APPENDIX P

Aboriginal cultural heritage assessment

Cobbora Holding Company Pty Limited

EMM
EMGA Mitchell McLennan

Aboriginal cultural heritage assessment

Cobbora Coal Project

Prepared for Cobbora Holding Company Pty Limited| 12 September 2012

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Aboriginal cultural heritage assessment

Final for public exhibition

Report J11030RP14|Prepared for Cobbora Holding Company Pty Limited|12 September 2012

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Executive Summary

This Aboriginal heritage assessment was conducted for the Cobbora Coal Project (the Project) Environmental Assessment (EA). The area assessed comprised the Project Application Area (PAA) located approximately 5 km south of Cobbora, 22 km south-west of Dunedoo, 64 km north-west of Mudgee and 60 km east of Dubbo in the central west of NSW.

A series of archaeological surveys identified Aboriginal sites in the PAA. Most Aboriginal sites were located along the major watercourses of Sandy Creek and Laheys Creek. Of the 229 Aboriginal sites recorded within the PAA, 164 were open stone artefact sites, 25 were scarred trees, 18 were grinding groove sites, 15 were hearths and seven were rockshelters. Several of the hearths had been recorded within the boundaries of open stone artefact sites. Aboriginal flaked stone artefacts were the most common type of Aboriginal object. Areas of archaeological sensitivity were also identified along many of the creeks.

Aboriginal community representatives involved in the assessment were consulted in regard to Aboriginal heritage values within the PAA. The PAA was held to be of value in as much as it formed a part of the overall Australian landscape, all of which is important to Aboriginal culture. The assessment sought to identify whether there were Aboriginal heritage values (ie traditional story places, ceremonial places or landscape features with Aboriginal traditional value) not specifically associated with Aboriginal archaeological sites. No such non-archaeological Aboriginal heritage values specific to the PAA were identified.

The distribution of Aboriginal sites described above has been an important consideration in mine planning. Preferred plans have been modified to avoid known sites where possible, particularly along Sandy Creek. The result is the Project will affect 78 Aboriginal sites out of the 229 recorded within the PAA, meaning 66% of sites identified with the PAA will be avoided. Of the sites impacted, four are of high significance, 34 are of moderate significance and 40 are of low significance.

An Aboriginal heritage management program of site protection, excavation and collection is recommended to mitigate development impacts. An Aboriginal Heritage Management Plan will be prepared in consultation with registered Aboriginal parties.

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Glossary of Terms

Aboriginal object: A physical manifestation of past Aboriginal activity. The legal term is defined in the *National Parks and Wildlife Act* 1974 section 5 as:

> any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Typical examples include stone artefacts, grinding grooves, Aboriginal rockshelters which by definition include physical evidence of occupation, midden shell, hearths, stone arrangements and other landscape features which derive from past Aboriginal activity.

Aboriginal scarred tree: A tree of sufficient age to have been mature at the time of traditional Aboriginal hunter-gatherer life and therefore generally of more than 220 years age with evidence of bark or cambium wood removal for the purpose of implement manufacture, footholds, bark sheet removal for shelter, or extraction of animals or other food. Care must be taken to distinguish Aboriginal scars from the much more common natural causes of branch tear, insect attack, animal impact, lightning strike and dieback. Scarred tree recognition guidelines exist to distinguish these features. Naturally scarred trees are often misidentified as Aboriginal scarred trees.

Aboriginal site: The location where a person in the present day can observe one or more Aboriginal objects. The boundaries of a site are limited to the extent of the observed evidence. A 'site' does not include the assumed extent of unobserved Aboriginal objects (such as archaeological deposit).

Different archaeologists can have varying definitions of a 'site' and may use the term to reflect the assumed extent of past Aboriginal activity beyond visible Aboriginal objects. Such use of the term risks defining all of Australia as a single 'site'.

Aboriginal stone artefact: A stone object with morphological features derived from past Aboriginal activity such as intentional fracture, abrasion or impact. Artefacts are distinguished by morphology and context. Typically flaked stone artefacts are distinguished from naturally broken stone by recognition of clear marginal fracture initiation (typically herzian/conchoidal or wedging initiation) on highly siliceous stone types which can often be exotic to the area. Care must be taken to distinguish modern broken stone in machine impacted contexts and therefore context must be carefully considered as well as morphology.

AHIMS: Aboriginal Heritage Information Management System – a computer software system employed by the Office of Environment and Heritage to manage many aspects of Aboriginal site recording and permitting. AHIMS includes an Aboriginal sites database which can be accessed via an internet portal.

Archaeological deposit: Aboriginal objects occurring within one or more soil strata. The most common form of archaeological deposit relates to the presence of a single conflated layer of Aboriginal stone artefacts worked into the topsoil through bioturbation.

Backed artefact: A thin flake or blade-flake that has been shaped by secondary flaking (retouch) along one lateral margin. The retouched margin is typically steep and bipolar to form a blunt 'back' in the manner of a modern scalpel blade. Distinctive symmetrical and asymmetrical forms are typically found called geometric microliths and bondi points respectively. A thick symmetrical form, called an *elouera*, is typically the size of a mandarin segment.

Bondi point: See *backed artefact* definition.

Carved tree: A tree with carved designs in the bark or outer wood typically in contexts associated with ceremonial sites or burials. These are exceptionally rare.

Conchoidal: A term used in relation to fracture surfaces on Aboriginal stone artefacts **-** bulb-like in the manner of a bulbous protrusion on a bivalve shell.

Cylcon: Cylindro-conical stone.

Elouera: See *backed artefact* definition.

Eraillure scar: The small flake scar on the dorsal side of a flake next to the platform. It is the result of rebounding force during percussion flaking.

Fish trap: Aboriginal people have constructed fish traps from woven organic materials or as a series of rock walls which trap fish when water levels fluctuate. A famous example is the Brewarrina fish traps which comprise extensive lines of carefully arranged cobbles on a rock bar in the Barwon River.

Geometric microlith: See *backed artefact* definition.

Grinding grooves: Grinding grooves typically derive from the sharpening of stone hatchet heads on sandstone rock. Grooves appear as elliptical depressions of around 25 cm length with smooth bases. Although mostly occurring in association with water to wash the abraded stone dust away from the groove, such sites have been recorded away from water. Narrow grooves or broad abraded areas may occur less commonly and may be derived from spear sharpening or other grinding activities.

Hearth: A hearth is a collection of stones interpreted by an observer as being heat retainer stones assembled by Aboriginal people in the past as a fireplace. Care must be taken to avoid natural collections of stones, gathering of stones within potholes, concentrations of charcoal from burnt tree stumps or burnt clay patches from burnt tree stumps.

Holocene: A period of time generally 10,000 years, which marks the end of the last ice age, to the present.

Isotropic: Having a physical property that has the same value when measured in different directions. In relation to stone used for stone tools a fracture path is not hindered by layer boundaries or other favoured plane of cleavage.

Midden: A collection of shells and associated economic remains resulting from Aboriginal food gathering and processing activity. Middens comprise shellfish remains of consistent size in a rich dark earth matrix commonly associated with stone artefacts, fish bone and animal bone although shells are commonly the most obtrusive element.

Keeping place: A room or facility with the express and exclusive purpose of storing Aboriginal cultural heritage materials with accompanying documentation in a secure and accessible manner which protects their cultural heritage values.

Open stone artefact site/stone artefact site: An unenclosed area where Aboriginal stone artefacts occur – typically exposed from a topsoil archaeological deposit by erosion. Typically the term is used to refer to two or more artefacts although this is an arbitrary distinction. A general 'rule of thumb' boundary definition employed by archaeologists is that artefacts or features more than 50 m apart are regarded as separate sites, however there is no theoretical imperative dictating such as rule. (The 50 m separation rule is used for the most part in EMM's work).

Pleistocene: A period of time 2.6 million years ago to 10,000 years ago. Reference to 'Pleistocene sites' generally means reference to sites older than 10,000 years.

Potential Archaeological Deposit: An area where there is an inferred presence of Aboriginal objects within the soil based on the environmental context which is typically associated with discovery of Aboriginal objects in analogous areas. This is not strictly a 'site' type, although AHIMS records it as such for the purpose of associating Aboriginal heritage Impact Permits with geographical areas.

Stone artefact concentration (SAC): See open stone artefact site.

Thumbnail scraper: A thumbnail sized thin flake with steep unidirectional retouch or use-wear around a convex working edge.

Well: Various features have been described as wells including isolated deep ground depressions dug out to provide reliable water or depressions in rock which have been artificially expanded by abrasion or pecking.

Acronyms

Abbreviation	Full term
AHIMS	Aboriginal Heritage Information Management System
am	Morning
BBS	Brigalow Belt South biogeographic region
CHC	Cobbora Holding Company Pty Limited
CMA	Catchment Management Authority
DEC	Department of Environment and Conservation
DECCW	Department of Environment, Climate Change and Water
DGRs	Director General's environmental assessment requirements
DLALC	Dubbo Local Aboriginal Land Council
EA	Environmental assessment
EMM	EMGA Mitchell McLennan Pty Limited
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ERM	Environmental Resources Management Australia Pty Ltd
GAC	Gallanggabang Aboriginal Corporation
GIS	Geographic Information System
GPS	Global Positioning System
ICOMOs	International Council on Monuments and Sites
km	Kilometres
m	Metres
MAC	Mingaan Aboriginal Corporation
MGATSIC	Murong Gialinga Aboriginal & Torres Strait Islander Corporation
MLALC	Mudgee Local Aboriginal Land Council
NEWCO	North-East Wiraduri Co Ltd
NPWS	National Parks and Wildlife Service
NTSCorp	Native Title Services Corporation
OEH	Office of Environment and Heritage
PAA	Project Application Area
PAD	Potential archaeological deposit
PEA	Preliminary environmental assessment
pm	Afternoon
RAP	Registered Aboriginal party
SAC	Stone artefact concentration
SWS	South Western Slopes biogeographic region
The Project	Cobbora Coal Project
WDD	Wirrimbah Direct Descendants
WNTCAC	Warrabinga Native Title Claimants Aboriginal Corporation
WVW	Wellington Valley Wiradjuri Aboriginal Corporation

1 Introduction

1.1 Project description

1.1.1 Overview

The Cobbora Coal Project (the Project) is an open cut coal mine that will be developed on approximately 276 square kilometres (km^2) of land near Cobbora (Figure 1.1) in the central west of New South Wales (NSW). The Project will primarily provide coal to three companies operating major power stations in NSW: Macquarie Generation, Origin Energy and Delta Electricity.

Up to 9.5 million tonnes per annum (Mtpa) of coal is contracted to the companies and will be used for domestic power generation in NSW. In addition, up to 2.5 Mtpa will be produced for a combination of the export and spot domestic markets.

The Project's key elements (Figure 1.2) are:

- an open cut mine;
- a coal handling and preparation plant (CHPP area);
- a train loading facility and rail spur;
- a mine infrastructure area; and
- supporting infrastructure including: access roads; water supply and storage; and electricity supply.

It is envisaged that construction activities will commence in mid-2013 with coal supplied to customers from the first half of 2015. A mine life of 21 years is proposed.

1.1.2 Open cut mine

Multiple open cut mining pits will be developed within three mining areas:

- Mining Area A north of the infrastructure area;
- Mining Area B south of the infrastructure area; and
- Mining Area C north-east of the infrastructure area.

There will be three out-of-pit waste rock emplacements:

- AC-OOP between Mining Areas A and C;
- B-OOP E adjacent to Mining Area B on the east side of Laheys Creek; and
- B-OOP W adjacent to Mining Area B on the west side of Laheys Creek.

Over the mine life, operations will affect approximately 4,700 ha, including the associated infrastructure (eg haul roads), out-of-pit waste rock emplacements and rehabilitated areas. The pits and out-of-pit emplacements have been designed and placed to maximise the efficient extraction of the coal resource, while avoiding or minimising impacts on Aboriginal heritage, creeks and ecologically significant vegetation.

A conventional load and haul operation is proposed using excavators, front-end loaders and trucks. Initially, trucks will haul waste rock to out-of-pit emplacements. Following this, the majority of the waste rock will be placed within the mined-out voids.

Trucks will haul excavated run-of-mine (ROM) coal to the CHPP where it will be tipped into dump hoppers above the primary crushers or onto the secondary ROM stockpiles for later rehandling.

1.1.3 Coal handling and preparation plant

The CHPP will treat the ROM coal so that product coal meets the sizing and coal quality requirements of the customers. Subject to the level of impurities (rejects) in the coal and washability characteristics, the ROM will be either crushed and bypassed or treated (washed) in the preparation plant. The rejects will typically include waste rock from above, below and within the coal seam as well as mineral matter dispersed within the coal.

The CHPP will be typical of those used by most coal mines in NSW and will be capable of treating up to 20 Mtpa of ROM coal. The washed product coal will be separated from rejects in a series of coal cleaning circuits (including heavy media separation) in the CHPP. The CHPP will also include a truck dump station; crushing plants; coal stockpiles; and infrastructure to move and stockpile the coal. Rejects from the CHPP will be disposed within the footprint of the Mining Operations Area.

1.1.4 Train loading facility and rail spur

Coal will be transported by rail to the Project's customers, including Bayswater and Liddell power stations in the Upper Hunter Valley and Eraring, Vales Point and Munmorah power stations on Lake Macquarie on the NSW Central Coast. Coal may also be transported to other domestic customers or to a ship loading facility in Newcastle for export.

Product coal will be loaded onto trains from an overhead train loading bin located on a rail spur balloon loop. Approximately five trains will be loaded each day. The rail spur will be approximately 28 km long (including the loop) and will join the Dunedoo-Gulgong rail line near Tallawang. A locomotive provisioning facility and a siding for fuel delivery may be located adjacent to the balloon loop.

1.1.5 Mine infrastructure area

The mine infrastructure area will be located adjacent to the mining areas. It will include workshops; hardstand and lay-down areas; bulk storage buildings; bulk fuel storage and a fuelling station; office buildings; an operations building and change-house; parking; an explosives magazine; and vehicle wash down bays.

1.1.6 Supporting infrastructure

i Access roads

The main access to the mine will be from the Golden Highway to the north of the operations, via a road diversion that will replace an existing section of Spring Ridge Road. There will be limited light vehicle access from the south via Spring Ridge Road.

Internal roads will connect the access road to the workshop, administration buildings and to the mine infrastructure area. Internal roads will also connect the various areas of the Project.

ii Water supply

The Project will require water primarily for the CHPP and for dust suppression. The primary source of water for the Project will be the Cudgegong River. Water will be supplied via approximately 26 km of pipeline from a pump station on the Cudgegong River to the primary raw water dam south-east of the mining area. Pre-existing high security water access licences have been purchased for the Project to allow up to 3.3 gigalitres (GL) of water to be extracted from the river. Water will also be sourced by intercepting surface water and by pumping groundwater that enters the mine accordance with the relevant permits and licences.

iii Electricity supply

The Project will require approximately 20 megawatts (MW) of electrical power. The Project will be connected to the supply grid at a small switching yard adjacent to the Castlereagh Highway. A power line, generally running parallel to the rail spur, will deliver the electricity to a substation in the mine infrastructure area.

