC 269 shelters.
**Previously visited** by NIAC and others were FRC 11, 208, 269.

Detailed descriptions and photographs can be found in the ACHA draft report May 2008. Note that the ACHA draft report May 2008 states that systematic monitoring of 41 Aboriginal sites at the Metropolitan Colliery has been undertaken in 1994, 1995, 1996, 1998, 2000, 2002, 2004, 2006 and 2008 (p 19).

# APPENDIX 4

some of the non-lithic **Traditional Materials**, as defined in Section 203FCA(2) of the *Native Title Act (Commonwealth) 1993*, occurring in and about the Metropolitan Colliery study area

## Plants:

*Telopea speciosissima* (both Red and Wirrimbirra White varieties),
*Epacris*,
*Lomatia*,
*Persoonia* (dji-b-ng or "Geeboong"),
*Podolepsis jaceoides* ("yam daisy"),
*Exocarpus* ("native cherry/currant"),
*Santalum obtusifolium*,
*Dianella* ("snake whistle"),
*Lambertia Formosa* ("red devil"),
*Xanthorrhea* ("grass tree"),
*Solanum aviculare* ("Contraceptive Apple"),
*Thysanotus virgatus* ("fringed violet"),
*Doryanthes excelsa* ("gigantic long-stalked lilly")

## Animals:

*Phascolarctos cinereus* (goolaya-winy, "Koala"),
*Ornithorhynchus anatinus* (moola-ng-gayan:g, "platypus"),
*Euastacus australiensis* (red freshwater crayfish),
*Calyptorhynchus funereus* ( "yellow tailed black cockatoo"),
*Agrotis infusa* ("Bogong Moth")
Frogs, Dragon Flies and Beetles etc

# PLANTS


*Flowering Eucalypt, small pink Orchids, Christmas Bells.*


TOP: *Keith Simms and Paul Cummins admiring a 2 m diameter Eucalypt, that could be a thousand years old.*
BELOW: *Flannel Flowers.*

## *Telopea speciosissima*

Now-days defined as any shrub of the genus *Telopea*, Waratahs were one of many native plants collected by Robert Brown, a botanist who came to Australia with Flinders in 1801, under Banks' patronage. The specimen which he collected was red and for more than a century it was widely believed by Europeans that the New South Wales Waratah, *Telopea speciosissima*, only occurred in that colour. However rare Wirrimbirra Whites also occur, known only from the Woronora Plateau, protected by both NSW and Federal legislation. They have enormous significance as part of Gundungara Dreamtime CREATION lore within Traditional Aboriginal culture and, with some basic landcare, potential habitat occurs within the catchment within a realistic zone of likely adverse influence of the proposed mining - Ellen Anderson (1925) reported them as far north as Sherbrook near Bulli Tops.

**"Wirrimbirra" White Waratah**: the emblem of Wollondilly Shire Council,

Aboriginal name *Wundjgaribu* = wundji-garibay ("*wingecarribee*")

**Perhaps the rarest flower in the world**, known only from a single specimen found at Kangaloon in 1968. All present specimens are clones from that one original plant. Against a tide of disbelief and ridicule in 1928, Aboriginal elder Ellen Anderson stated that these rare flowers existed at Kangaloon, Jamberoo and Sherbrook, forty years before they were officially found by non-Aboriginals.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL:

During the years 1888 and 1889 an Aboriginal elder named Ellen Anderson (1855-1933), and her family, resided in the remote upper reaches of Kangaroo Valley, about 20 kilometres from the Robertson/Kangaloon area of the Southern Highlands. During this time she obtained, from traditional Gundungara sources, several White Waratah stories which she related to C.W. Peck many decades later. Although one of Ellen's stories seems biographical [Peck 1933, pages 199-200] there is clearly an underlying Dreamtime Story theme that can be summarised as follows:

*"away back in the Alcheringa ..."* [Peck 1933, pages 199-200]

*"... trees were bigger and of softer wood. There were more flowers – many more – and they were bigger and brighter. And the land, especially the mountains, were far more densely clothed"* [Peck 1925, page 56]

> *"... [the waratah was] at first a white flower ... loved then just as much as now, and its whiteness did not detract from its charm."* [Peck 1933, pages 199-200]

> *"There is really [still] a white waratah ... at Sherbrooke and Mittagong. One at the former place was changed to red ... [It] was stained with [innocent] blood ... [and] later ... threw out its cluster of follicles, and they were streaked with red. The seeds were streaked in the same way. And all the plants that came from them bore flowers as red as waratahs could be. But they had to wait for three years to know that. Not so the parent bush. Always afterwards its flowers were red, and whenever the natives saw a white waratah they pricked their fingers and allowed their blood to stain the bloom. So there are not many white waratahs in New South Wales."* [Peck 1925, pages 26-29]

In Ellen's own lifetime she incurred disbelief and ridicule over the notion that New South Wales waratahs could be white, and her collection of traditional Aboriginal stories of country was at least popularly perceived to have been discredited by this botanical "impossibility" until, in October 1968, two Water Board truck drivers – Norm Peachey and Dick Fawcett – found a specimen twenty metres off a track at Kangaloon near Robertson. They collected five flowers and distributed them to awed recipients at the Thirlmere Hotel, the El Greco Restaurant in Tahmoor, and the Queen Victoria Hospital at Picton. Word spread throughout the Highlands and a local botanist Thistle Harris, owner of what is today the Wirrimbirra Sanctuary, heard of the discovery. Eventually, in the late 1970's, she was taken to the site to collect cuttings from the lone shrub. Flowers and plants produced from clones are now available at the sanctuary, and the Wirrimbirra White Waratah has become the emblem of Wollondilly Shire.

The original wild shrub has flowered only twice in recent decades, in 1982 and 1985, and attempts to hand pollinate in order to obtain seed have been unsuccessful. Only one specimen is "officially known" to exist, making it the nation's rarest plant, and all commercially available Wirrimbirra White blooms are clones from this single original wild shrub which is white simply because it lacks the "red gene".

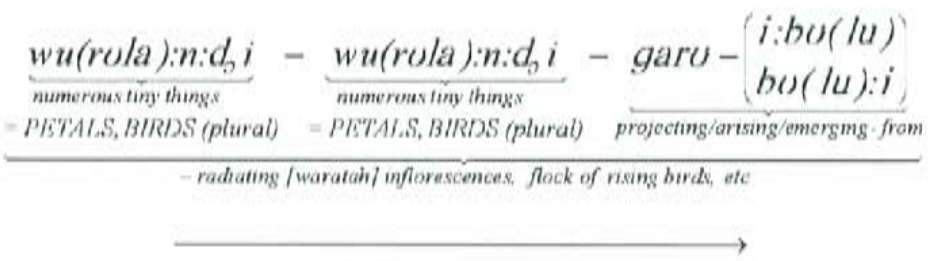
Ellen's claim that White Waratahs existed, was precisely and spectacularly verified by the 1968 discovery of the single shrub in the Waterboard catchment. This episode dispels wrong popular notions that have prevailed for decades, instead illustrating the reliability and value of Ellen's traditional knowledge of Illawarra country and the degree of her physical and cultural connections. It also shows the wisdom of taking traditional Aboriginal knowledge of country seriously.

Ellen's story "how the waratah got its honey" teaches about the use of a rare word/name *garu:bu:i* (spelled "*krubi*"). Her preamble to this story tells that

> *"Krubi was the name of the beautiful black girl who became a waratah, and amongst the Aborigines ... the name is only given to one girl of any tribe, of all its branches; and then only when the mother or the father has been reckoned to be good looking, and the child is expected, therefore, to bear the same advantage*

*(if advantage it is); so that not a baby girl can be christened Krubi until the former Krubi is dead".*

Thus the name *garu bu i* or *garibu* occurs as rarely as White Waratahs themselves, making it the appropriate Aboriginal name for the White Waratah, based upon the semantic paradigm [flower with] RADIATING INFLORESCENCES




("*wi : n : gic - wi : n : gic - chara :: bie*"
*Capt.W. Schaw, 1816, midthung*

":: -*wi : n : gi - carr : i : bie* "
*Lieut.C. Dawe, 1816, midthung*

":: -*wi : n : ge - carr : i : bee* "
*("flight [flock] of birds")*
*C.Macalister, 1907, midthung*

"::::::: *kru : b : i* " *("waratah")*
*Ellen Anderson in C.W.Peck, 1925*

"::::::: *yerre :: bie* "
*("Aboriginal woman's name")*
*Rev.W.B.Stone, 1851, midthung*
*Berrima Aboriginal Census*)

Thus, Wingeecarribee (= **white** waratah) Shire Council wrongly has the (**red** coloured) waratah for its emblem. Furthermore *garu bu i* was a real historic person, the wife of a Midthung chieftain, listed on the Aboriginal census taken at Berrima in 1851 by Rev. W. Stone, within walking distance of Kangaloon where the lone white Waratah was found in 1968. Thus Ellen's stories about *"krubi"* were authentic oral historical accounts of this real woman's life, obtained during Ellen's 1888/9 stay in Kangaroo Valley, interwoven with older strands of traditional lore.

Thus white Waratahs, occurring throughout the Woronora Plateau at least as far north as Sherbrook, are the subject of well documented traditional **Dreamtime creation legends** as culturally important to Gundungara people as *the Book of Genesis* is to Christians. Even river gorges such as the Waratah Rivulet are a Traditional Material created by a giant Dreamtime Eel moving through the landscape (NOTE: the recent Sandon Point Commission of Inquiry ruled that even "visual aspect" can be a Cultural Material). Accordingly senior Gundungara elders refuse permission for mining underneath the Waratah Rivulet and Woronora Reservoir. However, if mining proceeds regardless, then elders from NIAC's traditional owner member groups must be consulted and involved at all stages and in all future SMP's.

**Red Waratah**: the New South Wales floral emblem, also the emblem of Wingecarribee Shire Council, traditionally occurs throughout the Woronora Plateau including the proposed mining area. Its Aboriginal name wayari-d̲'haya (*"waratah"*), is the basis of other important Dreamtime CREATION Legends, and also legends associated with women's lore and women's sites, within Woronora Plateau Gundungara Aboriginal traditional beliefs and culture.

## THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL

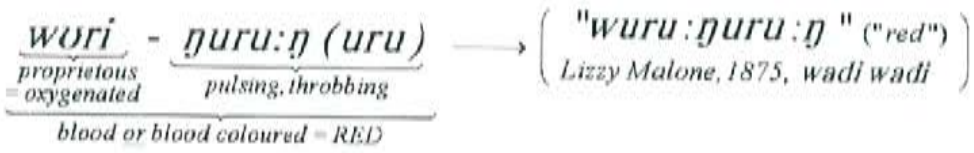
From about 1911 onward an Illawarra Aboriginal elder named Ellen Anderson (1855-1933), and her family, resided at the Peakhurst Salt Pan Aboriginal settlement. Over the following decades she recounted (to the writer C.W. Peck) numerous traditional local Aboriginal legends about Waratahs including the following ten published examples:

a) "the first waratah" [Peck 1925 & 1933],
b) "how the waratah got its honey" [Peck 1925 & 1933],
c) "how the white waratah became red" [Peck 1925 & 1933],
d) "how the pistils of the waratah became firm" [Peck 1925 & 1933],
e) "why the waratah is firm" [Peck 1925 & 1933],
f) "why the petiole of the waratah grew long" [Peck 1925 & 1933],
g) "the hand that tried to draw the waratah" [Peck 1933],
h) "the fight of the ants for the waratah" [Peck 1925],
i) "a waratah legend, story 1" [*Sydney Mail* 22 Feb 1928],
j) "a waratah legend, story 2" [*Sydney Mail* 29 Feb 1928].

Variously spelt ("waratah", "warratah", "warrataw", "warrettah" etc), the flower is generally a striking bright-red color. In 1847 G.F. Angus gave the spelling "warrator", as did C.W. Peck (1925) who explained that this

> *"was pronounced by the natives ... with the accent on the second syllable. Therefore, it has often been written with two r's. One, however, is so common as to be right, and the last syllable is accented".*

From a cultural perspective, in traditional women's lore, the red waratah is a symbol of transition for Aboriginal girls going through puberty – as evidenced by the fact that the most common Aboriginal names for this flower derive from words meaning *red/blood* and *menstruation*. For example the colour *RED* is



hence RED FLOWER (**singular**)

$$\underbrace{wori:(\,ŋuru:ŋ\,)}_{=RED}\;-\;\underbrace{\underline{d}o(\,la:n)}_{thing\ (singular)}\longrightarrow\begin{pmatrix}"wara:::tah:\ "\\ "warra:::tah:\ "\\ "warra:::taw:\ "\\ "warra:::tor:\ "\\ "warre:::ttah:\ "\end{pmatrix}$$

alternately we have WARATAH

$$\underbrace{mula}_{=menstrual}\;-\;\underbrace{(\,\underline{d}ola):n}_{thing\ (singular)}\longrightarrow\begin{pmatrix}"moolo::nc\ "\ (\text{"the waratah"})\\ F.McCaffrey,1920's\end{pmatrix}$$

Thus these red flowers, growing throughout the Woronora plateau, along watercourses such as the Waratah Rivulet, sometimes indicated important initiation sites for Gundungara Aboriginal girls – as evidenced by the numerous well documented traditional legends of enormous cultural significance. Their ubiquitous presence throughout the study area makes the entire landscape a Traditional Material (NOTE: the recent Sandon Point Commission of Inquiry ruled that even "visual aspect" can be a Cultural Material). On this basis senior Gundungara elders refuse permission for mining under the Waratah Rivulet and Woronora Reservoir on what should be a sacred green corridor. However, if mining proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Epacris.*

1) *Epacris pulchella*, an erect few-branched shrub to 1.5 metres high, occurring in heathland and woodland understories. Actual and potential habitats occur along the length of the Waratah Rivulet and tributaries throughout the proposed mining area.

2) *Epacris microphylla*, occurring in heathland, often growing densely giving a snowy appearance in Spring. Actual and potential habitats occur along the length of the Waratah Rivulet and tributaries throughout the proposed mining area.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL

Ellen Anderson's story "the Epacris" is a children's account of the death of their mother, Jane Simms (nee Timbery), on a sandy beach near a river somewhere on the Woronora Plateau in about 1890 – in other words an ASCENSION legend. The related story of "winged Lomatia seeds" (discussed below) suggests that this was the Upper Nepean River. No doubt these stories were originally told to the orphaned Gundungara children by Queen Emma during The Great Walk in 1890 then, later,

published by Emma's cousin Ellen Anderson (*Sydney Mail*, 25th January, 1928). The published story went as follows -

*"Fairies, or 'little men of the bush', were very real ... they passed good on to people who behaved well, and ill to those who worked mischief. **On a sandy tract somewhere near a broad creek** these fairies used to play ... Those who went there always saw in the sand between the plants and flowers the footprints of these elusive and generally invisible beings. ... one young [Aboriginal] man had actually caught one, and was bringing it to show his people ... This adventurous man was picking his way **along the edge of the creek**. He had to skirt round beautiful **callistemons** glowing with their crimson bottlebrushes – not the lanceolatus but the broader leaved one that has the most beautiful flowers [probably Callistemon citrinus]. He passed between soft, shy white **Actinotus helianthi**, or flannel flowers, and amongst the big flaming **Blandfordias** that hung out their clusters of bells at Christmas time, and the funny balls covered with flaring yellow fluff that he used for playing games of bowls, and which we call **Ispogen anemonefolius** ... [the little fairy] gave a strong wriggle ... [and] slipped to the ground, but not before a fingernail had so injured [its] tender little body that blood began to ooze out. Immediately other little fairies who were following their captive play-fellow, and were invisible, plucked a prickly spray that bore the tiny white flowers, and with it brushed the eyes of the man and nearly blinded him ... he tripped and fell amongst a cluster of these sprays. ... Every fairy had disappeared. Each had become as small as a fly, and had taken refuge by slipping into a tiny white flower that grew on the prickly spray. The flower bent over to hide the tiny fairies, and in that way, ... these fairies can always be hidden from men's sight, for no one thinks of looking into one of the flowers ... The flower into which the wounded fairy had gone was white like the rest, but ... blood trickled down and formed a sort of bubble around the opening, and that is why some of these flowers have a beautiful crimson band".*

Christmas Bells as they occur in

Ellen Anderson's traditional Aboriginal theme of "fairies"/bush-babies seeking refuge within inverted bell-shaped native Australian flowers occurs commonly in the artwork May Gibbs. However, whilst Ellen Anderson's stories are those of an expert in native flora and fauna (quite precise about the flowers being *Epacrids*), May Gibbs lacked the botanical knowledge to distinguish *Epacrids* from, say, *Blandfordia nobilis*. In any case flowers, the subject of documented Aboriginal legend specifically from the Woronora Plateau, are clearly Traditional Materials and, on this basis, senior Gundungara elders refuse permission for mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages through their regional peak native title body NIAC.

*Tiny bush-babies hiding inside flowers were a theme in the May Gibbs stories. That they were part of an earlier Aboriginal tradition, from the Wara-N'hayara Plateau waterways, is attested by Ellen Anderson's stories of "the Epacris" and "the winged Lomatia seeds" published in the Sydney Mail in 1928. These stories, in turn, came from Queen Emma during The Great Walk of 1890 as a young children's account of the death and ascension of their mother Jane Timbery.*

## *Lomatia*

A tall shrub to 4 metres high with drooping foliage, occurring toward its northen limit with actual and potential habitats within the study area.