An 11 kV power line will supply the Cudgegong River pump station from the existing grid approximately 2 km south of the pump station site.

1.1.7 Workforce and operating hours

The proposed mine construction workforce peaking at approximately 550 persons over a 26 month period covering Q3 2013 to Q2 2016 will average approximately 350 persons.

The proposed mine operation workforce is estimated to be 300 persons during the first two years of full production in 2016 and 2017. This will increase steadily over the next ten years to reach a peak level of approximately 590 persons between 2027 and 2030.

Mine construction is expected to occur up to 20 hours per day. However, construction may occur up to 24 hours per day at times (eg during major concrete pours).

Mine operation will occur up to 24 hours per day, 7 days per week, 52 weeks per year.

1.2 Study area

The Project is located approximately 5 km south of Cobbora, 22 km south-west of Dunedoo, 64 km north-west of Mudgee and 60 km east of Dubbo in the central west of NSW. The project application area (PAA) addressed by the EA covers 276 km^2. The PAA comprises the area within which development impacts will occur, however not all of the PAA will be affected.

The PAA is a mix of agricultural land, pastoral land, woodland and some rural residential areas.

1.3 Planning context

A Major Project application under Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) was submitted to the NSW Department of Planning on 5 January 2010 (application number MP 10_0001). The Director General's environmental assessment requirements (DGRs) for the Project were issued on 4 March 2010. Revised DGRs were issued for the Project on 23 December 2011.

1.4 Objectives of this assessment

EMGA Mitchell McLennan Pty Limited (EMM) was commissioned by Cobbora Holding Company (CHC) to prepare an environmental assessment (EA) for the proposed mine. This Aboriginal heritage assessment report forms part of that EA.

This report addresses the applicable DGRs and has been prepared in accordance with the draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005).

A preliminary environmental assessment (PEA) was prepared for the Project in December 2009. The PEA was based on a maximum production rate of 20 million tonnes per annum (Mtpa) of product coal over a 21 year period. The pit shell was approximately 3,900 ha. The proposal also included the construction of two water pipelines, a power line, a rail spur and loop, and diversion of Sandy and Laheys Creeks.

An Aboriginal assessment was conducted in 2009 and 2010 by Environmental Resource Management (Australia) Pty Ltd (ERM). A baseline report which details the methods and results of ERM's survey was prepared by ERM (ERM 2012) and is lodged with the OEH Aboriginal Heritage Information Management System reports catalogue. This was based on preliminary mine designs. It included Aboriginal consultation, fieldwork and site identification. The work undertaken for this assessment is referred to as the 2009 — 2010 survey. The relevant sites and consultation from the 2009 — 2010 survey are replicated in this report which is a complete assessment of the potential impacts to Aboriginal heritage from the Project.

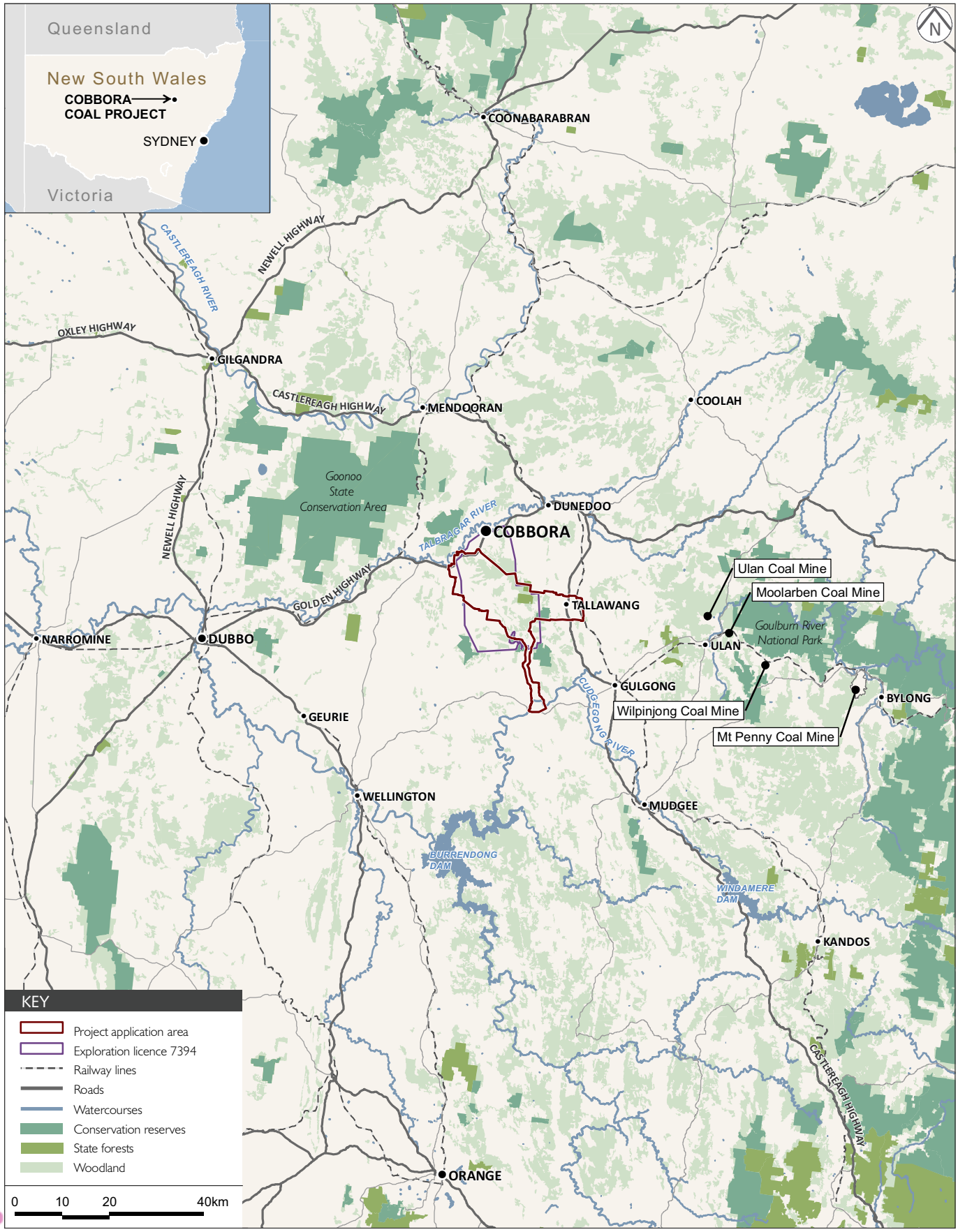
The mine plan has been modified since the preparation of the PEA. As a consequence, the disturbance footprint and potential environmental impacts have been substantially reduced. The maximum production rate has been reduced to 12 Mtpa of product coal, the pit shell changed from one large pit to three mining areas and total pit area reduced to approximately 4,000 ha. Refinement of the mine planning has provided for the avoidance of creek diversions, a reduction in the disturbance of sensitive areas and rationalisation of power and water pipeline easements.

This report assesses the Aboriginal heritage values identified within the PAA. It was prepared as a technical study appended to the EA for the Cobbora Coal Project.

The objectives of the assessment were to:

- identify Aboriginal heritage values relevant to the study area which may entail:
    - Aboriginal objects and sites;
    - Aboriginal socio-cultural values which may or may not be related to Aboriginal objects;
    - areas of archaeological sensitivity;

- assess the significance of Aboriginal objects, sites and places identified in the course of archaeological investigations and through Aboriginal community consultation;
- assess the impact of the proposed development on the identified Aboriginal heritage values; and
- identify appropriate management measures for potentially impacted Aboriginal heritage values in response to the assessed significance of those values and potential impacts.



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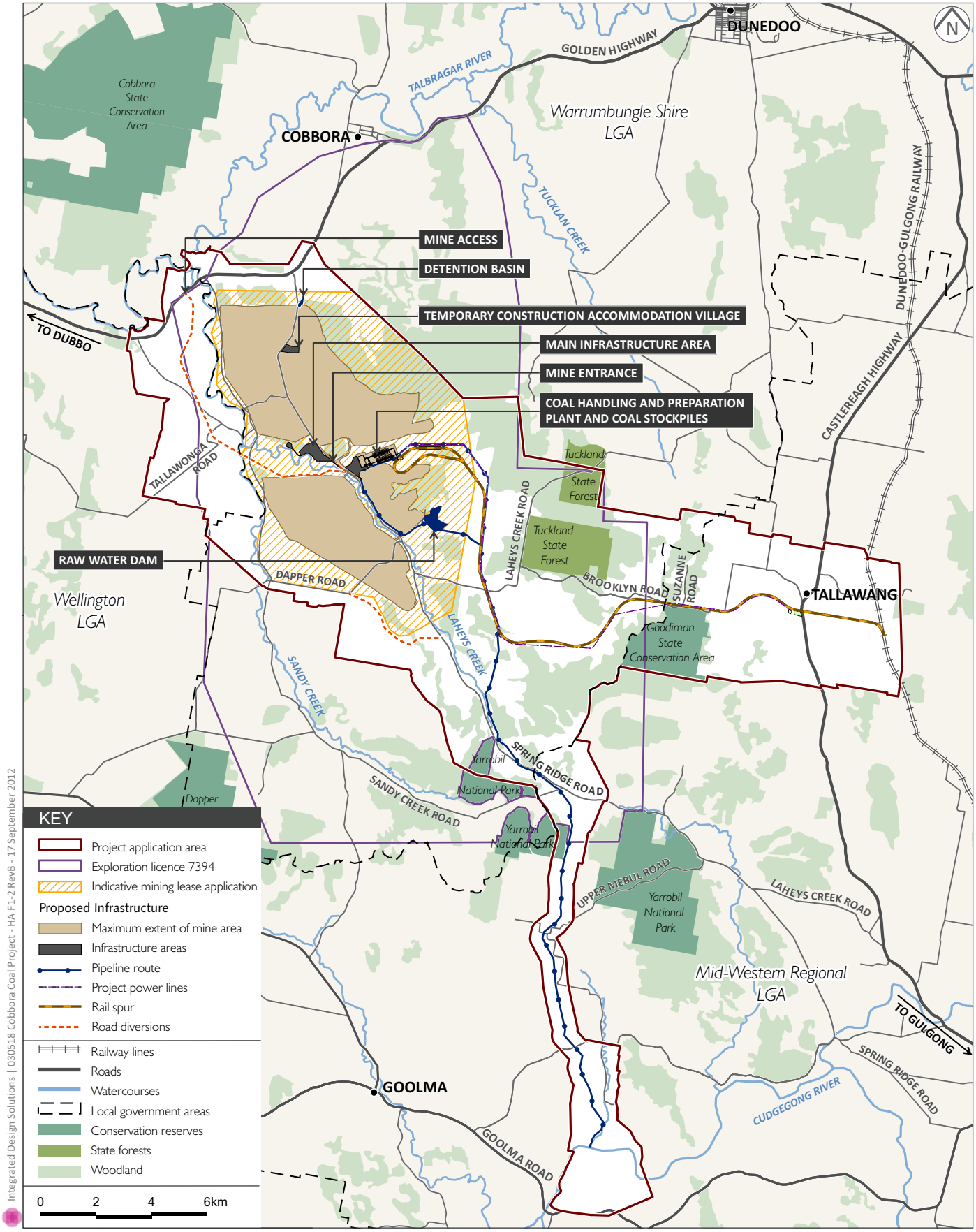
Cobbora Holding Company Pty Limited

Project Application Area

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 1.1



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Proposed Development

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 1.2

2 Aboriginal consultation

2.1 Consultation process

2.1.1 Statutory basis

The statutory requirement for Aboriginal consultation for this study is set out in the DGRs. The Aboriginal heritage assessment is to be conducted in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (the guidelines - DEC 2005) which requires consultation with Aboriginal communities about the proposed development and management of Aboriginal heritage throughout the assessment process.

The guidelines make reference to the *National Parks and Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* (ICCRs - DEC 2004) as providing 'guidance' on the process. The ICCRs and their successor, the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) were established with direct relevance to applications for approvals under Part 6 of the *National Parks and Wildlife Act 1974*. In this case no Part 6 approvals are required as the proposal is a 'Major Project' under Part 3A of the *Environmental Planning and Assessment Act 1979.*

The Aboriginal consultation process for the Project commenced in 2009 under the ICCRs. The procedures in the 2010 consultation guidelines have also been consulted in the course of the assessment. Therefore, whilst the 2005 guidelines are the statutory requirement for Aboriginal consultation for the Project, the 2010 guidelines are referred to as a model.

In accordance with the 2010 guidelines, each private Aboriginal organisation or individual who responded with a written request to be registered for consultation is referred to as a *registered Aboriginal party (RAP)*. Government agencies who registered interest were also consulted in parallel with RAPs.

Details of consultation are provided in Appendix A.

2.1.2 Best practice consultation

The principles embodied within relevant consultation guidelines include stages of:

- identification of potential Aboriginal stakeholder parties and invitation to register interest in consultation;
- presentation of project information to RAPs;
- consultation on assessment methodology;
- identification of Aboriginal heritage values;
- consultation on the significance of identified Aboriginal heritage values (including tangible sites and places, as well as non-tangible socio-cultural values pertaining to the landscape through Aboriginal stories or tradition);
- consultation on the management of Aboriginal heritage values which may be impacted by proposed development; and
- response within the assessment report to the issues raised by RAPs during consultation.

The relevant guidelines referred to above explicitly exclude employment on archaeological fieldwork from the definition of 'consultation'.

2.1.3 Process followed

The Aboriginal heritage assessment was commenced in late 2009 by Environmental Resources Management (ERM) following the ICCRs and the best practice consultation stages above. After a period of revision to mine plans by CHC in late 2010 and early 2011, EMM continued the consultation process.

Aboriginal stakeholders identified in 2009 continued to be consulted through 2011. A letter advising of EMM's involvement in the Project was issued to previously registered Aboriginal parties in July 2011 noting that, since the conclusion of the 2009 — 2010 survey, mine plans had been amended in response to environmental issues, including heritage concerns. The letter stated that further information would be provided about changed mine plans as they became available.

Following the revised mine plans, EMM recommenced formal Aboriginal consultation steps. In addition to consulting with the previously identified RAPs, a new attempt was made to identify Aboriginal stakeholder parties in accordance with the 2010 Aboriginal consultation guidelines.

An advertisement was placed in the *Mudgee Guardian* in early October 2011, requests to agencies listed in the guidelines were issued for advice on who to contact, and written invitations were made to potential parties identified by agencies. Important correspondence was issued by registered post with requests for receipts.

As a result of this process, three additional Aboriginal parties registered interest and one additional NSW government body was identified. RAPs are listed in section 2.3 below.