1) *Lomatia silaifolia.*
2) *Lomatia ilicifolia.*
3) *Lomatia myricoides* ("River Lomatia").

Potential habitat along the Waratah Rivulet and its tributaries within a realistic zone of likely adverse influence of the proposed mining.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL

Ellen Anderson's story of "winged Lomatia Seeds" is **a religious ascension story** of equivalent importance to traditional Gundungara peoples as *the New Testament* is to Christians. Historically it was recorded as a second children's account of the death of their mother and her soul being carried on these seeds, borne by a gust of wind, up to the Milky Way (Heaven) – as told to the orphaned Gundungara children by Queen Emma during The Great Walk in 1890 then, later, published by Emma's auntie Ellen Anderson in the 1920's. It invokes a "Wullundigong" (the equivalent of May Gibbs' hairy Banksia Man), as in Ellen's story about "stone throwers" which commences with two Aboriginal lads travelling up a river in search of rare Persoonia berries. These Woronora Plateau Wullundigongs were documented in traditional Aboriginal legends as early as 1899, in stories obtained from William Bothong at Coolangatta Mountain, a decade before May Gibbs even arrived in Sydney. May Gibbs demonstrably did not bring these ideas with her from Western Australia, though she did bring with her artistic and literary talent.

C. Illert (May 2003), *Shoalhaven Chronograph (quarterly newsletter of the Shoalhaven Historical Society Inc.)*, volume **23(10)**: pages 1-8.

Ellen Anderson, "winged lomatia seeds", *Sydney Mail*, 23 January 1928.

> *"About the wings on the seeds of the lomatia, the Aborigines of the Upper Nepean and adjacent country told ... that a little being of the bush, or a fairy as we have it, for she was good and she had wings – was being pursued by a ... Wullundigong ... The second was surely a goblin, for he was not good and he had no wings. He was in league with the horrible being that causes all tempests. The night was beautifully fine, and the end of the Milky Way was close to the earth. Several spirits were about to start the journey to the other world, and were clustered at the foot of the way awaiting a leader. ... The Pukkan, or track, was plain enough ... [but] there are pitfalls in what we call Magellan's Clouds, and there was also the Unseen River".*
>
> *"... By-and-by the frightened fairy, running without hindrance because the night was so clear, came upon the group of spirits".*
>
> *"... Presently the pursuing goblin also reached the group of spirits ... He, of course, saw the fairy, and he dashed in such a way as to dreadfully scare every being, and with terrified cries the spirits scattered ... into some flower or another, but the influence of the fairy calmed them and none went far".*

*Lomatia silaifolia*, flowering after a fire, in front of a giant tree. Close-ups of the winged seeds, layered in an open pod and separately.

*"... She pointed to the pod of the lomatia, and told the spirits to crowd in and enter the seeds. They trusted her and did eventually as they were bidden to do".*

*" ... Suddenly eluding the grasp of the goblin, the fairy skipped into that pod, and hastily she tore off her own wings and fastened them to the two seeds".*

*"... [the goblin] called to ... the western source of our great tempests ... then the blast was upon the fairy, and the goblin and the lomatias. It was upon every living thing".*

*"... The goblin went with the wind. The follicles opened, and the winged seeds with the spirits that sheltered in them were borne along the Milky Way, not needing a leader".*

*"The fairy crept into the creamy flower, and there she died; and if one is examined closely before it is quite open it takes but little imagination to find its likeness to her, and to be seized with a sense of her presence. At any rate, ... Aborigines can sense these things, and they can point out the scars that came to mark the fact that she tore off her wings".*

This story shows that the Woronora Plateau landscape, including Lomatias and other associated flora are Traditional Cultural Materials and, as such, senior Gundungara elders refuse permission for mining underneath what should be a green river corridor. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Persoonia* *Aboriginal name djibg = djubng ("Geebung")*

These plants occur in the shrub layer of sandstone woodlands and gully forests, along the Waratah River and surrounding catchment. They are prolific fruit bearers and were an important source of sustenance for Aboriginal people. Refer to Cath Renwick's book "geebungs and snake whistles" (Aboriginal Studies Press, Canberra, 2000). Additionally they have well documented cultural significance within Traditional Lore.

1) *Persoonia hirsuta*, endangered & known to exist in and about the mining area.
2) *Persoonia bargoensis* (the "Bargo Geebung") listed as **endangered** on the TSC Act and vulnerable on the EPBC Act.
3) *Persoonia formosa* listed as **endangered** on both the TSC Act and EPBC Act.
4) *Persoonia mollis ssp. Nectens* an **uncommon**.
4) *Persoonia linearis* .
6) *Persoonia pinifolia* .

Most with actual and potential habitat along the Waratah Rivulet .

ABOVE: *Persoonia glaucescens*. The whole plant is shown on the left and the flower is on the right. It is listed as **endangered** on the TSC Act and **vulnerable** on the EPBC Act.


ABOVE: This ripe edible berry of *P. lanceolata*, is a traditional Aboriginal food.

LEFT. *P. linearis*, after flowering, showing edible berries.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL

Traditional Aboriginal Lore from the Woronora Plateau has long told of hairy malevolent goblins called Wullundigongs (the equivalent of May Gibbs' "hairy Banksia men"). They are documented in archival sources dating back at least to 1898 – more than a decade before May Gibbs even arrived in Sydney. A relevant scholarly review article is:

C. Illert (May 2003), *Shoalhaven Chronograph (quarterly newsletter of the Shoalhaven Historical Society Inc.)*, volume **23(10)**: pages 1-8.

Ellen Anderson also gave a legend of two lads journeying up-river in search of Geebungs and being frightened by Wullundigong "stone throwers" (hairy Banksia Men). This story could well be a "smoking gun" original blueprint for the May Gibbs characters Snugglepot and Cuddlepie (*Sydney Mail*, 14th March, 1928):

> *"Two young Aborigines – brothers – were travelling up the ... River in order to inspect a piece of country in which the Persoonia grew plentifully. Its berries, called Geebungs, were green and unpalatable a few weeks before, and these two men thought that by this time they must be ripe ...".*

Oral traditions amongst today's Aboriginal women elders at La Perouse Mission, Bellambi and Coomaditchie, still tell of goblin-like "hairy-men", variously called "Wullundigongs" or "D'hula-Gayals" (the equivalent of Banksia Men), who live in the Woronora Plateau catchment where they *"hoard and protect precious stones"* sometimes *"chasing people away by throwing these stones at them"*. This combination of rare Geebungs and the oral traditions of stone-throwing hairy goblins, supported by the older published Ellen Anderson published versions, show that the entire Metropolitan Colliery landscape, including its associated flora, is a Traditional Cultural Property and a Traditional Material. Accordingly senior elders refuse permission for mining underneath the Waratah Rivulet and Woronora reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Podolepsis jaceoides* ("Yam Daisy").

A perennial dandelion-like herb with an edible root that is a traditional Aboriginal food, occurring on grassland and open forest within a realistic zone of likely adverse influence due to the proposed mining.

## *Exocarpus* ("Native Cherry/Currant").

Aboriginal name *bʊlu:d̲* = bayaloo-d'h ("projecting thing/fruit").

1) *Exocarpus cupressiformis* ("Native Cherry"), common in the woodlands but less so on sandstone. Actual and potential habitats occur within a realistic zone of likely adverse influence of the proposed mining.

2) *Exocarpus strictus* ("Dwarf Current"), dominant species in this region. Actual and potential habitats occur within a realistic zone of likely adverse influence of the proposed mining.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL
A much sought-after traditional food. In 1836 the Quaker minister Rev James Backhouse and his companion George Washington Walker made detailed observations of Aboriginal women with *"considerable quantities of native currants which they carried in [coolamins] vessels scooped out of knots in gum trees"*. Clearly these edible currants are a Traditional Material likely to adversely affected by the proposed mining. Accordingly senior elders refuse permission for proposed mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Santalum obtusifolium.*

Olive-like fruits sought after as a traditional food. Actual and potential habitats occur within a realistic zone of likely adverse influence of the proposed mining. Accordingly senior elders refuse permission for proposed mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Dianella* ("snake-whistle")

1) *Dianella formosa.* Actual and potential habitats occur within a realistic zone of likely adverse influence of mining.
2) *Dianella caerulea.* Actual and potential habitats occur within a realistic zone of likely adverse influence of mining.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL
The juice of these bright blue berries was traditionally used as a dye or to colour white Kaolinite clay. The leaves were also used to make high pitched "snake whistles" (see Cath Renwick's book "Geebungs and snakewhistles", Aboriginal Studies Press, 2000) – which is especially significant as Ellen Anderson was of the Black Snake totem (Sydney Mail, 8 February 1928). They also had cultural significance in traditional legends.