2.2 Identification of Aboriginal stakeholders

2.2.1 Agency contact

A letter requesting advice on which Aboriginal parties to invite for consultation and all known heritage matters to be taken into consideration was posted, faxed and/or emailed to the following groups in September 2009:

- The Office of Environment and Heritage (OEH formerly DECCW in 2009 - Paul Houston);
- Registrar, *Aboriginal Land Rights Act 1983* (NSW) (Megan Mebberson);
- Dubbo Local Aboriginal Land Council (Dubbo LALC - Uppannia Sullivan);
- Mudgee Local Aboriginal Land Council (Mudgee LALC - Aleshia Lonsdale);
- Native Title Services Corporation (NTSCorp - Peter Shultz);
- Mid-Western Regional Council (Sarah Armstrong);
- Warrumbungle Shire Council (Rebecca Ryan); and
- Wellington Council (Paul West).

An additional request for identification of Aboriginal parties with cultural knowledge to be consulted was issued in early October 2011 to the above agencies as well as:

- National Native Title Tribunal; and
- Central West Catchment Management Authority.

2.2.2 Press advertisement

At the commencement of consultation in 2009, advertisements were placed in the following newspapers:

- *Dubbo Daily Liberal*, 22 September 2009;
- *Mudgee Guardian*, 23 September 2009; and
- *Koori Mail*, 7 October 2009.

In 2011, an additional newspaper advertisement was placed in a paper with distribution covering the PAA:

- *Mudgee Guardian*, 7 October 2011.

2.2.3 Initial Meeting with Local Aboriginal Land Councils

On 21 September 2009, ERM held meetings with the Dubbo LALC and Mudgee LALC. The purpose of these meetings was to identify Aboriginal stakeholder groups, provide the LALCs with an overview of the Project, discuss the proposed field survey methodology and determine the most appropriate procedure for involving Aboriginal people in the cultural heritage assessment.

2.2.4 Aboriginal Community Group Contact Letters

The names and addresses of potential Aboriginal parties were provided by government agencies in response to the requests. Each of these potential Aboriginal parties was posted (and emailed, if possible) a letter formally requesting registration for the Project, participation in the forthcoming Aboriginal community stakeholder meeting and feedback on the proposed survey methodology. This process occurred in 2009 and 2011.

2.3 Registered Aboriginal parties

Following the identification and notification processes described above, the following Aboriginal parties formally registered an interest in being consulted for the Project in September and October 2009:

- Dubbo LALC (DLALC; contact - Uppannia Sullivan);
- Mudgee LALC (MLALC; contact - Aleshia Lonsdale);
- Warrabinga Native Title Claimants Aboriginal Corporation (WNTCAC; contact - Wendy Lewis);
- North-East Wiradjuri Co Ltd (NEWCO; contact - Lyn Syme);
- Wirrimbah Direct Descendants (WDD; contact - Stephen Ryan);

- Murong Gialinga Aboriginal & Torres Strait Islander Corporation (MGATSIC; contact - Debbie Foley and Larry Foley);
- Gallanggabang Aboriginal Corporation (GAC; contact - Joyce Williams, via Lee Thurlow); and
- Mingaan Aboriginal Corporation (MAC; contact - Helen Riley).

The Central West Catchment Management Authority (CMA) was also identified as a registered stakeholder in 2009. EMM maintained contact with the CMA as an interested government agency.

The following Aboriginal parties registered interest in consultation following the second round of notifications in October 2011:

- Jenny Williams (an individual person);
- Dorothy Stewart (trading as Binjang Wiradjuri Aboriginal Heritage Surveys); and
- Wellington Valley Wiradjuri Aboriginal Corporation (WVW - which was a new corporation established to replace GAC having the same membership as GAC).

The following NSW government agency was also noted as requesting consultation:

- NSW Department of Aboriginal Affairs - Dubbo Office (Tony Fuller).

2.4 Presentation and methodology correspondence

ERM contacted RAPs by letter about the Project and the proposed Aboriginal heritage assessment draft methodology on 2 October 2009. The methodology was further discussed at a meeting in late October 2009 as described below.

EMM contacted RAPs by letter on 5 October 2011 with information about the altered mine project, a draft methodology and the date of a proposed meeting (21 October 2011) to explain these details. One of the above-listed RAPs (Jenny Williams) registered after the meeting (and subsequent fieldwork) and was forwarded the information originally presented.

2.5 Consultation meetings

2.5.1 Aboriginal stakeholder meeting — October 2009

In order to gain input and participation, an invitation to attend a community meeting was issued to each RAP. The meeting was held in the Dunedoo Jubilee Hall on 19 October 2009. The invitation to attend the community meeting was ‘open’ where each RAP could bring any members of their community.

Paul Houston (OEH) was invited to the meeting, but could not attend. The proponent was represented at the meeting by Steve Bulman. Representatives from DLALC, MLALC, WNTCAC, NEWCO, WDD, MGATSIC and GAC attended the meeting.

The meeting was held in two parts: introduction to the project and forthcoming survey (chaired by Tim Owen from ERM); and the selection, by the Aboriginal community members present, of which Aboriginal groups were to participate in the field survey (chaired by Stephen Ryan).

The first half of the meeting provided an overview of the Project (CHC); the intended heritage survey methodology and then an open forum for any Aboriginal person to ask questions and pose statements. Feedback from the community was used to refine the survey methodology.

The second half of the meeting was an open discussion held only between the Aboriginal community representatives to determine which groups should be present on the survey, and division of representation between the groups.

The outcome of this discussion was used for involving the community selected groups in the field survey.

Following the meeting, ERM provided an opportunity for all stakeholder representatives to inspect a portion of the project area and some of the Aboriginal sites already identified. Around half of the meeting's participants attended this initial inspection.

2.5.2 Aboriginal stakeholder meeting — February 2010

Following the initial archaeological field survey conducted over three phases between October 2009 and February 2010, a second meeting of Aboriginal stakeholder parties was held in the Dunedoo Jubilee Hall on 8 February 2010. An open invitation was extended to all members of all Aboriginal stakeholder parties. All RAPs provided an affirmative response that they would attend the meeting, although not all did. Representatives from DLALC, MLALC, WNTCAC, NEWCO, WDD, MGATSIC and GAC attended the meeting. OEH was also invited to attend but did not. A separate meeting was held with Phil Purcell, OEH, on the 11 February 2010 to provide all results as presented at the stakeholder meeting. CHC was represented at the meeting by Steve Bulman and Brett Waters.

The aims of the meeting were:

- to provide RAPs with the results of the initial survey;
- to present the initial archaeological significance assessment;
- to obtain RAP feedback with respect to Aboriginal socio-cultural values across the project area; and
- to discuss Aboriginal community requirements with respect to mitigating the loss of Aboriginal cultural heritage.

All groups were provided with maps defining the location and extent of all recorded Aboriginal sites. The DLALC was provided with a complete set of Aboriginal site cards for all sites within their boundary. A preliminary overview of impacts to Aboriginal sites was provided, with reference to the number of sites to be lost or conserved.

It was stated at the meeting that, as a collective, the community did not wish to provide a cultural significance assessment without first fully understanding the impacts to their culture. Discussion was held regarding mitigation measures including a cultural centre and employment and training.

Subsequent to this meeting and the 2009 — 2010 survey, the mine plans were altered by CHC. As a result, many impacts discussed at the meeting will now be avoided.

A pause in consultation ensued during the reworking of mine plans.

2.5.3 Aboriginal stakeholder meeting – October 2011

EMM invited all previously registered Aboriginal parties to a meeting at Dunedoo Jubilee Hall on 21 October 2011. The meeting included presentation of new mine plans, the draft methodology for feedback, and included an explicit request for involvement in identifying Aboriginal heritage values, including non-archaeological Aboriginal heritage values.

A presentation was made and colour hardcopies provided to all attendees (Appendix A). Representatives of all previously registered Aboriginal parties attended as well as the newly registered Binjang (Dorothy Stewart).

The meeting was chaired by Neville Baker (EMM) with input at various times by Trish McDonald (CHC), Tony Hanrahan (National Management Consultants), and Rebecca Moore (EMM).

Neville explained that EMM had taken over from ERM and that the assessment was a continuation of the fieldwork and consultation commenced by ERM. It was explained that the proposed field survey was not a reworking of ERM's survey, but rather a supplementary survey addressing minor gaps in coverage given the new mine plans. The alteration of mine plans was discussed with attention to the movement of the previously planned large pit over Sandy Creek to the east, avoiding destruction of the majority of sites previously identified in the 2009 — 2010 survey. The positive impact of this avoidance was noted. It was also noted that, despite the avoidance of large areas of Laheys Creek, there would be unavoidable impacts to certain Aboriginal stone artefact sites from the main infrastructure area.

The draft methodology was presented and support was offered by all representatives. Fieldwork proceeded on the basis of the verbal support offered during the meeting and previous support provided to ERM for the directly comparable assessment methodology. A request was also made by Aunty Violet Carr of Wellington Valley Wiradjuri for direct meetings with their elders. EMM made several attempts to arrange this meeting without success.

EMM emphasised the interest in non-archaeological aspects of Aboriginal heritage and stated that given the lack of historical information, EMM was relying on the Aboriginal community to provide relevant information if available or identify individuals who might be interviewed for an oral history of the area or cultural mapping.

The presentation included maps of the PAA, landform types to be covered by proposed survey transects with logistical and safety details for proposed fieldwork on 31 October – 11 November 2011. In discussion it was agreed that a representative of nine RAPs present at the meeting would be involved each day of fieldwork. Much discussion was held on the amount to be paid.

2.5.4 Aboriginal stakeholder meeting — 5 March 2012

EMM invited all RAPs and interested government agencies to a meeting at the Gulgong RSL on 5 March 2012. A total of seven out of the 11 RAPs attended with one apology received. The meeting included presentation of archaeological survey results, proposed development impacts, a draft significance assessment and draft management measures. An explicit request was made from the RAPs for information regarding non-archaeological Aboriginal heritage values.

A presentation was made and colour hard copies provided to all attendees (Appendix A). RAP attendees included:

- Dubbo LALC – Paul Carr and Charlie Trindall;

- WDD – Stephen Ryan;
- Jenny Williams;
- Mudgee LALC – John Newton and Tony Lonsdale;
- WNTCAC — Wendy Lewis and Kevin Williams;
- NEWCO – Robyn Williams accompanied by Cliff Foley; and
- MGATSIC – Larry Foley and Debbie Foley.

An apology was received from WVW.

Tony Fuller and Rebecca Suckling of Aboriginal Affairs (Dubbo office) attended. Phil Purcell (OEH) passed on his apologies.

The meeting was chaired by Neville Baker (EMM) and also attended by Rebecca Moore (EMM), Trish McDonald (CHC), Tony White (CHC), Greg Hartley (CHC) and Tony Hanrahan (National Management Consultants). Tony spoke on issue of land claims, noting that the development will avoid all potentially claimable crown land with regard to Native Title and NSW Aboriginal Land Rights Act 1983.

Neville spoke to a series of maps and photos showing the locations of Aboriginal sites identified and explained development changes to the rail line and raw water dam. Invitations for questions and comments were made at several stages through the meeting. The imminent issue of the draft report for review and feedback by the RAPs was noted. The draft nature of significance and management was emphasised and explicit requests for feedback was made. General feedback from RAP representatives attending suggested that the information would be taken away and feedback provided in due course. A request was made by Stephen Ryan for an Aboriginal stakeholder-only meeting to discuss the draft assessment and draft recommendations.

RAPs not in attendance were mailed a hard copy of the presentation and accompanying maps.

2.6 Aboriginal stakeholder meeting April 2012

EMM invited all RAPs to a meeting at the Gulgong RSL on 12 April 2012. The purpose of the meeting was to enable RAPs an opportunity to discuss the draft assessment and draft recommendations in a stakeholder-only session as requested at the previous meeting. Maps of the PAA showing the Project elements and assessment results were distributed and also displayed in a PowerPoint projected presentation. Although attended by Neville Baker and Tony Hanrahan, Neville and Tony sat out of the room for a morning session chaired by Stephen Ryan.

RAP attendees included:

- Dubbo LALC – Charlie Trindall and Ian Pritchell;
- Mudgee LALC – Tony Lonsdale and Aleshia Lonsdale;
- WNTAC and NEWCO – Robyn Williams accompanied by Cliff Foley;
- MGATSIC – Debbie Foley.

Apologies were received from Kevin Williams, Lyne Syme, Wendy Lewis and MAC.

After a morning discussion of the draft assessment and draft recommendations, the RAPs advised that there was general agreement with the draft assessment and draft recommendations, although concern had been expressed about aspects of the survey. This referred to a letter of concern from MGATSIC handed to Neville Baker at the meeting but dated 9 April 2012. This letter, which responds to the draft report, is described in Table 2.1 below.

The attendees expressed interest in the timing of the Aboriginal Cultural Heritage Management Plan (ACHMP) foreshadowed in the report. Development of the ACHMP in consultation with RAPs following submission of the EA was discussed. A request was made for a site tour for executive members of RAP organisations who had not seen the area. In response to this request a site tour was arranged for 10 May 2012.

2.7 Review of draft Aboriginal heritage assessment and management measures

2.7.1 Distribution of draft report

A draft version of this report which included all background, results, draft significance assessment and draft management recommendations was issued in hard copy to all RAPs by registered post on 15 March 2012. The draft report document included highlighted text indicating draft sections where RAP input was sought in regard to non-archaeological Aboriginal heritage values, input to significance assessment and recommendations.

A letter indicating a four week timeframe for review was issued with the draft assessment report. Towards the end of the assessment period telephone calls were made to RAPs chasing a written review and offering time extensions if required. Furthermore, a meeting for RAPs was on 5 March 2012 to explain the results, draft assessment and draft recommendations held immediately prior to the review period (mid March - April 2012) and another meeting held towards the close of the review period on 12 April 2012 to explain aspects of the draft assessment and draft recommendations and seeking input on non-archaeological Aboriginal heritage values.

Responses were obtained verbally from those RAPs attending the meeting of 12 April 2012 which indicated general agreement with the draft assessment and draft recommendations.

Written responses were received from NEWCO, WVW, WDD/NSWALC and MGATSIC. Written submissions from WVW and MGATSIC took issue with the archaeological fieldwork process and demanded an entirely new survey be conducted over the entire PAA. A written submission by WDD/NSWALC (Stephen Ryan) indicated agreement with the report. A written submission by NEWCO provided a detailed response to each part of the draft report and Aboriginal heritage assessment process generally agreeing with it.

No written or verbal responses were received by RAPs other than those indicated above.

No new Aboriginal heritage values were raised by RAPs other than those identified in the draft report.

The issues raised in submissions to the draft report are detailed in the letters from RAPs and response letters from EMM to RAPs included in Appendix A. Requests or concerns raised in response correspondence from RAPs and the manner in which those concerns are addressed are summarised in Table 2.1 . Detailed responses to concerns raised by WVW and MGATSIC on fieldwork are found in the EMM response letters included in the appendix.