Ellen Anderson, of the Black Snake Totem, gave a legend of "the Dianella berry":
(*Sydney Mail*, 4th January 1928, page 18; also in Peck (1933), pages 99-102)

Accordingly senior elders refuse permission for proposed mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Lambertia formosa* ("Red Devil").

Actual and potential habitats occur within a realistic zone of likely adverse influence due to the proposed mining.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL
Sought after food plant occurring in heath scrubs and dry forest under-stories within the sandstone bushland. Medium sized shrub with bright red flower clusters. Fruit are "horned" and woody, full of sugary nectar when fresh.

May Gibbs, "tales of Snugglepot and Cuddlepie ... being their first adventure", 1918.

Accordingly senior elders refuse permission for proposed mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Xanthorrhea* ("Grass Tree").

Aboriginal name *gula ga-dji wur* = gavala ga-dji woor

*Xanthorrhea arboria* has an actual tree-like "trunk". Occurs about the study area within a realistic zone of likely adverse influence due to the proposed boreholes.

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL
Its resin is an important "glue" used in making spears and tomahawks.

May Gibbs, "Prince Dande Lion", 1953.

Accordingly senior elders refuse permission for proposed mining underneath the Waratah Rivulet and Woronora Reservoir. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages, and in all future SMP's, through their regional peak native title body NIAC.

## *Solanum aviculare* ("Contraceptive Apple").

Aboriginal name *bu:mula* = baya-moola ("induces menstruation").

THE CULTURAL SIGNIFICANCE OF THIS TRADITIONAL MATERIAL
A food, but also an important component of women's business, being a natural traditional contraceptive containing the steroid Solasodine as used in modern oral contraceptive pills. In this instance Gundungara herbal knowledge was centuries ahead of European medicine. Traditionally "bugaya", the berry part, was consumed by young women after first baking off the skin which, in the raw state, would burn the

mouth. Actual and potential habitats occur within a realistic zone of likely adverse influence due to the proposed mining. This plant is a Traditional Material and part of women's business, on which basis senior Gundungara women elders refuse permission for boreholes in and about the Kangaloon area. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages through their regional peak native title body NIAC.

## *Thysanotus virgatus* ("fringed violet").

*Extremely rare fringed 'violet' with three purple petals that open during mists. A sacred plant in Traditional Lore, with actual habitats within and about the colliery within the zone of adverse influence of the proposed longwalls.*


Ellen Anderson's legend about "the mist and the fringe flower" says that it can be found toward the northern end of the Plateau from Maddens Plains to the Georges river and up to Helensburgh. This one was photographed in the Metropolitan Colliery in January 2007. Different versions of her story were published in:

*The Sydney Mail*, 7th March 1928, page 58
*Australian Legends* (1933), pages 204-207.

This rare flower, the subject of Ellen Anderson's traditional Aboriginal story, is so important that it was featured on a 50 cent postage stamp.


## *Doryanthes excelsa* ("gigantic long-stalked lilly")

*The flowering stems of the Gymea Lilly were traditionally roasted and eaten, also the roots were made into an edible cake. Additionally they have cultural significance within Traditional Lore, recorded in Campbelltown Hospital's three wall civic mural (see Figure 4), and existing within the colliery within a realistic zone of likely adverse influence.*

Ellen Anderson's relevant Traditional Legends were published in:
*Australian Legends* (1925), pages 14-21.
*Australian Legends* (1933), pages 24-32.

# ANIMALS

*A Diamond Python seen near FRC 139*

*An Echidna seen at site FRC 12*

*A Dragon lizard in a creek line environment near FRC 267*

*A camouflaged cave dwelling Gecko on the roof of FRC 36.*

*An 8 cm Bush Cockroach crawled into the leaf litter.*

*A Red Bull Ant sat on a ledge of a shelter and watched people working*

## *Phascolarctos cinereus* ( "koala")

Aboriginal name *gulʊ-wiɲ* = goolaya-winy (lethargic climber).

*A traditionally sacred and currently endangered native animal that inhabits eucalypt forests and woodlands. Of enormous cultural significance within Traditional Lore.* Actual and potential habitat along the Waratah Rivulet and its tributaries within a realistic zone of likely adverse influence of the proposed mining.

**There should be an SEPP 44 Assessment** of koala populations along the entire length of the proposed mining area. This does not appear to have been done.

Ellen Anderson gave a legend "the clinging Koala":
*Australian Legends* (1925), pages 97-99.
*Australian Legends* (1933), pages 187-190.

> *"Of the native bear they spoke very little. Its humanlike cry awed them. It was tabu...".*
>
> *"... the bears were loved for their gentleness, and their cry, plaintive as it is, reached hearts, and all koalas were safe. The flesh was never eaten".*
>
> *"... they tell of a black who essayed to catch a native bear that had its hole in the fork of a big gum-tree ... In spite of appeals and protestations of his people, he took his waddy and climbed the tree. He reached the bear, and just as he was about to club it, the tree opened. The centre was rotted away, and into the hollow the man fell. His cries could be plainly heard outside, but no one dared to do anything to effect a rescue. He was left to slowly weaken and to go out in death".*
>
> *"... this tale was told many times ... sometime in the 1870's, when the tree was blown down, ... the bones of the Aborigine were found in the trunk. There was no opening from the outside at the bottom of the tree. The bones were of great age".*

This widespread traditional reverence for Koalas is further illustrated by The Koala Song recorded in **the Australian Alps**, by A.W. Howitt (1904: 420-422), more than a century ago, for which NIAC can now supply a modern translation endorsed by the Wara-N'hayara Plateau Gundungara Elders Council. Howitt explained that this song

> *"was composed and sung by a bard called Kurburu, who lived during early settlement of the country by whites ... He was supposed to have killed a native bear, and being possessed by its Murup or spirit, thenceforth [regretfully] sang its song ... 'you cut across my track, you spilled my blood, and you smashed your tomohawk on my head'."*

## *Ornithorhynchus anatinus* ( "platypus")

Aboriginal name *mula : ŋ –g ʊ n:g* = moola:ng:gayan:g (bubbly critter)

*The Cowpastures Platypus is well documented. The Australian Museum in Sydney has a specimen labelled "**Georges River 1864**", the naturalist Harry Burell reported one at Glenfield in 1927, and they have been commonly seen in the Camden area between 1920-1930 and even as late as the 1960's. There is a recent report of a juvenile found dead in a rock-pool on the Georges River. They also exist in the Nepean Dam downstream from Kangaloon and have been sighted along the Upper Nepean. There is also a cave on Ousedale Creek (a tributary of the Nepean near Appin) with a platypus depicted in Traditional Aboriginal rock-artwork (see NIAC submission to the recent Inquiry into the Southern Coalfields, copy lodged with DECC). Therefore probable and actual habitats occur within the study area, likely to be adversely influenced by any proposed mining.*

May Gibbs in "Chucklebud and Wunkydoo" (1924/32) captures the spirit of Gundungara children during their 1890 Great Walk off Traditional Lands in the Macarthur region, to La Perouse, with her bush-babies journeying down (nearly drowning in) a river with a platypus and a crayfish indicating fresh water (NOTE a red freshwater crayfish *Euastacus australiensis* was sighted during field surveys). Mary A. FitzGerald, in "King Bungaree's Pyalla" (1891: 26-33), recorded the **Sydney**-region's name for the platypus, "Mullangong", and went on to give the earliest documented story of how this creature came into being *"on a riverbank far inland"* from the union of a rat and a bird. Generations of authors from all over the continent seem to have subsequently adapted this story – even as far away as the Kimberleys, where the platypus simply does not exist, see K. Langloh Parker's "Australian Legendary Tales" (1953: 170-173).

In 1904 A.W. Howitt published two versions of a traditional Aboriginal song about the platypus. The earliest version was actually recorded in **Botany Bay** in 1861 and recalled in later years by a non-Aboriginal who *"never knew its meaning"*. It is phonetically poor but complete. The Aboriginal informant in 1861 would probably have been an "upstream" George's River man, as that river discharges into Botany Bay and the platypus cannot live in salty water. It was probably this same Aboriginal man who lead the Australian Museum's expedition up **the Georges River** in 1864 to obtain their specimen, perhaps near the Platypus Cave on Ousedale Creek near Appin. A second version of this platypus song, less complete but phonetically better, was obtained by Howitt in **the Canberra Region** in about 1880. Combining these two sources, provides an excellent account of a traditional platypus song that once ranged from Sydney to the Australian Alps. Howitt could not understand the language, and provided a botched "translation" based upon 19th century knowledge. Combining the information from FitzGerald, and Howitt's two sources, NIAC now has a modern translation of **the Wara-N'hayara Plateau Platypus Song** which is endorsed by the Wara-N'hayara Plateau Gundungara Elders Council.