Table 2.1 Summary of RAP concerns/requests and how they are addressed

Issue raised	How this issue is addressed
NEWCO letter of 26 April 2012	
Ongoing involvement in ACHMP Would like to be further involved in the '...regional program of protection for representative cultural landscapes and sites...'	All RAPs will be consulted in the course of ACHMP development.
For Aboriginal heritage management issues where the ACHMP is silent, would seek to have a consensus view of RAPs dictate action; biannual review of ACHMP.	The ACHMP will be subject to regular review on a reasonable timeframe in consultation with RAPs but this may not be biannual (twice a year) but may be biennial (every two years).
Mapping of collect and set aside site management.	The Aboriginal objects that may be moved out of the path of the pipeline will be mapped and documented in a salvage report and AHIMS update site cards.
Geomorphologist – advice on material within the landscape.	A geomorphologist will report on the landscape attributes influencing Aboriginal site location and preservation.
Forensic anthropologist for Aboriginal ancestral remains discovery.	RAPs will be consulted regarding the names of a suitably qualified and experienced forensic anthropologist who may assist where human skeletal remains are discovered.
WVW email of 2 March 2012	
Aboriginal sites of great significance discovered along the proposed railway not be moved, but rather the train tracks be moved and the Aboriginal sites be fenced.	Although several Aboriginal open stone artefact sites were found along the route of the railway, none of high (or 'great') significance were identified. The greater proportion of the larger sites with large backed artefact assemblages (eg CBR-OS-43 and 44a) which were of great interest to RAPs during fieldwork will be avoided and, in response to the request, will be fenced in accordance with procedures to be set out in the ACHMP. Any site of low and moderate significance will be salvage collected. The train track design mostly avoids watercourses and associated open stone artefacts sites, but must cross watercourses at some point where Aboriginal objects will occur.
WVW letter dated 5 March 2012 received by email 6 April 2012	
Concern expressed over the archaeological survey and requests the entire survey be redone with a different archaeologist.	The issues raised by WVW with the archaeological survey process are addressed in detail in the EMM response letter of 13 April included in Appendix A. A new archaeological survey will not be conducted.
MGATSIC letter of 14 March 2012	
Concern expressed over the archaeological survey.	
All artefacts to be collected and relocated or put in a keeping place accessible to RAPs and registered in AHIMS with return to country when mining is completed.	This will occur and is consistent with the commitment made during the February 2012 RAP meeting for collection of impacted sites.
Aboriginal heritage to be included in induction process.	Aboriginal heritage will be included in induction process.
A site visit to view sites for those that haven't seen them.	A site tour was arranged for 10 May 2012.

Table 2.1 Summary of RAP concerns/requests and how they are addressed

Issue raised	How this issue is addressed
MGATSIC letter of 9 April 2012 received 12 April 2012	
Concern expressed over the archaeological survey and requests the entire survey be redone with a different archaeologist.	The issues raised by MGATSIC with the archaeological survey process are addressed in detail in the EMM response letter of 19 April included in Appendix A. A new archaeological survey will not be conducted.
The issue of blasting effects on rockshelters needs to be addressed.	In response to this concern the impact of blasting on Rockshelters is addressed in this report. Rockshelter CBR-RSH-01 which falls within the mining area is to be salvaged. Rockshelter 02 lies close to the boundary of mining area A and blasts will be modified to avoid impact to the site. Other rockshelter sites are more than 1 km away from mining areas and beyond vibration impact areas.

3 Environmental background

3.1 Land systems

The PAA lies within the southern edge of the Brigalow Belt South (BBS) biogeographic region of NSW. The Sandy Creek catchment forms a southerly extending finger of the Talbragar Valley sub-system of the BBS. Project infrastructure extends easterly and southerly across the BBS boundary to the NSW Southw estern Slopes (NSS) biogeographic region.

3.2 Geology and terrain

The BBS is characterised by primarily sedimentary geology and geomorphology derived largely from the eroding sandstone and conglomeritic geology. The proposed open cut mining areas fall within the Pilliga landscape of the BBS as defined by Mitchell (2002).

The northern part of the Mining Operations Area comprises sandstone ridges with scree slope edges and rock outcrops from the Dunedoo Formation, a pebbly quartz lithic conglomerate sandstone. These rocks are friable and fragment readily with the result that rockshelters rarely occur.

Long gentle outwash slopes occur intersected by sandy streambeds and prior stream channels. General elevation is 400 m to 550 m, with local relief of 50 m. On sandstone, the ridge tops have thin discontinuous soils with stony, sandy profiles and low nutrients. Down slope texture-contrast soils are more common, typically with clay subsoils and in the valley floors sediments tend to be sorted into deep sands with yellow earthy profiles, grey clays, or more texture-contrast soils with a greater concentration of soluble salts.

The southern and eastern parts of the PAA traversed by infrastructure are characterised by undulating ground due to varying volcanic geology. Geology, soils and vegetation are complex and diverse but typified by granites and meta-sediments, texture contrast soils and a variety of eucalypt woodland.

3.3 Relief

Relief in the north-west and mining areas varies between 400 m and 440 m, allowing for the classification of the land as ‘plains’ and ‘rises’. The remainder of the project area has relief varying between 400 m and 565 m, allowing for the broad classification of ‘low hills’, with some ‘hills’ in places (Speight 1990: 35).

The majority of the project area is very gently inclined (between 1% to 3%) to gently inclined (3% to 10%). These slopes cover the majority of the Mining Operations Area and areas within the far east of the PAA. A central ribbon of moderately inclined to steep slopes runs through the eastern-central PAA.

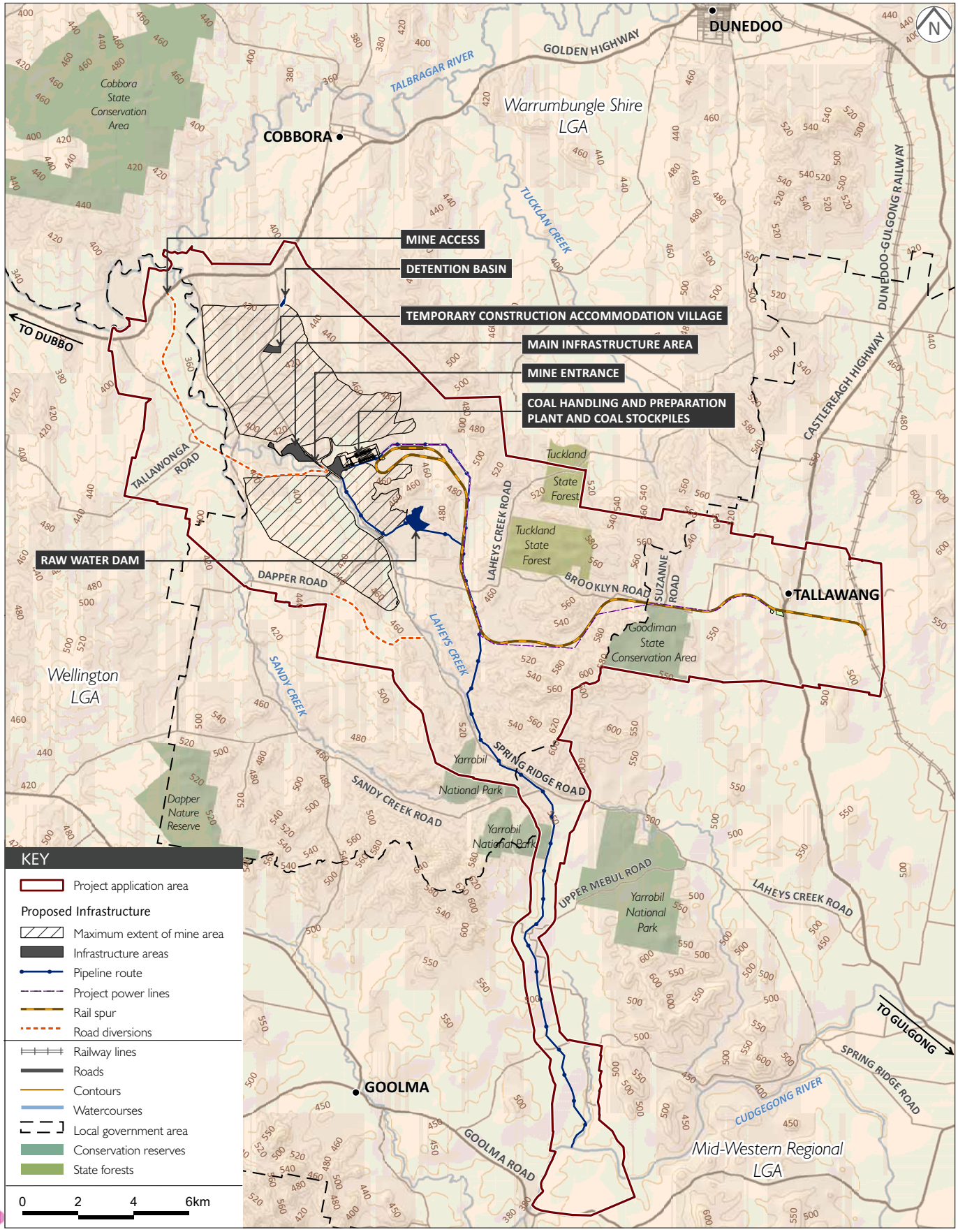
3.4 Broad landform division

The landform pattern across the PAA was broadly classified on the basis of terrain, drainage and geomorphology for the purpose of Aboriginal site context comparison across the extensive PAA. The general layout of these landforms is shown in Figure 3.2.

The classification broadly distinguishes:

- rocky slopes – derived from weathering sandstones and conglomerates within the BBS (approximately 28% of the PAA);

- ridge tops – atop many of the rocky rises (approximately 2% of the PAA);
- valley floors - demarcated by visible rocky ridges with a simple slopes either side of a central watercourse (approximately 7% of the PAA);
- undulating ground - the broad undulating slopes without nearby defined valley edge ridges generally from Sandy Creek to the west and south to the Cudgegong River within the BBS, and east of Laheys Creek associated with NSS land system (approximately 59% of the PAA).



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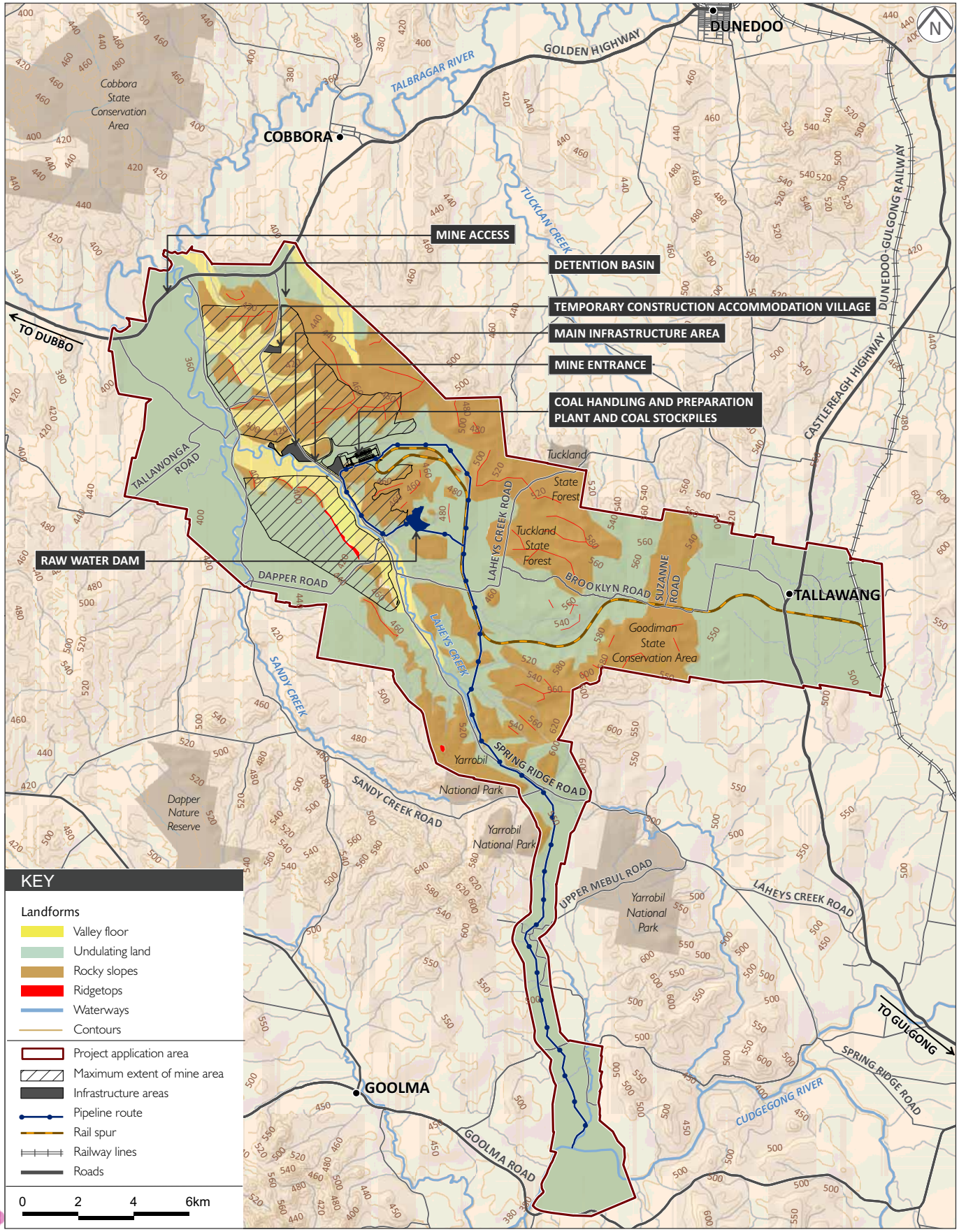
Terrain and Drainage

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 3.1



Broad Landform Division

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 3.2

3.5 Drainage

The PAA lies at the eastern edge of the Murray-Darling Basin. Much of the land occurs within the catchment of the Talbragar River with the exception of the southern pipeline area which is within the Cudgegong River catchment.

Sandy Creek is a third order stream upstream of its junction with Laheys Creek, after which it becomes a fourth order stream flowing north to the Talbragar River just west of the proposed mine areas. Laheys Creek is a third order stream which flows between proposed Mining Areas A and B and joins Sandy Creek approximately 6 km south of the Talbragar River. Conglomerate and sandstone rock outcrops and boulders occur along these creeks. Sandy Creek and Laheys Creek are the major watercourses running alongside the mining areas.

Unnamed minor tributary creeks flowing west to Laheys Creek and Sandy Creek in the northern half of the PAA pass through sandy valleys to form chains of ponds. Such chains of ponds are evident west of Spring Ridge Road and north of Laheys Creek. Although now somewhat altered by farm dam construction, a particularly good example occurs within the Danabar property in the north-west part of the PAA. Laheys Creek itself is more heavily entrenched and also would have included a series of waterholes providing reliable water.

Mebul Creek is a third order stream in its lower reach where it joins the Cudgegong River at the south end of the PAA.

Known springs occur south of the main open cut impact area between 5 — 10 km east of Yarrobil National Park. No springs occur within areas impacted by the Project.

3.6 Landuse and disturbance

Landuse in the region is typically cattle and sheep grazing with some wheat cropping. Forest and woodland areas generally occur in association with rock outcrops on the low hills and ridges. The broad flat areas which very gently slope down to the creeks have been cleared and ploughed regularly over many decades. The clearing of trees along watercourses has exacerbated erosion and increased salinity in some areas. Salt scalds are present in some low lying areas in the north-western part of the PAA. A summary of potential primary landuse impacts is listed here derived from the 2009 — 2010 survey report.

Table 3.1 Past landuse impacts across the project area

Impact	Possible results of impact	Location of past landuse impact
Land clearing	Land clearing can disturb soil and/or trees and has removed the majority of old growth trees, some of which may have been scarred by Aboriginal people.	Clearing has occurred across the majority of the PAA.
Forestry practices (including logging and logging camps)	Old growth trees have been largely removed.	All forested areas are largely devoid of mature trees.
Ploughing	Ploughing of topsoil generally disturbs the upper soil up to 300 mm and can scratch, break or move artefacts. The spatial patterning of Aboriginal campsites can be disrupted.	Ploughing appears to have occurred across most plains within the PAA.
Dam construction	Dam construction results in excavation of soils. This can displace Aboriginal stone artefacts from their original creek-side contexts and thus disturb sites.	Dams have been constructed across first and second order creeks across the PAA. They are present on most properties.
Levee bank construction	Levee bank construction results in movement of soil from a plain to create a bank adjacent to a creek. This can impact any Aboriginal sites adjacent to the bank or at the origin of the bank's soil.	Levee bank construction was rare within the PAA. One large levee bank was observed on the upper reaches of Sandy Creek. This bank had impacted an extensive Aboriginal site.
Road construction (and grading), including firebreaks	Road construction necessitates soil excavation via grading, which will disturb any Aboriginal sites within the area excavated. Grading results in the unintentional movement of any Aboriginal objects, pushing them to the side of the road. Fire break construction results in the disturbance of all soil horizons and therefore displacement of Aboriginal objects.	A few main roads extend through the PAA, most notably Sandy Creek Road, Spring Ridge Road (sealed), Danabar Road and Dapper Road. Some mature trees remain along the road margins. Most farms have small 4WD tracks. Fire breaks are found surrounding most forests, and occasionally through the forests.

3.7 Implications for Aboriginal site location

The coarse sedimentary geology limits rockshelters to outcrops around the margins of the low ridges and hills. In contrast, the sedimentary geology is suitable for the occurrence of Aboriginal grinding grooves on broad sandstone exposures, particularly where finer grained sandstone platforms and boulders occur in association with water.

Highly sensitive landscapes are mainly areas within 200 m of major creeks such as Laheys Creek and Sandy Creek where stone artefact sites and grinding grooves may occur. Stone artefact sites may occur in minor tributaries where chains of ponds occur, or along drainage lines as very low density artefact distributions. The latter contexts are of moderate sensitivity.

Given that the woodland and forest areas have been subject to regular harvesting over the past century, mature trees which might carry the scars of Aboriginal implement manufacture (Aboriginal scarred trees) are rare across the PAA generally. Mature trees occur mostly within road reserves, making these locales of moderate sensitivity for the presence of Aboriginal scarred trees. Apart from these locales which are primarily in the north-west of the PAA and in close proximity to the Cudgegong River in the southern end of the PAA, there is a low sensitivity for open stone artefact sites, scarred trees and grinding grooves to occur across the PAA.

Soil erosion along creek edges has been the primary cause of Aboriginal stone artefact site discovery even though it is an ongoing form of disturbance to such sites. Even in areas where grass cover obscures the ground surface, the presence of Aboriginal artefacts within the sandy topsoil near creeks may be inferred. Erosion disturbance next to creeks thus contributes in some part to educational heritage value of such sites through making their contents visible.

The general disturbance across the cleared land through ploughing is typical of the Australian rural landscape. It is likely to cause minor displacement of Aboriginal stone artefacts where they occur in creek-side contexts, but without totally diminishing the heritage value of such objects.

4 Aboriginal heritage background

4.1 Ethno-history

Central NSW was originally inhabited by the cultural and linguistic group known as Wiradjuri people (Tindale 1974). The Wiradjuri is the largest Aboriginal language group in NSW and the word means, 'people of the three rivers', which refers to the Macquarie (Wiradjuri name: *Wambool)*, Lachlan (*Kalari*) and Murrumbidgee rivers (NPWS 2003:121). The land of the Wiradjuri people stretched from south of the Murrumbidgee to north of the Lachlan, as far as the upper reaches of the Macquarie river. From the eastern boundary of the Great Dividing Range, the territory of the Wiradjuri extended to the vicinities of the present-day towns of Dunedoo, Wellington, Condobolin, Booligal, Hay, Albury and Tumbarumba.

European contact in the central NSW area began in 1817 when the surveyor, General John Oxley, entered the area for expedition along the Lachlan River. Survey of the Cudgegong River was led by George Cox and William Lawson in 1821 — 1822. Pastoralists entered the Wellington Valley area as early as 1819 and a convict stock station was established in 1823 (Pearson 1981). In 1822 colonial administrators presented the chiefs of the five tribes in the Bathurst region with 'King Plates'. Granting these brass plates was an attempt to coerce powerful Aboriginal men into co-operating with pastoralists and avoid open conflict. The plates were seen by the Europeans as playing a powerful role in the expansion of the pastoral frontier (Troy 1993).

These gestures did not work and the Wiradjuri engaged in attacks on the landholders in the Cudgegong and Bathurst areas until Governor Brisbane declared a state of martial law in August 1824. An estimated one quarter to one third of the Wiradjuri were killed (Read 1988).

In 1832 Reverend William Watson established a Christian mission and school for the Wiradjuri at Wellington. In 1837 Reverend Jakob Günther and his wife Lydia (nee Paris) arrived in Wellington. In 1840 he took over the mission's superintendence from Rev. William Watson, until the mission was disbanded in 1843 (Ganter 2010). His six years as a missionary were used to compile a Wiradjuri grammar, which was published in 1892 by J. Fraser. He reported many of his activities to the London Missionary Society, which were in turn translated and reported in various missionary magazines. His work with the Wiradjuri drew to a close in 1843, with Günther becoming discouraged in his attempts to convert Aboriginal people to Christianity. The Wellington mission closed in 1843 when the State of NSW withdrew all funding for missions (Ganter 2010).

By the end of the 1840s many of the Wiradjuri men were living and working on European stations. The gold rush of the early 1900s brought a great influx of white settlers to the broader region and further restricted the areas of Aboriginal occupation.

Pearson's research into the ethno-history of the Upper Macquarie River Valley identified that the local Aboriginal populations were unlikely to be affected by seasonal change. He suggested that Aboriginal people required limited seasonal movement in the area and it is estimated from early accounts that family groups had a territory with a circumference of 40-60 kilometres from which to hunt and procure food resources (Pearson 1981).

The people found an abundance of fish, yabbies and freshwater mussels in the rivers, creek, lakes and waterholes of the region. They hunted game such as ducks, snakes, lizards, kangaroos, emus and echidnas as well (Clayton 1985). Plant foods were also part of the diet including a wide range of berries, seeds, roots, pods, fruits, nuts, bulbs and greens. From archaeological evidence of hundreds of grinding stones on the west of the Great Dividing Range, grinding of these foods was more common in the west (Clayton 1985).

Camping is reported to have occurred along river banks. Huts used for shelter were made of grass-thatch and held groups of 50 or 60 people. Huts would be waterproofed over the wet winter months with animal skins or clay coverings (Clayton 1985). Mathews (1896: 304) reports the layout of camps:

> "In all native camps, the young men, and all visitors who have not their wives with them, always camp together a short distance from the camp of the married people and girls."

Stone and wooden implements were commonly used by the Wiradjuri. Stone implements are still apparent in the landscape today and include many items from ground edge axes, adze, blades, scrapers, grinding stones, hammer stones bull-roarer (*mudthega* Mathews 1896: 298) and others made from sedimentary and volcanic rock. Wooden implements also were important and used daily, but have not survived within the archaeological record. Wooden implements described by historical accounts include "boomerangs, nullanullas, bundies, hielamans etc" (Mathews 1896: 301). Many raw stone materials were sourced locally from quarries, outcrops and cobbles found in alluvium. However, not all raw materials were available locally and trade routes opened up both north and south over the mountains to the coast (Clayton 1985). It has been stated that the Darling River was a meeting or exchange place for central and eastern groups (Clayton 1985).

Ceremonial life involved myths and stories explaining right and wrong forms of behaviours. Religious ceremonies often involved sky gods (Clayton 1985). Significant ceremony included the Burbung ceremony, which was associated with male initiation. This ceremony is described in detail by Matthews (1896; 1901) with further detail appearing in Howitt (1904). Aspects of Mathews' (1896) description provide insight into elements of the wider Wiradjuri demography. Mathews relates that the Burbung ceremony involved numerous members from many Wiradjuri tribes. Gathering for the ceremony commenced with the headmen from three tribes deciding to hold the ceremony. Five messengers were dispatched (carrying sacred emblems) to invite neighbouring tribes to participate in the ceremony; these messengers were dispatched in five different directions. The need to dispatch so many messengers suggests the size of the ceremony and the extensive nature of Wiradjuri territory:

> "These messengers generally arrived at the camp to which they were dispatched a little before sundown, because at that time of the day all the men have generally returned from hunting, and are to be found in their own quarters."(Mathews 1896: 303)

This indicates that tribes were possibly extended family units, each occupying a distinct area, as the messenger knew where to go to find the tribe:

> "The next day, or it might be in a few days' time, the message was sent forward to the next tribe, or section of the tribe, either by the headman dispatching one of his own people bearing the sacred emblems, or by the same messenger who had brought the invitation to the camp. In this way the message was sent from tribe to tribe, or to sections of a tribe, until the farthest-off camp of natives was reached."(1896: 304)

The journey to the appointed place was undertaken by men, women and children in easy stages. Given the descriptions of tribes involved in the Burbung recorded by Mathews, the participating tribes travelled up to 200 km to attend the ceremony. Travelling this distance would have taken at least two weeks and shows that the Wiradjuri had sufficient knowledge of resources to move large numbers of people through their territory.

Mathews reports that the ceremony commenced at the "end of May" and "the final ceremonies were not concluded till the beginning of July" (1896: 296). Two months of ceremony during the late autumn and winter months indicate the ability to procure and provide food and sufficient water for several hundred people.

Art was important as a means of bringing spirit power or influence over everyday activities. Body painting and decoration were used in corroborees and battles (Clayton 1985). Ceremonies involved constructing large elaborate earthen features, decorated with earth carvings; and also constructing 'images' of Dharamoolan (Mathews 1901: 340) and Baiamai (Mathews 1896: 300) from mud, clay and sticks.

Finally, a basic description of a burial from the Wellington area has been described by (Hood 1843, cited in le Maistre 1993):

> "I saw a native grave today. It was heaped up with earth over a deep pit; was of circular form, and covered with trees; a hollow space was scooped out are it, from whence the soil had been taken; and to the south were two semi-circles trodden in the earth, which with the figures cut on to adjoining trees are supposed by these poor people to keep off the debbil debbil, or evil spirit. I understand they will not pass a grave at night and never mention the name of a person after his decease."

4.2 Previously recorded sites

Searches of the Aboriginal Heritage Information Management System (AHIMS) register was conducted by for the 2009 — 2010 survey and again for the 2011 — 2012 assessment for the PAA and nearby areas. Discussion here will be limited to the Aboriginal sites listed on AHIMS prior to these investigations.

The AHIMS search results showed that little detailed correlation of results is to be gained because of the scarcity of surveys. As a very gross description, 'open camp sites' are located near creek systems, whilst scarred trees are found along side roads amongst old growth timber.

Furthermore, the locations of older registered Aboriginal sites can be considered inaccurate due to coordinate errors possibly deriving from the translation of imperial to metric map coordinates in the past.

Analysis of the 279 Aboriginal sites (excluding the non-site type 'PAD') in the region generally surrounding the PAA from AHIMS revealed that 86% of recorded sites comprised one or more stone artefacts (14% were isolated finds) and 9% were modified trees (presumably scarred trees given the rarity of carved trees). Only six grinding groove sites were recorded regionally. Three sites with art were recorded in addition to a waterhole/well site, a fish trap site and a quarry site. In summary, stone artefact sites dominate the archaeological record and grinding groove sites have been surprisingly rarely recorded. Given that the archaeological assessment of the Project identified many grinding groove sites, the lack of previously grinding groove sites appears to be the result of few previous archaeological surveys in the region.

Prior to 2009 only 14 Aboriginal sites had been registered as occurring within the PAA: nine open stone artefact sites and five scarred tree sites. Of these, most are on the periphery of the PAA in non-impacted areas.

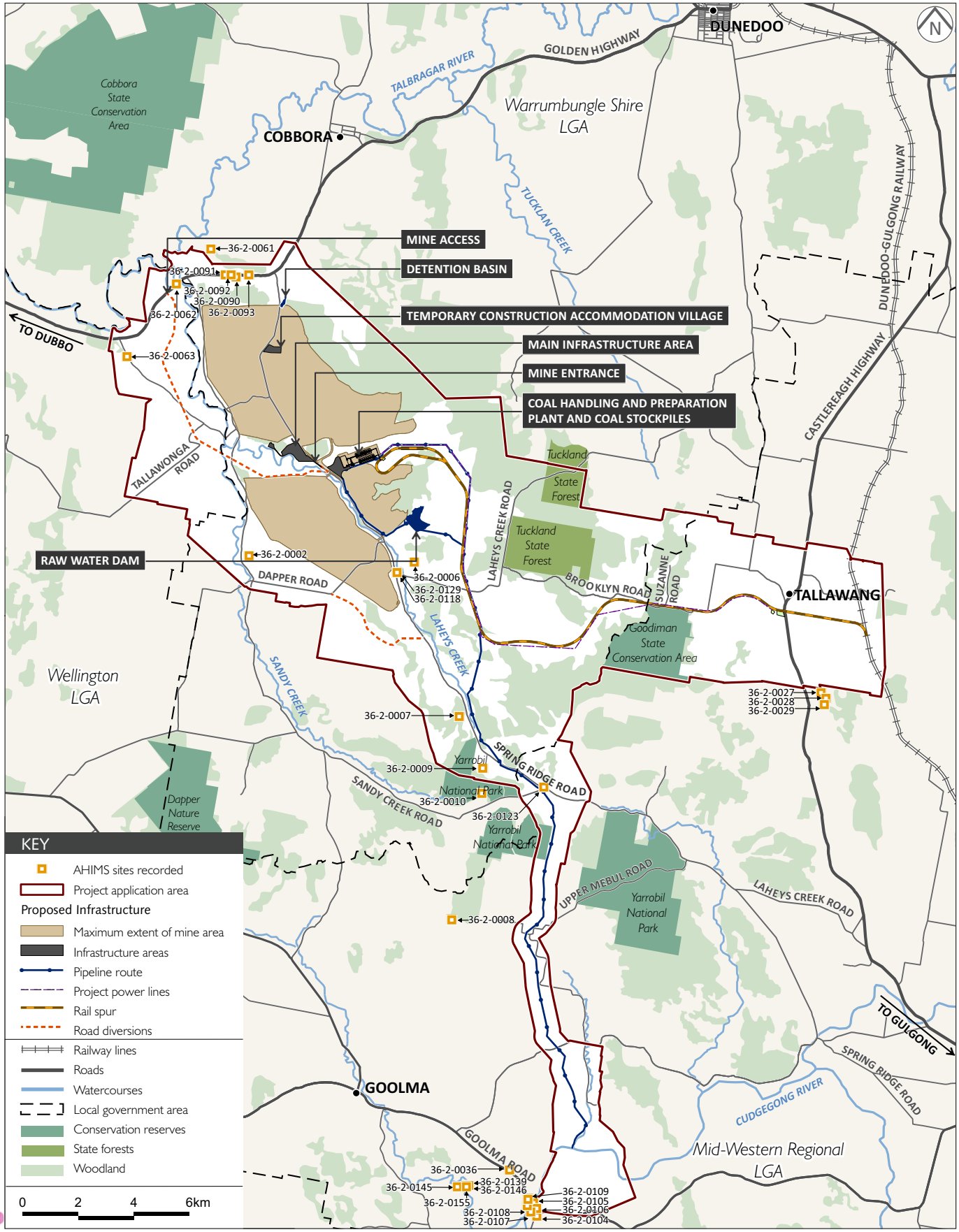
Sites cards for Aboriginal sites and elements of Aboriginal sites from the 2009 — 2010 survey were submitted to AHIMS separately. This has resulted in separate AHIMS registered site records for a 'Stone Artefact Concentration' (SAC) and a 'hearth' even where the hearth occurs within the boundaries of the SAC.