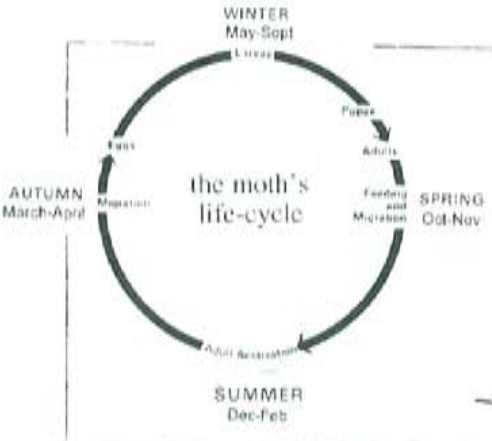
The platypus, demonstrably a creature of Traditional Gundungara song and legend, with potential sites along the Waratah Rivulet and its tributaries, is clearly a Traditional material likely to be adversely affected by proposed mining underneath the river gorge and reservoir. Accordingly senior Gundungara elders refuse

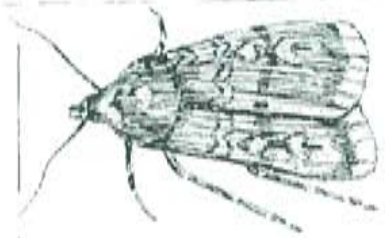
permission for the proposed mining. However, if work proceeds regardless, traditional Aboriginal owners must be involved at all stages through their regional peak native title body NIAC.

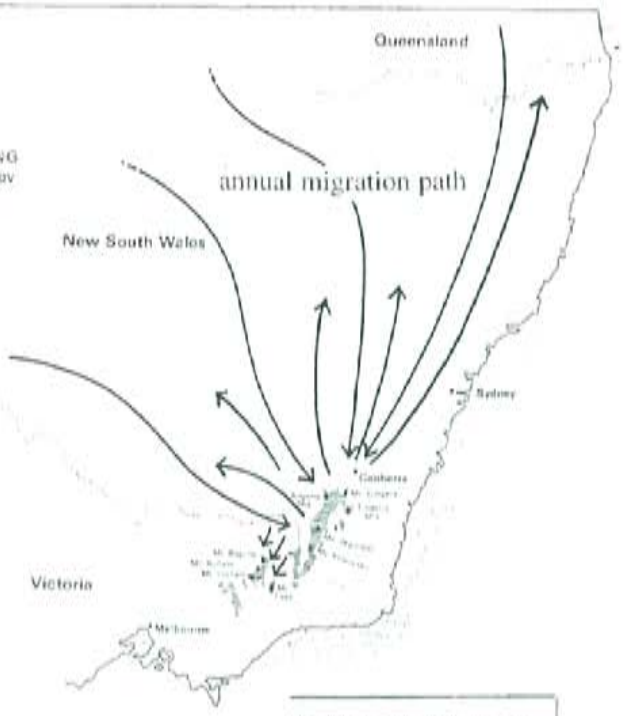
## *Euastacus australiensis* ( "freshwater crayfish")

Specimen sighted along a creek line near site 2-0659. As it hid, immediately when it saw us, we were unable to obtain a field photograph but supply the following one from the book "Austrealian Crustaceans" by A. Healey & J. Yaldwyn.

*Calyptorhynchus funereus* ( "yellow tailed black cockatoo")






## *bo:gon:g Moth*

(i) *Nature* **170**: 981 (1952)
(ii)*Australian Journal of Zoology* **2**: 223-63 (1954)
(iii) J. Flood et al, *Aborigines of the Canberra Region: foods*.

The "*bo:gon:g*" moth (*Agrotis infusa*) derives its Aboriginal name from the word *bo(lu):gon:g(un)* = *extremely high [altitude creature]* or *[arising]* *extremely high [up creature]*. This contrasts with **R.H. Mathews**'[1900's] words "***sinking***" = "*bu:gun:g*" [ŋunawol] and "*bu:ga:*"[wiraɖuri], also **J. Dawson**'s [1881] word "***dwarf*** *[creature]*" = "*pol:kuu:k*" [chaap whuurong], all deriving from *bul(o):gon:g(un)*. The adult is a brownish moth about 23 mm long, with a 25 mm wing-span when in flight. In about June they hatch as caterpillars from eggs laid on broad-leafed plants (di-cotyledons) in breeding grounds throughout the western slopes and plains of NSW and southern Queensland. They feed for a while on these leaves then, after going through a winter/spring pupation stage, they emerge as fully grown moths. With springtime grasses displacing their dicotyledon foodsource on the western plains, the moths must migrate toward the Australian Alps to the high cool mountaintops in the Bimberi, Scabby, Booth, Brindabella and Tidbinbilla Ranges in the ACT and the summits of the Snowy Mountains and Victorian Alps - in search of granite crevices and caves where they can hide away from predators and the summer heat. As the caves and crevices are not all that large, the moths crowd in upon themselves in layers to hide their sensitive eyes from the light. The first to arrive go into the darkest places whilst latecomers tuck their heads beneath the wings of others in a continuous layer of bodies like roof tiles. They stay in these crevices and caverns during daytime, coming out for an hour or so to fly about during the early morning and also in the evening, probably just for exercise but maybe sometimes to feed upon the alpine flowers which grow in profusion, their flowering being retarded by the cool climate.

# THARAWAL
## LOCAL ABORIGINAL LAND COUNCIL

30 May 2008

Nevill McAlary
General Manager
Helensburgh Coal Pty Ltd
PO Box 402
HELENSBURGH NSW 2508

Dear Neville

**RE: METROPOLITAN COAL PROJECT ABORIGINAL CULTURAL HERITAGE ASSESSMENT**

On behalf of the Tharawal Local Aboriginal Land Council (TLALC), I wish to express our concern regarding impacts to Aboriginal heritage. Aboriginal heritage sites provide evidence of our ancestry and links to past occupation. TLALC considers all Aboriginal heritage to be important to our people.

TLALC has been involved in the Metropolitan Coal Project since early 2007 and is satisfied with the level of survey coverage and consultation undertaken throughout the Aboriginal heritage assessment. The level of information provided on each of the sites is of a high standard and appreciated when commenting on cultural significance and management.

The TLALC has received and reviewed the draft report prepared by Kayandel Archaeological Services dated May 2008 and supports the application of the proposed management and mitigation measures proposed.

TLALC considers it necessary that the TLALC be involved in all aspects of Aboriginal heritage management at the Metropolitan Colliery, including involvement in site recording and monitoring, development and implementation of mitigation measures and development and implementation of the Aboriginal Cultural Heritage Management Plan.

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# THARAWAL
## LOCAL ABORIGINAL LAND COUNCIL

The TLALC does not support undertaking invasive survey techniques at all Aboriginal sites. These techniques (brushing of floors, test pits, moving rocks, draining waterholes) can greatly impact Aboriginal sites both culturally and physically. There may be appropriate application of these techniques at some sites and TLALC would appreciate being involved in any assessment of the application of these techniques. Perhaps it should be undertaken as part of the development of the Aboriginal Cultural Heritage Management Plan.

TLALC looks forward to being involved in the Metropolitan Coal Project in an ongoing capacity with regard to all Aboriginal heritage related aspect including the development and implementation of a management and monitoring plan and the development and implementation of mitigation measures.

Yours sincerely

**WENDY LEWIS**
Tharawal Local Aboriginal Land Council

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# APPENDIX 6:

# SUBSIDENCE PREDICTIONS FOR KNOWN ABORIGINAL HERITAGE SITES WITHIN THE STUDY AREA

Ground movements resulting from the extraction of longwalls are referred to as systematic subsidence movements. These movements are described by the following parameters (MSEC, 2008):

- Subsidence refers to vertical and/or horizontal movement of a specific location (i.e. how far down any point on the surface is expected to move). Subsidence is usually expressed in units of mm.
- Tilt is the change in the slope of the ground as a result of differential subsidence (i.e. how much any given area is expected to lean or tip). Tilt is usually expressed in units of millimetres per metre (mm/m). A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %.
- Strain is the change in horizontal distance between two points on the ground, divided by the original horizontal distance between them. Strain is dimensionless and is typically expressed in units of mm/m:
  - Tensile Strains occur where the distance between two points increases (i.e. stretching).
  - Compressive Strains occur where the distance between two points decreases (i.e. squashing).