As a result of the 2009 — 2010 survey a total of 126 Aboriginal sites (several of which are separate elements within a common area) were recorded within the present PAA. Additional Aboriginal sites were recorded outside of the PAA as part of a broader study area which included a pipeline route extending to the east. This pipeline is no longer part of the Project.

The sites within the PAA recorded during the 2009 — 2010 survey include:

- 20 scarred trees located within road or creek reserves;
- six rockshelters (none of which have recorded evidence of occupation or activity, but presumably potential archaeological deposit) on rocky slopes;
- 52 'stone artefact concentrations' being open stone artefact sites along creeks;
- 17 isolated artefacts;
- 15 hearth features, almost all of which occur within the mapped boundaries of stone artefact sites; and
- 16 grinding groove sites predominantly along Sandy Creek and Laheys Creek.

These sites are predominantly within the areas of Sandy Creek and Laheys Creek which are now avoided by the amended plans, although several fall within impact areas. Project impacts are discussed in chapter 8 of this report.



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AHIMS Sites Recorded Prior to Assessment (pre-December 2009)

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 4.1

4.3 Archaeological reports in the local area

There are no previous archaeological reports available that specifically address land solely within the PAA or the locality generally. The Dubbo-Tamworth gas pipeline Aboriginal heritage report (JMCHM 1998) deals with a liner pipeline development which passed through the north-western corner of the PAA. The 2009 — 2010 survey report summarises several archaeological reports relevant to the broader area, but these are no longer relevant since the revisions to the Project.

Pearson's PhD thesis (Pearson 1981) addressed Aboriginal settlement in the Cudgegong Valley and noted the common occurrence of Aboriginal stone artefact sites along the major creeks. This is typical of archaeological patterning in eastern NSW. The trend of Aboriginal sites and their association with water was noted in Koettig's Aboriginal heritage study for Dubbo Council in 1986 (Koettig 1986). Although limited to travelling stock routes and state forests, Koettig's sample surveys had identified the trend already well established in regional studies within the Hunter Valley and Sydney's Cumberland Plain.

An Aboriginal cultural heritage assessment of the Brigalow Belt South (BBS) was undertaken by the National Parks and Wildlife Service (NPWS 2002). Archaeological surveys were conducted within the Goonoo and Pilliga State Forests in 2000 with the results reported by Phillip Purcell in an Appendix to the BBS study. Goonoo State Forest is the closest to the PAA, located 20 km to the north-west (NPWS 2002).

A total of 107 sites were recorded within the Goonoo State Forest as part of the BBS survey. These sites were primarily stone artefact sites (N=74 sites) comprising one or more flaked stone artefacts, 29 scarred trees and one grinding grooves site. No Aboriginal rockshelter sites were recorded. Mention was made by an Aboriginal participant of a burial within the forest. One natural source of ochre was identified which, despite the lack of evidence for extraction, may have been a suitable source for cultural purposes.

Most of the sites were found within the alluvial landforms, primarily within 200 m of watercourses. Eighty four per cent of sites were recorded within 200 m with the remainder scattered across other parts of the landscape. The largest stone artefact site recorded during the survey was 800 m in length along a forest track exposure. Most stone artefact sites comprised less than 50 artefacts. Only one site had more than 500 artefacts.

Only four sites were recorded on rocky elevated landforms, the remainder on alluvial and colluvial landforms close to water. This may reflect reduced ground visibility with increased distance to water, but is more likely due to quartz stone artefacts being obtrusive against a rocky ground surface regardless of actual soil visibility. The observed trend is likely to be a reliable indicator of differential site occurrence: sites occurring predominantly within 200 m of watercourses and rarely on rocky elevated ground.

A major linear survey of the Dubbo to Tamworth gas pipeline in 1998 — 1999 provided a view of Aboriginal site distribution (JMCHM 1998, 1999). Archaeological survey was conducted along a 300 km pipeline construction corridor which passes through the north-west part of the PAA. Of the 98 Aboriginal sites recorded, 56 were stone artefact sites comprising one or more stone artefacts, the other major site type being Aboriginal scarred trees (N = 36). Similar to the Goonoo Forest survey, most Aboriginal sites were found in close association with watercourses with 56% of stone artefact sites occurring within 200 m of watercourses, and the remaining number distributed variously up to 2 km from watercourses. Grinding grooves were also found on watercourses but other site types were not strongly associated with a particular part of the landscape.

5 Field survey methods

5.1 General fieldwork strategy

Fieldwork was conducted in two broad phases by professional archaeologists and representatives of the Aboriginal community.

5.1.1 2009 — 2010 survey

ERM (Tim Owen with Angie So) directed fieldwork over 24 days in October 2009 to February 2010. Fieldwork was conducted in summer months where temperatures regularly exceeded 40°C and therefore survey transects were limited to a maximum of 10 km. While access was limited from some properties, the extensive survey coverage provides an adequate basis for identifying broad site location patterns. The survey also extended approximately 15 km beyond the PAA to the east towards Ulan along the corridor of a previously planned pipeline which no longer forms part of the Project. A series of test excavations were also conducted permitted under section 75U (4) of the EP&A Act. These are described in section 6.3.8.

5.1.2 2011 — 2012 assessment fieldwork

EMM (Neville Baker with Rebecca Moore) directed fieldwork over 12 days from 31 October to 11 November 2011 and 21 — 22 March 2012. Nine members of the Aboriginal community participated on each day.

The 2011 — 2012 assessment fieldwork was comprised of primarily pedestrian field transects across defined landform types supplemented by targeted inspections to test hypotheses about site location patterns which emerged from the survey results. The survey inspected all areas of ground within survey transects which were generally covered by survey participants spread out across a 50 m wide path where possible. All mature trees were inspected for scars of Aboriginal origin, sandstone areas inspected for grooves and rockshelters inspected for the presence of Aboriginal objects. All stone artefacts were inspected by Neville Baker who has expertise in their identification. Archaeological verification for all identified stone artefacts occurred through flagging and then GPS waypoint recording by Neville Baker. This also allowed the identification of many backed artefacts and other implement types during fieldwork which may have been overlooked in earlier recordings.

Fieldwork was initially planned to include extensive survey of steep rocky slopes within the Mining Area C on the eastern side of Spring Ridge Road. This fieldwork proved slow, difficult and potentially unsafe. Planned additional transects on rocky slope areas were abandoned due to the lack of archaeological evidence from the initial steep rocky slope transect (T10), the emerging pattern of site distribution concentrated on the relatively well watered land west of Spring Ridge Road and the perceived unsuitability of the steep rocky slopes for sustained Aboriginal habitation.

Fieldwork for the 2011 — 2012 assessment occurred after a wet year and in the midst of extensive grass growth across the paddocks. Visibility was constrained within grazing paddocks in many areas, resulting in the inability to observe the ground surface. Transects through paddocks were targeted at those areas with exposure, but otherwise were limited to areas of visibility resulting from vehicle track or cattle treadage exposures.

5.2 Constraints

The areas addressed by the surveys were substantial and therefore fieldwork could only be undertaken across a sample of landforms. Field survey addressed almost all areas of watercourse landform deemed highly sensitive and covered extensive areas away from watercourses which might otherwise be considered of low sensitivity.

Non-archaeological Aboriginal heritage values were limited. The Aboriginal community expressed deep attachment to the archaeological evidence. At a general level the notion of such attachment as 'spiritual' significance was raised in the meeting of October 2011 by one Aboriginal community member. The assessment of non-archaeological Aboriginal heritage values relied on the contributions of the RAPs and the extent of its consideration in this report reflects the input of the RAPs.

5.3 Landform division for sampling

The PAA comprises a main operational area around the proposed open cut mining areas, emplacement areas and infrastructure located either side of Spring Ridge Road and east of Sandy Creek, an eastern branch traversed by the rail spur, and a southern branch traversed by the water pipeline.

The landscape of the PAA was broadly divided into landform types for the purpose of transect sampling within the core impact area. In the branch areas, survey followed the linear path of the proposed construction where feasible.

The 2009 — 2010 survey covered extensive areas as a continuous series of transects covering landform elements across the PAA. The following table demonstrates that the broad spread of landform elements covered. Over 181 km was walked during the 2009 — 2010 survey. The landform element terrain types covered by the survey are shown in Table 5.1.

Table 5.1 2009 — 2010 survey transects – landform coverage

Landform	Transect length (m)	Proportion of survey effort	Area available for detection (m^2)	Effective coverage (avg)
Watercourse	61921	34%	1,725,323	41.4%
Ridge top	11,891	7%	447,536	39.2%
Slope	2,729	2%	64,481	24.8%
Flat	9,854	5%	119,812	20.4%
Gully	3,060	2%	63,808	30.7%
Lower slope	49,930	28%	1,230,073	31.0%
Mid slope	28,920	16%	472,004	26.8%
Modified	2,865	2%	71,627	25.0%
Open depression	4,675	3%	391,617	45.7%
Upper slope	5,287	3%	109,097	38.5%
Total	**181,132**	**100 %**	**4,695,378**	**32.2%**

Following the 2009 — 2010 survey, the proposed mine development was altered from a large single open cut pit over Sandy Creek to three mining areas largely away from the creeks and extending further to the north-east. The coverage of elevated ground and rocky slopes within the core impact area was seen as a priority for the 2011 — 2012 assessment given the extensive number of Aboriginal sites already recorded along the watercourses within the PAA. Despite the added focus on survey coverage on elevated ground, most Aboriginal sites were recorded by EMM along watercourses. The greater association with watercourse could not be attributed to greater survey effort in that part of the landscape, as survey along watercourses comprised just less than one third of the effort. Furthermore survey away from watercourses identified comparable ground exposure and effective coverage. Greater number of Aboriginal sites along the watercourses in contrast with other landforms therefore reflects a real archaeological pattern, and not a result of any bias in survey coverage.

In the approximately 4,350 ha main operational area in the north-west of the PAA, approximately half comprises rocky slopes and ridges generally evident on the aerial photos by forest vegetation. Of the remainder in the main operational area, a majority of the land comprises valley floor or gently undulating ground more than 200 m from reliable water.

For the 2011 — 2012 assessment landforms were generally divided into:

- watercourses – generally second order (Strahler system) and above including their near banks;
- valley floor, within the Sandy Creek – Talbragar River catchment;
- rocky slopes including outcrop and colluvial scree slopes;
- ridge top; and
- undulating ground – in the water pipeline area through the Cudgegong River catchment and generally in the south-western core impact area in Mining Area B.

A total of 35 discrete transects, each within a separate landform, were walked (Appendix B).

Survey coverage during the 2011 — 2012 assessment is summarised in Table 5.2. More than two thirds of the survey was directed away from watercourses. More than 41 km was walked. The effective coverage of the 2011 — 2012 assessment fieldwork transects (20.2% on average) appeared to differ markedly from 2009 — 2010 survey data (32.2% on average), possibly due to a more conservative approach to estimating visibility and exposure by EMM. Undulating ground in the southern part of the PAA was covered adequately by the 2009 — 2010 survey and was therefore not subject to further detailed survey. Instead, the undulating ground landform surveyed in the 2009 — 2010 survey within the Cudgegong River catchment in the south of the PAA was subject to inspection by vehicle. Survey within the Cudgegong catchment during the 2011 — 2012 assessment was limited to watercourse landform by the Cudgegong River and Mebul Creek.

Table 5.2 EMM transects – landform coverage

Landform	Length (m)	Proportion of survey effort	Area available for detection (m^2)	Effective coverage (avg)
Ridge top	6,460	11%	25,740	8.4%
Rocky slope	10,150	17%	17,355	2.8%
Valley floor	13,710	23%	211,695	34.8%
Watercourse	19,780	33%	130,947	11.5%
Undulating ground	9,730	16%	111,545	13.0%
Total	**59,830**	**100%**	**497,282**	**18.2%**

5.4 Definition of a 'site'

An Aboriginal site was defined in the archaeological component of this assessment as a location where a person in the present day can observe one or more Aboriginal objects. The boundaries of a site are limited to the extent of the observed Aboriginal objects. A 'site' does not include the assumed extent of unobserved Aboriginal objects (such as archaeological deposit). 'Aboriginal objects' are items or objects owing their form to past Aboriginal activity (see Glossary).

Typical examples of Aboriginal sites include but are not limited to open stone artefact sites (referred to variously in other archaeological reports as 'open camp sites', 'stone artefact scatters' or 'open sites'), grinding grooves, Aboriginal rockshelters (which by definition include physical evidence of occupation), middens, stone arrangements and other landscape features which derive from past Aboriginal activity.

The most common form of Aboriginal site identified in this assessment was the 'open stone artefact site'. This is defined as an unenclosed area (ie 'open' to the sky) where Aboriginal stone artefacts occur – typically exposed from a topsoil archaeological deposit by erosion. Typically the term is used to refer to two or more artefacts although this is an arbitrary distinction. A general 'rule of thumb' boundary definition employed by archaeologists is that artefacts or features more than 50 m apart are regarded as separate sites, however there is no theoretical imperative dictating such a rule. The 50 m separation rule is used for the most part in EMM's work.

5.5 Identification of stone artefacts

Aboriginal stone artefacts were identified as stone objects with morphological features derived from past Aboriginal activity such as intentional fracture, abrasion or impact. Artefacts are distinguished by morphology and context. Typically flaked stone artefacts are distinguished from naturally broken stone by recognition of certain fracture features. A clear marginal fracture initiation is normally observed on a flaked stone artefact (typically displayed in a bulb of force feature on the fracture surface, or distinct shattering at the point of impact) on highly siliceous stone types.