## Subsidence Predictions for Aboriginal Heritage Sites within the Study Area - Metropolitan Coal Project

| Label | AHIMS Site No. | Total Subsidence after LW44 (mm)[1] | Cumulative Subsidence due to LW18 to LW44 (mm)[2] | Total Tilt during or after LW18 to LW44 (mm/m)[1] | Cumulative Tilt due to LW18 to LW44 (mm/m)[2] | Maximum Predicted Tensile Strain during or after LW18 to LW44 (mm/m)[1] | Maximum Predicted Compressive Strain during or after LW18 to LW44 (mm/m)[1] |
|---|---|---|---|---|---|---|---|
| 2-0346 | 52-2-0346 | 1176 | 1176 | 4.3 | 1.4 | 0.5 | -0.6 |
| FRC 101 | 52-2-0875 | 749 | 749 | 3.3 | 1.8 | 0.6 | -0.9 |
| FRC 105 | 52-2-0340 | 606 | 592 | 4.2 | 4.1 | 1.3 | -0.3 |
| FRC 11 | 52-2-0089 | 436 | 5 | 3.1 | 0.1 | 0.9 | 0.0 |
| FRC 113 | 52-2-0365 | 1038 | 1038 | 5.8 | 3.2 | 0.5 | -1.4 |
| FRC 114 | 52-2-0725 | 34 | 34 | 0.4 | 0.4 | 0.1 | 0.0 |
| FRC 115 | 52-2-0726 | 107 | 107 | 1.1 | 1.1 | 0.2 | -0.1 |
| FRC 117 | 52-2-0739 | 408 | 408 | 3.0 | 1.2 | 0.9 | -0.4 |
| FRC 119 | 52-2-0196 | 606 | 606 | 6.0 | 6.0 | 0.8 | -0.3 |
| FRC 12 | 52-2-0255 | 701 | 406 | 6.0 | 4.2 | 0.6 | -0.4 |
| FRC 124 | 52-2-0162 | 1112 | 1111 | 2.1 | 2.1 | 0.4 | -1.0 |
| FRC 125 | 52-2-0310 | 1037 | 1037 | 1.8 | 1.2 | 0.3 | -0.7 |
| FRC 127 | 52-2-0203 | 406 | 406 | 3.0 | 0.6 | 0.5 | -1.2 |
| FRC 13 | 52-2-0125 | 294 | 26 | 3.1 | -0.4 | 0.8 | 0.0 |
| FRC 133 | 52-2-0410 | 244 | 225 | 2.3 | 2.0 | 0.5 | -0.2 |
| FRC 138 | 52-2-0238 | 1071 | 1058 | 4.5 | 4.4 | 0.6 | -0.6 |
| FRC 139 | 52-2-0239 | 1539 | 1415 | 1.0 | 0.2 | 0.4 | -0.8 |
| FRC 14 | 52-2-0138 | 484 | 455 | 2.2 | 1.9 | 0.2 | -0.2 |
| FRC 15 | 52-2-0396 | 1126 | 1126 | 7.4 | 2.5 | 1.2 | -1.7 |
| FRC 16.1 | 52-2-0120 | 402 | 363 | 2.4 | 1.9 | 0.1 | -0.3 |
| FRC 16.2 | 52-2-120 | 344 | 292 | 2.3 | 1.8 | 0.4 | -0.3 |
| FRC 160 | 52-2-0823 | 833 | 833 | 3.5 | 3.5 | 0.4 | -0.4 |
| FRC 164 | 52-2-0171 | 378 | 378 | 4.2 | 0.5 | 0.5 | -0.4 |
| FRC 168 | 52-2-0541 | 331 | 271 | 2.3 | 1.7 | 0.4 | -0.2 |
| FRC 169 | 52-2-0747 | 813 | 813 | 6.5 | 6.5 | 0.8 | -1.3 |
| FRC 17 | 52-2-0121 | 335 | 280 | 2.4 | 1.8 | 0.4 | -0.2 |
| FRC 171 | 52-2-0734 | 381 | 381 | 3.6 | 0.9 | 0.5 | -1.6 |
| FRC 172 | 52-2-0735 | 395 | 395 | 2.2 | 1.1 | 0.4 | -0.6 |
| FRC 176 | 52-2-0826 | 1223 | 1223 | 3.7 | 0.8 | 0.6 | -0.7 |
| FRC 180 | 52-2-0828 | 389 | 389 | 2.4 | 0.2 | 0.4 | -0.5 |
| FRC 184 | 52-2-0222 | 361 | 361 | 4.1 | 1.0 | 0.4 | -1.1 |
| FRC 185 | 52-2-0223 | 363 | 363 | 3.8 | 0.3 | 0.8 | -0.3 |
| FRC 186 | 52-2-0224 | 364 | 364 | 3.8 | 0.7 | 0.4 | -1.0 |
| FRC 187 | 52-2-0225 | 372 | 372 | 2.3 | 0.4 | 0.4 | -0.4 |
| FRC 189 | 52-2-0180 | 340 | 340 | 4.9 | 0.5 | 0.7 | -0.4 |
| FRC 191 | 52-2-0183 | 360 | 360 | 4.3 | 0.6 | 0.8 | -0.3 |
| FRC 193 | 52-2-0144 | 970 | 970 | 4.2 | 2.0 | 0.6 | -0.7 |
| FRC 194 | 52-2-0263 | 356 | 356 | 4.2 | 0.7 | 0.9 | -0.3 |
| FRC 195 | 52-2-0264 | 353 | 353 | 6.0 | 1.4 | 0.6 | -1.4 |
| FRC 198 | 52-2-0268 | 363 | 363 | 1.9 | 0.9 | 0.6 | -0.4 |
| FRC 199 | 52-2-0265 | 370 | 370 | 3.0 | 0.7 | 0.8 | -0.3 |
| FRC 20 | 52-2-0107 | 553 | 526 | 2.4 | 2.1 | 0.1 | -0.1 |
| FRC 201 | 52-2-0267 | 349 | 332 | 4.3 | 4.0 | 0.6 | -0.2 |
| FRC 203 | 52-2-0259 | 743 | 13 | 3.9 | 0.2 | 0.0 | -0.7 |
| FRC 208 | 52-2-0246 | 1570 | 189 | 1.5 | 0.8 | 0.5 | -0.3 |
| FRC 21 | 52-2-0105 | 768 | 755 | 5.0 | 4.8 | 1.6 | -1.1 |
| FRC 22 | 52-2-0145 | 1143 | 1143 | 2.2 | 1.1 | 0.7 | -0.4 |
| FRC 23 | 52-2-0161 | 1116 | 1116 | 2.4 | 1.6 | 0.4 | -1.0 |
| FRC 24.1 | 52-2-159 | 1139 | 1139 | 6.0 | 0.8 | 0.4 | -1.2 |
| FRC 24.2 | 52-2-0160 | 1074 | 1074 | 5.3 | 0.9 | 0.9 | -0.3 |
| FRC 25 | 52-2-0129 | 1240 | 1240 | 4.5 | 1.8 | 0.6 | -1.0 |
| FRC 253 | 52-2-0738 | 372 | 372 | 5.9 | 1.0 | 0.8 | -0.9 |
| FRC 254 | 52-2-0829 | 342 | 342 | 5.9 | 1.4 | 1.0 | -0.5 |
| FRC 26 | 52-2-0135 | 1145 | 1145 | 5.7 | 0.9 | 0.8 | -0.7 |
| FRC 266 | N/A | 257 | 176 | 1.7 | 0.9 | 0.4 | 0.0 |
| FRC 267 | N/A | 26 | 16 | 0.3 | 0.1 | 0.0 | 0.0 |
| FRC 268 | 52-2-3095 | 1024 | 20 | 5.1 | 0.0 | 0.8 | 0.0 |
| FRC 269 | 52-2-3135 | 1544 | 130 | 0.7 | 0.1 | 0.5 | -0.1 |
| FRC 270 | 52-2-3136 | 1205 | 1193 | 3.6 | 3.5 | 0.6 | -0.4 |

## Subsidence Predictions for Aboriginal Heritage Sites within the Study Area - Metropolitan Coal Project

| Label | AHIMS Site No. | Total Subsidence after LW44 (mm)[1] | Cumulative Subsidence due to LW18 to LW44 (mm)[2] | Total Tilt during or after LW18 to LW44 (mm/m)[1] | Cumulative Tilt due to LW18 to LW44 (mm/m)[2] | Maximum Predicted Tensile Strain during or after LW18 to LW44 (mm/m)[1] | Maximum Predicted Compressive Strain during or after LW18 to LW44 (mm/m)[1] |
|---|---|---|---|---|---|---|---|
| FRC 271 | N/A | 1405 | 1308 | 2.2 | 1.5 | 0.2 | -1.0 |
| FRC 272 | 52-2-3074 | 1094 | 1094 | 6.2 | 1.6 | 1.1 | -0.9 |
| FRC 273 | 52-2-3075 | 1100 | 1100 | 5.8 | 1.4 | 0.4 | -1.0 |
| FRC 274 | N/A | 1213 | 1213 | 4.5 | 1.1 | 0.4 | -0.5 |
| FRC 275 | N/A | 1221 | 1221 | 3.8 | 1.3 | 0.6 | -0.8 |
| FRC 276 | 52-2-3078 | 1156 | 1156 | 5.4 | 0.5 | 0.3 | -1.0 |
| FRC 277 | 52-2-3079 | 1169 | 1169 | 3.2 | 0.7 | 0.6 | -0.2 |
| FRC 278 | 52-2-3080 | 357 | 297 | 2.6 | 2.0 | 0.5 | -0.2 |
| FRC 279 | 52-2-3081 | 1002 | 998 | 3.1 | 3.0 | 0.4 | -0.4 |
| FRC 28 | 52-2-0154 | 399 | 399 | 4.9 | 0.8 | 0.5 | -2.0 |
| FRC 280 | 52-2-3082 | 1059 | 1059 | 4.4 | 0.7 | 1.0 | -0.2 |
| FRC 281 | 52-2-3083 | 1041 | 1041 | 2.6 | 1.2 | 0.8 | -0.3 |
| FRC 283 | 52-2-3085 | 1172 | 1172 | 2.5 | 0.8 | 0.7 | -0.4 |
| FRC 284 | 52-2-3086 | 1118 | 1118 | 3.2 | 1.8 | 0.4 | -0.8 |
| FRC 285 | 52-2-3097 | 1120 | 1120 | 3.2 | 2.0 | 0.5 | -0.4 |
| FRC 29 | 52-2-0155 | 412 | 412 | 1.8 | 1.0 | 0.5 | -0.5 |
| FRC 30 | 52-2-0200 | 418 | 418 | 2.6 | 0.8 | 0.6 | -0.3 |
| FRC 301 | N/A | 1080 | 1080 | 5.3 | 2.5 | 0.4 | -1.4 |
| FRC 302 | N/A | 15 | 15 | 0.2 | 0.2 | 0.0 | 0.0 |
| FRC 304 | N/A | 225 | 47 | 1.7 | -0.5 | 0.4 | -0.1 |
| FRC 305 | N/A | 1086 | 1086 | 2.5 | 2.4 | 0.4 | -1.0 |
| FRC 306 | N/A | 1056 | 1056 | 4.3 | 1.6 | 1.1 | -0.4 |
| FRC 307 | N/A | 378 | 378 | 7.1 | 2.1 | 1.0 | -2.0 |
| FRC 308 | N/A | 347 | 347 | 6.3 | 3.9 | 1.0 | -1.3 |
| FRC 309 | N/A | 381 | 381 | 5.5 | 0.8 | 0.7 | -0.9 |
| FRC 31 | 52-2-0722 | 409 | 409 | 2.7 | 0.5 | 0.4 | -0.9 |
| FRC 310 | N/A | 471 | 471 | 4.1 | 0.6 | 0.6 | -0.5 |
| FRC 311 | N/A | 376 | 376 | 4.1 | 1.0 | 0.4 | -0.9 |
| FRC 312 | N/A | 372 | 372 | 4.2 | 1.0 | 0.5 | -0.6 |
| FRC 313 | N/A | 532 | 532 | 2.7 | 1.8 | 0.5 | -0.2 |
| FRC 314 | N/A | 400 | 400 | 2.6 | 0.6 | 0.4 | -0.3 |
| FRC 315 | N/A | 403 | 403 | 2.5 | 0.7 | 0.4 | -0.3 |
| FRC 316 | N/A | 497 | 497 | 2.6 | 1.8 | 0.5 | -0.3 |
| FRC 317 | N/A | 414 | 414 | 2.9 | 1.0 | 0.5 | -0.8 |
| FRC 319 | N/A | 968 | 968 | 2.0 | 0.6 | 0.5 | -0.5 |
| FRC 32 | 52-2-0194 | 413 | 413 | 2.5 | 0.2 | 0.4 | -0.5 |
| FRC 320 | N/A | 396 | 396 | 2.5 | 0.7 | 0.6 | -0.3 |
| FRC 321 | N/A | 389 | 389 | 3.6 | 0.5 | 0.4 | -1.4 |
| FRC 322 | N/A | 486 | 486 | 2.4 | 0.5 | 0.4 | -0.3 |
| FRC 323 | N/A | 360 | 360 | 6.0 | 1.4 | 1.1 | -0.3 |
| FRC 324 | N/A | 361 | 361 | 5.7 | 0.9 | 0.7 | -1.1 |
| FRC 325 | N/A | 388 | 388 | 6.0 | 1.7 | 1.3 | -0.3 |
| FRC 33 | 52-2-0188 | 409 | 409 | 4.2 | 0.3 | 0.7 | -0.3 |
| FRC 338 | N/A | 286 | 280 | 3.1 | 3.0 | 0.7 | -0.2 |
| FRC 339 | N/A | 488 | 476 | 5.8 | 5.6 | 0.9 | -0.2 |
| FRC 34 | 52-2-0195 | 361 | 361 | 5.9 | 1.1 | 1.0 | -0.3 |
| FRC 340 | N/A | 371 | 371 | 2.1 | 0.3 | 0.4 | -0.4 |
| FRC 342 | N/A | 1206 | 1206 | 4.6 | 0.6 | 0.6 | -0.6 |
| FRC 343 | N/A | 296 | 294 | 2.1 | 2.0 | 0.4 | -0.1 |
| FRC 344 | N/A | 410 | 410 | 3.3 | 0.4 | 0.4 | -0.4 |
| FRC 345 | N/A | 411 | 411 | 2.6 | 0.8 | 0.3 | -0.2 |
| FRC 40 | 52-2-0333 | 1257 | 1257 | 3.7 | 1.5 | 0.6 | -1.2 |
| FRC 44 | 52-2-0103 | 1236 | 1236 | 4.5 | 0.9 | 0.6 | -1.2 |
| FRC 45 | 52-2-0102 | 1169 | 1169 | 3.0 | 0.6 | 0.4 | -0.3 |
| FRC 46 | 52-2-0408 | 1100 | 1100 | 2.7 | 1.2 | 0.4 | -1.3 |
| FRC 52 | 52-2-0257 | 1115 | 1115 | 2.8 | 0.5 | 0.4 | -0.3 |
| FRC 55 | 52-2-0256 | 326 | 49 | 0.8 | 0.2 | 0.4 | 0.0 |
| FRC 57 | 2-2-258, 52-2-373 | 605 | 12 | 6.3 | -0.2 | 1.0 | 0.6 |
| FRC 59 | 52-2-0228, | 1227 | 541 | 6.7 | 1.6 | 0.3 | -0.8 |