Care must be taken to distinguish modern broken stone in machine impacted contexts and therefore context must be carefully considered as well as morphology. Morphological features included positive and negative flaking scars showing a distinct marginal point of force application. On brittle isotropic stone, such as chert, point of force applications were generally in the form of clear bulb of force emanating from a ring-crack sometimes with an eraillure scar and ripples on the surface of the flake that has been detached from the core (the ventral surface) (Figure 5.1). However the majority of artefactual stone was quartz which, owing to its crystalline structure, is tough and mostly resists development of clear bulbs of force when flaked.

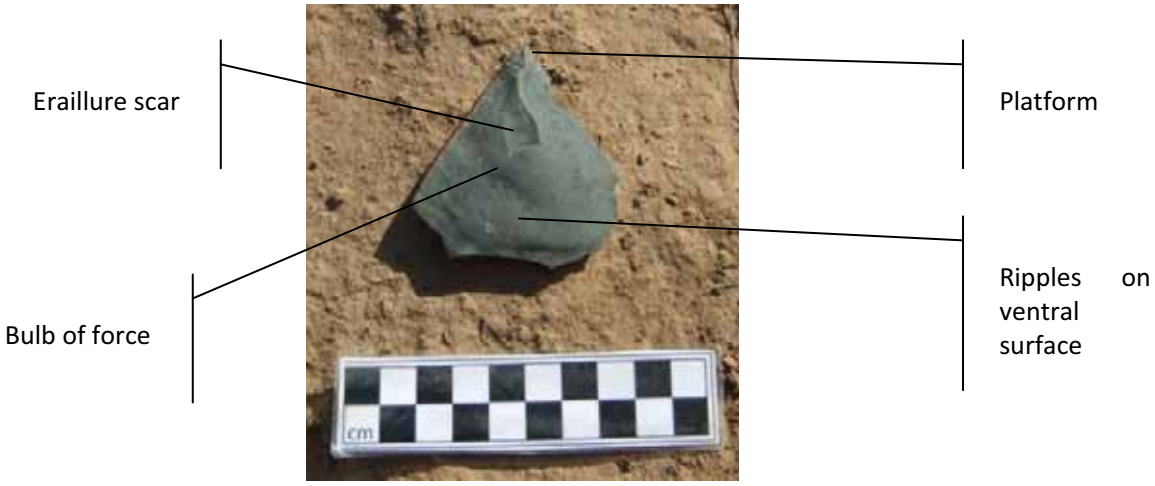


Figure 5.1 Flake Identification Features

Care was taken to not simply identify angular fragments of quartz as artefacts, but instead artefacts were mostly inspected for marginal fissures at fracture initiation points as well as signs of systematic flaking indicating that the object was the result of Aboriginal flaking rather than modern machine damage. Much of the quartz used for artefacts was distinguished from the background quartz gravel common through the area by its higher quality, with many artefacts of consistent glassy white, grey or grey quartz often sustaining good conchoidal fracture.

5.6 Aboriginal site recording

Site locations were recorded using a non-differential GPS unit with recorded data confirmed on GIS. Transects were accurately recorded and mapped by downloading the daily tracks recorded on GPS. Aboriginal sites were recorded by flagging each stone artefact, marking each artefact as a waypoint in the GPS and then downloading the data to confirm that mapped locations were accurate and not distorted by GPS error. GPS information was supplemented by daily field notebook entries and photos. In all instances GPS-recorded locations corresponded exactly with ground exposures on geo-referenced air photos displayed in GIS (Mapinfo and ArcMap). Site boundaries were defined by marking a boundary around the point cluster at each site. Site dimensions were then recorded from the GIS mapped site boundaries.

Scarred trees and grinding groove sites were sketched during the 2009 — 2010 survey and site cards have been prepared with scanned sketches and photos included.

5.7 Identifying non-archaeological Aboriginal heritage values

Non-archaeological Aboriginal heritage values refers to places which have meaning in accordance with memory or tradition but not associated with cultural objects. Natural features of the landscape may figure in traditional dreaming stories. Places may be associated with historical resource use. Areas may have been used as historical fringe camps. An area may have figured within a known traditional pathway. All such values can only be identified through archival research or interview with Aboriginal people with Aboriginal cultural knowledge. Aboriginal cultural knowledge is defined as,

> ...accumulated knowledge which encompasses spiritual relationships, relationships with the natural environment, and the sustainable use of resources, and relationships between people, which are reflected in language, narratives, social organisations, values, beliefs, and cultural laws and customs... (DECC 2010b).

Archival research may yield mention of historic encampments or fringe camps. The method of 'cultural mapping' referred to in the 2005 DEC draft Aboriginal cultural heritage assessment guidelines refers to the method advocated by Denis Byrne and explained in his book 'Mapping attachment',

> ...aerial photos would be unrolled on beaches, riverbanks, and kitchen tables elsewhere in the study area. Onto these maps Aboriginal people would mark pathways, houses, favourite old fishing spots, places where they had jumped fences to swim in a farmer's dam, places they had hunted in the bush. It became clear that Aboriginal people had their own map of this landscape that was different to the 'official' maps that you could buy at local newsagents and petrol stations. Their map was one that they kept in their heads...' (Byrne & Nugent 2004: 1).

The methods of oral history and cultural mapping rely on the initial identification of Aboriginal people who have Aboriginal cultural knowledge relevant to the area being investigated. No persons with such knowledge were identified during the Aboriginal consultation despite repeated requests both written and verbal for information. It follows that no oral history or cultural mapping could be conducted. Accordingly, no non-archaeological Aboriginal heritage values pertaining to the PAA were identified during this assessment.

6 Aboriginal site results

6.1 Aboriginal sites and distributions of Aboriginal objects

Although the archaeologist records *sites* on the landscape, the actual aim of assessment is to understand, interpret and manage the broader *distribution* of Aboriginal objects. This is especially relevant for the greater proportion of the archaeological record of Aboriginal life within the PAA – distributions of Aboriginal flaked stone artefacts. The artificial and ephemeral nature of open stone artefact *site boundaries* is clearly evident. For example, a sequence of test pits dug between two open stone artefact sites along a major creek would almost certainly reveal artefacts in areas where they are not visible on the surface. Open stone artefact sites in highly sensitive locations are simply artificial windows into a larger, partially hidden stone artefact distribution.

The aim of the archaeological component of this Aboriginal heritage assessment was to understand the nature and significance of Aboriginal objects present within the PAA. Aboriginal objects are the physical expressions of past Aboriginal life on the land. They are distributed across the landscape as a reflection of hunter-gather social life. They are part of the rich Australian heritage of Aboriginal life on the land.

Over the many thousands of years of Aboriginal life, Aboriginal objects have been created, enjoyed and eventually left behind with the cessation of activity and passing of generations. Those objects left behind are distributed across the landscape. For the most part these Aboriginal objects are buried through soil movement over long periods of time. Various natural and cultural processes also expose buried objects through erosion and disturbance. The resulting exposures of Aboriginal objects are what we observe in the present as *sites*. Sites are therefore windows into larger distributions of buried Aboriginal objects on the landscape. We record and study the contents of sites to provide insights into the greater but less accessible record of Aboriginal life.

The record of Aboriginal life within the PAA is dominated by the quartz rich stone artefact assemblages distributed along the major creeks and lower reaches of minor tributaries, at some ecotonal areas at the outer margins of valley floors, and in some ridge top areas associated with reliable water. This is primarily the area west of Spring Ridge Road and north of Dapper Road.

Site assemblages have different elements in different parts of the landscape. Common elements are cores flakes, and flaked pieces, all of which are either manufacturing by-products or expedient tools. Distributions along the watercourses include these elements as well as grindstones. In one instance a particular implement type from western NSW, a burren adze, was identified reflecting long distance exchange. Artefacts occur in greater density along the watercourses, reflecting a greater focus of occupation and repeated occupation events. Small carefully fashioned implements called backed artefacts were discovered along watercourses, at the edges of valley floors and on ridge tops. At least 22 backed artefacts were found, specifically forms referred to as bondi points and geometric microliths made of quartz with individual grey volcanic, mudstone and silcrete examples. The evidence suggests that areas of implement *manufacture* and areas of implement *use* may occur in different sites. Other related backed artefact forms such as an elouera and thumbnail scraper were also found made of quartz.

Grindstones (including broken sections of grindstones) and stone hatchet heads were identified exclusively in close association with watercourses. Grinding grooves were common where suitable sandstone platforms or sandstone boulders predominantly along the heavily incised Sandy Creek and Laheys Creek. One instance of a small boulder with grinding grooves (site CBR-GG-02) on a ridge demonstrates that grinding grooves are not solely associated with watercourses.

Scarred trees were recorded but are mostly problematic due to ambiguous causes of scarring. Based on the balance of probability or Aboriginal scarring origin, and in consultation with Aboriginal field representatives, a number of scarred trees were recorded as Aboriginal sites during the 2009 — 2010 surveys.

Rockshelters are rare and those that do occur are largely devoid of Aboriginal objects. The 2009 — 2010 survey recorded six rockshelters on the basis of potential archaeological deposit. One rockshelter was recorded during the 2011 — 2012 assessment with a single quartz flake on the rockshelter floor. On the basis of surface evidence, rockshelter occupation appears not to have been integral to Aboriginal land use within the PAA.

6.2 Are artefacts everywhere?

Aboriginal artefacts do not occur everywhere, instead they occur consistently along major creeks, sporadically along the edges of the valley floors and on minor creeks and rarely on the rocky slopes, ridgelines and minor drainage lines.

The archaeological survey identified many areas where no artefacts were observed despite extensive surface visibility and deep soil exposures. In contrast, soil exposures along the major watercourses of Laheys Creek and Sandy Creek almost invariably include stone artefacts. The archaeological evidence of consistent association between soil exposure and flaked stone artefacts points towards a consistent sub-surface distribution of artefacts. The lateral extent of this association is uncertain, but estimates can be made based on observations at select sites. At sites CBR-OS-31a, b, c, d, e, which all occur within the same cluster of exposures near Laheys Creek, each exposure within a select sample area of approximately 300 m x 300 m contained artefacts. From this evidence it may be inferred that there is a consistent distribution of artefacts within the soil which are visible wherever the ground is exposed over a distance of at least 200 m from the creek channel.

Excavations at Oran Park in western Sydney in comparable creek contexts have demonstrated that the spread of artefact distributions can increase with higher stream order (AECOM 2009). It thus seems likely that artefact distributions are more consistent and widespread along higher order watercourses such as Sandy Creek and Laheys Creek. In contrast, artefact distributions are likely to be patchy and less widespread along lower order tributaries such as Blackheath Creek.

6.3 Aboriginal sites

6.3.1 Sites as units of observation and management

At stated above, the *Aboriginal object* is the meaningful unit of analysis for understanding the record of Aboriginal life. Accordingly, this report places an emphasis on understanding *distributions* of Aboriginal objects on the landscape. However there is an established practice of defining ‘sites’ as the unit of observation and management. ‘Site’ and the problems in identifying are discussed above.

6.3.2 Site numbers and distribution

A total of 229 individual Aboriginal sites have been recorded within the PAA.

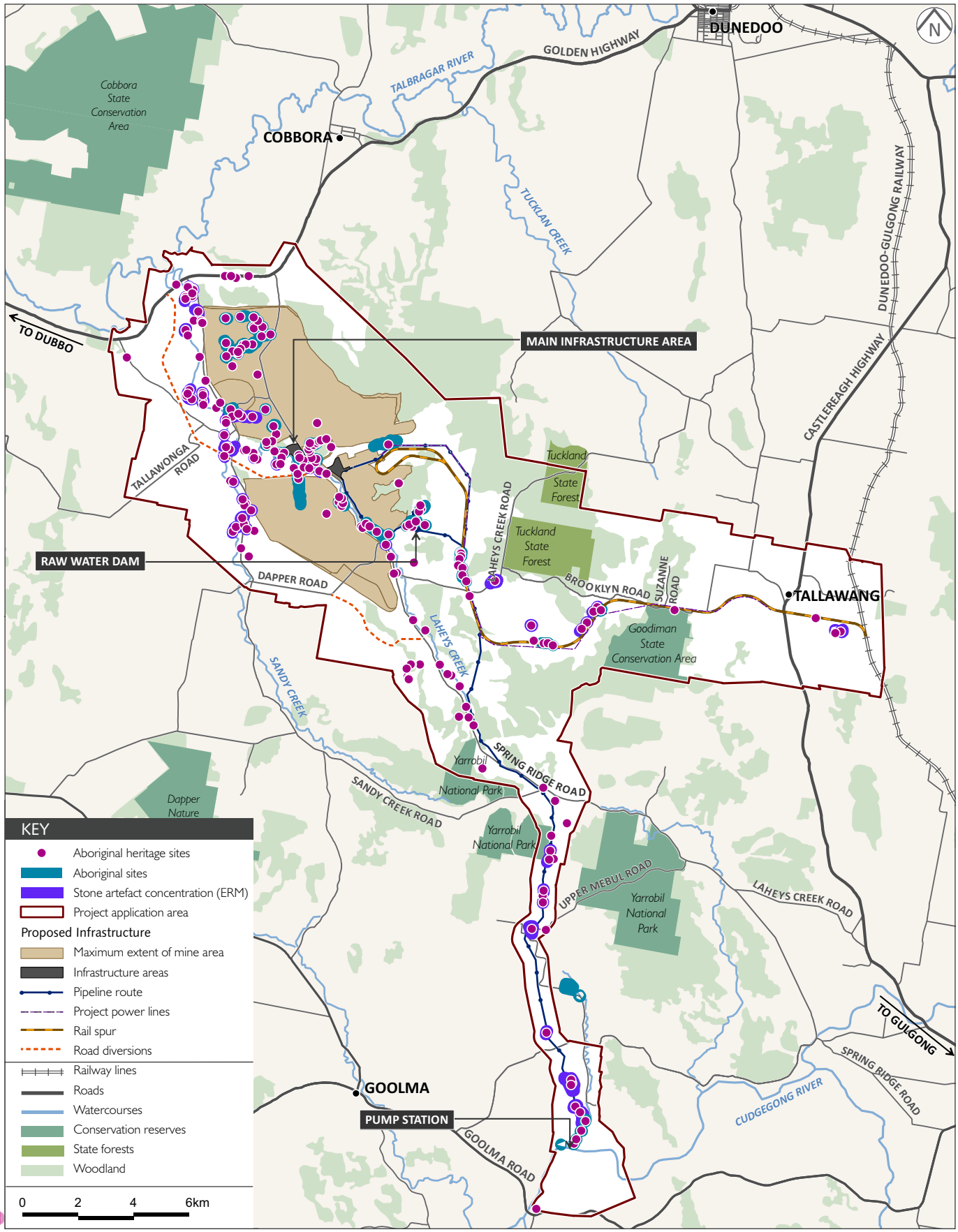
Higher numbers of sites in one area compared to another does not necessarily mean a comparatively higher degree of heritage value. The number of sites can be a poor guide to heritage significance, intensity of past Aboriginal occupation or present day heritage management focus. Site frequency more often than not reflects the many fragments of a single extensive artefact distribution. Furthermore, not all sites are equal in size, content and value. One site may comprise two artefacts over a one square metre area and another may comprise a consistent scatter over hundreds of metres.