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| Label | AHIMS Site No. | Total Subsidence after LW44 (mm)[1] | Cumulative Subsidence due to LW18 to LW44 (mm)[2] | Total Tilt during or after LW18 to LW44 (mm/m)[1] | Cumulative Tilt due to LW18 to LW44 (mm/m)[2] | Maximum Predicted Tensile Strain during or after LW18 to LW44 (mm/m)[1] | Maximum Predicted Compressive Strain during or after LW18 to LW44 (mm/m)[1] |
|---|---|---|---|---|---|---|---|
| FRC 60 | 52-2-0177 | 814 | 814 | 5.5 | 0.5 | 0.3 | -0.9 |
| FRC 61 | 52-2-0152 | 664 | 664 | 4.0 | 2.0 | 0.6 | -0.8 |
| FRC 62 | 52-2-0168 | 452 | 452 | 4.1 | 2.0 | 0.5 | -0.6 |
| FRC 63 | 52-2-0409 | 565 | 20 | 3.6 | 0.2 | 0.3 | -0.4 |
| FRC 67 | 52-2-0185 | 382 | 382 | 2.1 | 0.9 | 0.5 | -0.5 |
| FRC 68 | 52-2-0186 | 382 | 382 | 2.2 | 0.7 | 0.4 | -0.5 |
| FRC 70 | 52-2-0192 | 381 | 381 | 3.4 | 0.6 | 0.4 | -1.1 |
| FRC 71 | N/A | 396 | 396 | 2.2 | 0.1 | 0.6 | -0.5 |
| FRC 72 | 52-2-0199 | 608 | 608 | 6.8 | 3.2 | 1.2 | -1.5 |
| FRC 76 | N/A | 459 | 459 | 4.0 | 0.6 | 0.7 | -0.3 |
| FRC 77 | 52-2-0330 | 459 | 459 | 3.0 | 0.5 | 0.3 | -0.3 |
| FRC 78 | 52-2-0885 | 455 | 455 | 3.0 | 0.4 | 0.4 | -0.3 |
| FRC 85 | 52-2-0883 | 674 | 674 | 3.3 | 2.1 | 0.5 | -0.4 |
| FRC 86 | 52-2-0207 | 610 | 610 | 3.9 | 2.1 | 0.6 | -0.4 |
| FRC 87 | 52-2-0899 | 432 | 432 | 4.6 | 0.8 | 0.6 | -0.5 |
| FRC 90 | 52-2-0869 | 648 | 648 | 3.4 | 2.1 | 0.5 | -1.1 |
| FRC 91 | 52-2-0870 | 859 | 859 | 4.3 | 2.1 | 0.5 | -0.5 |
| FRC 93 | 52-2-0198 | 395 | 395 | 4.8 | 1.0 | 0.3 | -0.8 |
| FRC 94 | 52-2-0873 | 401 | 401 | 2.8 | 0.5 | 0.7 | -0.3 |
| FRC 95 | 52-2-0347 | 659 | 659 | 2.7 | 1.8 | 0.4 | -0.2 |
| FRC 96 | 52-2-0230 | 419 | 33 | 2.9 | 0.2 | 0.6 | -0.3 |
| FRC 97 | 52-2-0220 | 352 | 352 | 4.7 | 0.6 | 0.8 | -0.3 |
| MET 1 | - | 1091 | 1090 | 2.0 | 1.9 | 0.4 | -1.1 |
| MET 2 | - | 420 | 244 | 5.2 | 3.4 | 0.5 | -0.2 |
| NEW 1 | N/A | 418 | 418 | 2.6 | 0.9 | 0.4 | -0.2 |
| NEW 10 | N/A | 559 | 559 | 3.2 | 1.8 | 0.5 | -0.4 |
| NEW 15 | N/A | 9 | 9 | 0.2 | 0.2 | 0.1 | 0.0 |
| NEW 16 | N/A | 12 | 12 | 0.2 | 0.2 | 0.0 | 0.0 |
| NEW 17 | - | 70 | 70 | 1.8 | 1.8 | 0.3 | -0.1 |
| NEW 18 | N/A | 16 | 16 | 0.3 | 0.3 | 0.0 | 0.0 |
| NEW 19 | N/A | 165 | 165 | 3.9 | 3.9 | 0.5 | -0.1 |
| NEW 2 | N/A | 385 | 385 | 3.6 | 0.9 | 0.6 | -0.2 |
| NEW 20 | N/A | 15 | 15 | 0.4 | 0.4 | 0.1 | 0.0 |
| NEW 22 | N/A | 558 | 558 | 4.5 | 4.5 | 0.2 | -0.6 |
| NEW 9 | N/A | 12 | 12 | 0.2 | 0.2 | 0.0 | 0.0 |
| NT 10 | 52-2-625 | 264 | 264 | 2.9 | 2.9 | 0.5 | 0.0 |
| NT 11 | N/A | 391 | 391 | 4.1 | 0.8 | 0.5 | -0.4 |
| NT 12 | 52-2-753 | 246 | 246 | 2.7 | 2.7 | 0.5 | 0.0 |
| NT 17 | 52-2-629 | 340 | 340 | 2.9 | 2.9 | 0.4 | -0.4 |
| NT 18 | 52-2-751 | 368 | 368 | 4.2 | 0.7 | 0.2 | -0.5 |
| NT 19 | N/A | 344 | 344 | 4.6 | 1.0 | 0.3 | -0.6 |
| NT 21 | 52-2-630 | 341 | 341 | 2.8 | 2.2 | 0.5 | -0.3 |
| NT 22 | 52-2-758 | 8 | 8 | 0.2 | 0.2 | 0.0 | 0.0 |
| NT 23 | 52-2-631 | 6 | 6 | 0.2 | 0.2 | 0.0 | 0.0 |
| NT 29 | 52-2-637 | 297 | 297 | 3.4 | 3.3 | 0.4 | -0.4 |
| NT 3 | N/A | 391 | 391 | 3.4 | 0.7 | 0.7 | -0.3 |
| NT 33 | 52-2-0641 | 436 | 436 | 4.2 | 0.8 | 0.3 | -0.5 |
| NT 34 | 52-2-0642 | 407 | 407 | 4.2 | 0.7 | 0.5 | -0.4 |
| NT 35 | 52-2-0643 | 403 | 403 | 4.4 | 0.5 | 0.5 | -0.4 |
| NT 4 | 52-2-619 | 361 | 361 | 3.6 | 1.8 | 0.3 | -0.4 |
| NT 46 | 52-2-0755 | 615 | 615 | 3.5 | 1.5 | 0.6 | -0.6 |
| NT 5 | 52-2-620 | 351 | 351 | 2.5 | 2.0 | 0.5 | -0.3 |
| NT 52 | 52-2-652 | 38 | 38 | 0.3 | 0.3 | 0.0 | 0.0 |
| NT 53 | 52-2-371 | 45 | 45 | 0.4 | 0.4 | 0.0 | 0.0 |
| NT 54 | 52-2-374 | 55 | 55 | 0.5 | 0.5 | 0.0 | 0.0 |
| NT 6 | N/A | 397 | 397 | 4.0 | 1.0 | 0.4 | -0.5 |
| NT 7 | N/A | 413 | 413 | 4.0 | 0.6 | 0.5 | -0.4 |
| NT 74 | 52-2-658 | 361 | 361 | 2.4 | 1.5 | 0.5 | -0.3 |
| NT 75 | 52-2-0659 | 365 | 365 | 2.4 | 1.2 | 0.4 | -0.3 |
| NT 76 | 52-2-660 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |

## Subsidence Predictions for Aboriginal Heritage Sites within the Study Area - Metropolitan Coal Project

| Label | AHIMS Site No. | Total Subsidence after LW44 (mm)[1] | Cumulative Subsidence due to LW18 to LW44 (mm)[2] | Total Tilt during or after LW18 to LW44 (mm/m)[1] | Cumulative Tilt due to LW18 to LW44 (mm/m)[2] | Maximum Predicted Tensile Strain during or after LW18 to LW44 (mm/m)[1] | Maximum Predicted Compressive Strain during or after LW18 to LW44 (mm/m)[1] |
|---|---|---|---|---|---|---|---|
| NT 78 | N/A | 346 | 346 | 4.8 | 0.4 | 0.7 | -0.4 |
| NT 79 | N/A | 371 | 371 | 2.6 | 0.3 | 0.6 | -0.3 |
| NT 8 | N/A | 389 | 389 | 4.2 | 0.7 | 0.3 | -0.5 |
| NT 80 | N/A | 390 | 390 | 2.6 | 0.4 | 0.5 | -0.3 |
| NT 81 | N/A | 379 | 379 | 3.4 | 0.5 | 0.5 | -0.3 |
| NT 85 | N/A | 355 | 355 | 3.2 | 1.1 | 0.3 | -0.5 |
| NT 86 | N/A | 16 | 16 | 0.3 | 0.3 | 0.0 | 0.0 |
| NT 9 | N/A | 385 | 385 | 3.1 | 0.3 | 0.5 | -0.2 |
| PAD 2 | N/A | 661 | 644 | 4.7 | 4.5 | 1.6 | -0.3 |
| PAD 3 | N/A | 341 | 188 | 4.5 | 2.7 | 0.4 | -0.1 |
| Source: | Mine Subsidence Engineering Consultants 2007; 2008 | | | | | | |
| | | | | | | | |
| [1] | Total and Maximum values include the effects of all prevoius (i.e. LW1-13), current (i.e. 14-17) and proposed (i.e. LW18-44) longwalls. | | | | | | |
| [2] | Cumulative values indicate the additional predicted effects due to the mining of LW18-44 only. | | | | | | |
| | | | | | | | |
| Notes: | The normal ground movements resulting from the extraction of longwalls are referred to as systematic subsidence movements. These movements are described by the following parameters (MSEC, 2008): | | | | | | |
| | - Subsidence refers to vertical and/or horizontal movement of a specific location. Subsidence is usually expressed in units of millimetres (mm). | | | | | | |
| | - Tilt is the change in the slope of the ground as a result of differential subsidence. Tilt is usually expressed in units of millimetres per metre (mm/m). A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %. | | | | | | |
| | - Strain is the change in horizontal distance between two points on the ground, divided by the original horizontal distance between them. Strain is typically expressed in units of millimetres per metre (mm/m). | | | | | | |
| | - Tensile Strains occur where the distance between two points increases. | | | | | | |
| | - Compressive Strains occur where the distance between two points decreases. | | | | | | |

# APPENDIX 7

# ARCHAEOLOGICAL SIGNIFICANCE RATINGS OF INDIVIDUAL CRITERION FOR EACH KNOWN ABORIGINAL HERITAGE SITE WITHIN THE STUDY AREA

- This appendix contains culturally sensitive material and access is restricted to the Proponent, Aboriginal stakeholder groups, statutory authorities, and other parties with the consent of the Department of Environment and Climate Change.

# APPENDIX 8

# ARCHAEOLOGICAL SIGNIFICANCE OF ADDITIONAL ABORIGINAL HERITAGE SITES WITHIN 600 METRES OF SECONDARY EXTRACTION

- This appendix contains culturally sensitive material and access is restricted to the Proponent, Aboriginal stakeholder groups, statutory authorities, and other parties with the consent of the Department of Environment and Climate Change