Fragmented parts of localised artefact distributions were reflected by EMM in sites names with suffixes eg CBR-OS-31a, CBR-OS-31b, CBR-OS-31c, CBR-OS-31d and CBR-OS-31e all located in the same 300 m by 300 m area separated by grass cover, similarly site CBR-OS-29a, b, c, d, e, f, g, h, i, j, k and l (12 sites) were all sparse stone artefact sites recorded around the valley floors margin of a single defined landscape element as well as a nearby dam on the adjacent drainage line. Separate 'sites' were recorded simply through application of the 50 m separation convention commonly employed in archaeological site recording.

Most recorded sites occur in the core area of the PAA in association with valleys floors and watercourses. 100 sites occur within 300 m of Sandy Creek or Laheys Creek. Another 24 sites were recorded in the southern branch of the PAA primarily along linear survey tracks which followed alternate pipeline corridors before the current corridor was selected. While open stone artefact sites comprise more extensive assemblages along Mebul Creek near the Cudgegong River, the majority of sites comprised sparse artefact sites on undulating ground across the watershed between Talbragar and Cudgegong river catchments.

A total of six sites were recorded on the eastern branch of the PAA. The apparent paucity of sites may be attributed to the lack of watercourses, heavy forest cover and simple lack of evidence within exposures. Survey over the unnamed second and third order creeks at the eastern end of the railway revealed only a single quartz flake despite the ample exposure afforded along the creek banks and adjacent wheat paddock. In contrast only 500 m to the south of that site along an associated minor tributary drainage line, two open stone artefact sites were recorded.

The site location data demonstrate that, despite the great survey effort to the east of Spring Ridge Road, a much smaller proportion of Aboriginal sites were recorded in that area. This is due to the more sensitive environment west of Spring Ridge Road which includes the major watercourse of Laheys Creek and Spring Creek and the major chains of ponds in the two west flowing tributary creeks flowing through valley floors north of Laheys Creek. The greatest site density and greatest archaeological significance occurs from the infrastructure area where Laheys Creek turns west to join Sandy Creek, and the area of the PAA to the north of this junction and west of Spring Ridge Road (Figure 6.1 to Figure 6.10).



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All Recorded Aboriginal Sites in PAA

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 6.1

Figure 6.2 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.3 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.4 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.5 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.6 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.7 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.8 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.9 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.10 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.11 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.12 Details of Aboriginal Sites Recorded for the Project and Survey Transects

Figure 6.13 Details of Aboriginal Sites Recorded for the Project and Survey Transects

6.3.3 Site type frequency

Site types recorded within the PAA are listed in Table 6.1. The most common site type is the open stone artefact site.

Table 6.1 Aboriginal site type frequency within PAA

Site type	Number
Open stone artefact	164
Scarred Tree	25
Grinding grooves	18
Hearth *	15
Rockshelter with PAD**	6
Rockshelter with artefact***	1
Total	**229**

** several hearths occur within open artefact site boundaries*

*** Rockshelters with Potential Archaeological Deposit (PAD)*

**** Rockshelter with associated Aboriginal stone artefact*

6.3.4 Open stone artefact sites

Open stone artefact sites comprised flaked or abraded Aboriginal stone artefacts visible on the surface. The variation in contents and landscape associations are described in following sections. Site sizes and contents generally reflect exposure conditions and are recorded in the detailed site data table in Appendix C. Appendix C also contains site cards for all sites recorded during the present project and those available from AHIMS for previously recorded sites.

Artefact densities within sites of greater than 10 m² as calculated from basic site length x width divided by artefact frequency (excluding all isolated finds) resulted in densities ranging between 1:5,000 m² to maximum of 1:5 m². The median density was 1:100 m² and average 1:33 m². Higher densities were limited to site by watercourses and on valley floors. Sites on rocky slopes and ridge tops had artefacts at a density of less than 1:25 m². The following images provide typical examples of open sites at a general level.

Photograph 6.1 Open stone artefact site contexts

Laheys Creek west bank near Scarred tree 17

Unnamed watercourse; Big Scald Site CBR-OS-09

Ridge top – CBR-OS-01

Ridge top – CBR-OS-04

Valley floor edge – CBR-OS-11

Valley floor edge – CBR-OS-29c

6.3.5 Grinding Grooves

Grinding grooves are the result of abrading and sharpening the working edge of stone hatchets against fine grained sandstone. Typically sandstone associated with water is selected so that the groove can be washed clean of the rock dust abraded from the edge of the hatchet. An elongated groove generally between 15 cm and 30 cm in length is developed as the sandstone is gradually worn down in the grinding action.

Photograph 6.2 Grinding Groove site contexts

GG05 Sandy Creek Rd, Sandy Creek

GG05 Sandy Creek Rd, Sandy Creek

GG08 Mt Dapper property, Laheys Creek (photo: ERM)

GG08detail view (photo: ERM)

CBR-GG-02 Ridge top (grooves left of person)

CBR-GG-02 detail view

6.3.6 Rockshelters

Only one rockshelter with a visible stone artefact was recorded: CBR-RSH-01. Many rockshelters occurred of various sizes, all without evidence of art or stone artefacts, but with the possibility of archaeological deposit within their floors. Examples of good and problematic rockshelters are shown in the following photos.

Photograph 6.3 Rockshelters

CBR-RSH-01 artefact marked by blue flag

Rockshelter with disturbed natural sterile deposit

Rockshelter 01

Rockshelter 03 (photo: ERM)

6.3.7 Scarred trees

Scarred trees are a problematic site type given the uncertainty commonly inherent in identification. Scars commonly occur on trees through natural processes; however Aboriginal people were recorded using bark and cambium wood for container and implement manufacture and a variety of other uses. Scarred trees had been previously identified in AHIMS prior to 2009 mostly near the Golden Highway and were identified in the 2009 – 2010 survey along the Sandy Creek Road reserve. Examples are shown in the following photos.

Photograph 6.4 Scarred trees

Scarred tree 17 Laheys Creek, Road diversion area (photo: ERM)

Scarred tree 16, Laheys Creek, Infrastructure area (photo: ERM)

Scarred tree 04, Sandy Creek (photo: ERM)

Scarred tree 11, Sandy Creek (photo: ERM)

6.3.8 Test pits

A series of 1 m x 2 m test pits were mechanically excavated in the 2009 — 2010 survey in association with soil testing. The locations were selected by in accordance with soil testing requirements, scattered across the main operational area of the PAA. Of relevance to the assessment are the three test pits placed within sites SAC12 and SAC23. Artefacts were retrieved from the three pits within the recorded sites. One other pit on flat ground 300 m west of Laheys Creek yielded one artefact. The results therefore are of use for demonstrating the presence of artefacts in abundance within the topsoil in association with the minor tributary watercourse along which site SAC12 was recorded, and within the topsoil close to the junction of Sandy Creek and Laheys Creek where SAC 23 was recorded. The results are provided in Table 6.2 below.

Table 6.2 Test pits (2 m²)

Site	Test Pit #	Location	Artefact Count
SAC12	21	Minor tributary to Sandy Creek	58
SAC12	22	Minor tributary to Sandy Creek	16
SAC23	23	Junction of Laheys and Sandy Creeks	17

6.3.9 Artefact raw materials

Stone artefacts of open stone artefact sites across the entire PAA were dominated by quartz of mostly white appearance with minor proportions of smoky and clear quartz. Quartz made up approximately 95% of the assemblage on all sites within the Sandy Creek/Talbragar River catchment. Quartz is locally available as eroded pebbles from the Dunedoo formation in many of the rocky ridge areas. One outcrop was observed within the core PPA area approximately 600 m inside the entrance gate to the Woolandra property east off Spring Ridge Road.

Other minor raw materials included:

- siliceous volcanic stone in grey, green (termed ‘Goolma green’ by RAPs) and yellow colours – the grey volcanic stone being typical of the geology to the south of the PAA and generally the dominant raw material on open stone artefact sites in the Mudgee-Wellington area;
- silcrete in very low quantities including brown and cream colours;
- quartzite in pebble form;
- sandstone for grinding stones;
- fine grained siliceous stone given the generic term ‘chert’;
- chalcedony;
- mudstone – a siliceous stone of superficially chalky matt appearance; and
- metamorphic stone, possibly amphibolitised metabasalt, used for the manufacture of hatchet heads.

Artefacts of these rock types are illustrated in the following photos.

Photograph 6.5 Stone artefact raw materials

Quartz; grey volcanic; yellow volcanic and chert. backed artefact lower left. Laheys Creek SAC29

Grey volcanic core-tool Laheys Creek SAC29

Sandstone grindstone fragment CBR-OS-12

'Goolma green' volcanic CBR-OS-22

Quartzite core-tool CBR-OS-04 Ridge top

Metabasalt hatchet head SAC24 Infrastructure area

6.3.10 Stone artefact types

Examples of major stone artefact types are illustrated here (other than cores, flakes and flaked pieces illustrated above).

Photograph 6.6 Backed artefacts

Geometric microlith CBR-OS-04 Ridge top

Bondi Point CBR-OS-09 Watercourse scald site

Geometric microlith CBR-OS-12

Bondi point dorsal CBR-OS-19

Bondi point ventral CBR-OS-19

Bondi point CBR-OS-24

Mudstone bondi point proximal end Scarred Tree 17 area, Laheys Creek

Backed artefact CBR-OS-29

Detail of backing retouch CBR-OS-29

Photograph 6.7 Grindstones

Grindstone fragment SAC 08

Oblique view of ground surface

Grindstone fragment CBR-OS-12

Oblique view of ground surface

Grindstone fragment CBR-OS-20

Oblique view of ground surface

Photograph 6.8 Stone hatchet ('axe') heads

Hatchet head CBR-OS-14

Side view showing asymmetry

Hatchet head fragment with pitting and grinding CBR-OS-09

Alternate side

Hatchet head CBR-OS-26

Side view showing asymmetry

Photograph 6.9 Burren adze CBR-OS-09

Burren adze CBR-OS-09

Burren adze ventral CBR-OS-09

Burren adze side view of retouch CBR-OS-09

6.4 Landscape associations

Aboriginal sites were found in each of the broad landscape classes defined for this assessment (see Table 6.3). However the greatest number of sites was found in close proximity to watercourses. The predominant quartz artefact material was highly obtrusive within vegetation and amongst rocks and visibility was ample in the landscape away from watercourses. The observed association with watercourses was consistently evident along the tracks close to Laheys Creek where flaked quartz was consistently observed eroding from the tracks. During the 2011 fieldwork, artefacts were consistently observed occurring beyond the site boundaries identified during the earlier fieldwork, to the extent that an artefact continuum could readily be inferred. In contrast, open artefact sites on the valley floors within the core PAA area occur discontinuously and primarily at the ecotonal edges as exemplified by sites CBR-OS-10, 11, 17, 18, 20 and 33.

Table 6.3 Site type frequency within each landform class

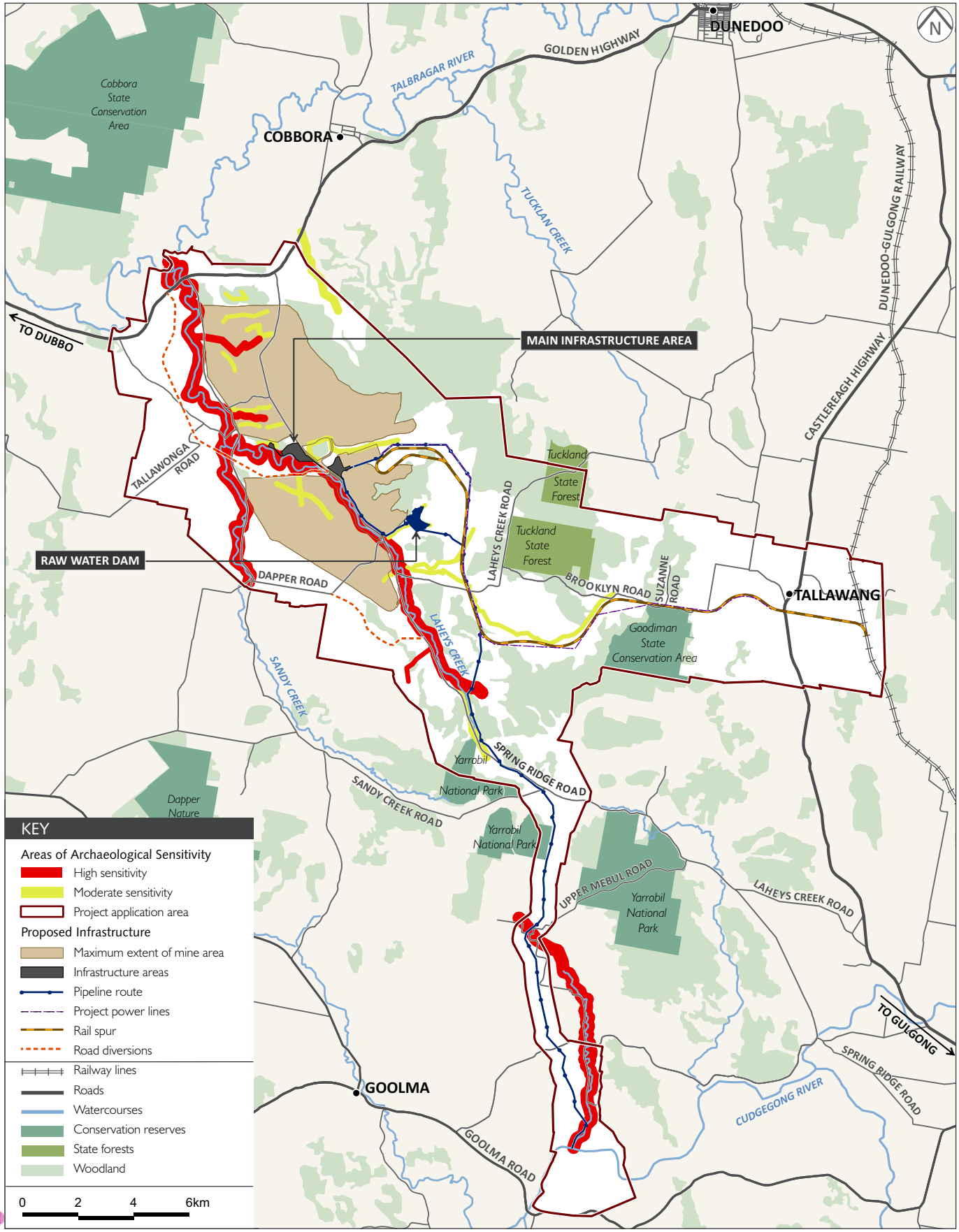
	Site type						
Landform	**Open stone artefact**	**Aboriginal rockshelter**	**Rockshelter**	**Scarred tree**	**Grinding grooves**	**Hearth**	**Total**
Watercourse	77	0	0	13	16	15	**121**
Valley floor	29	0	0	10	0	0	**39**
Undulating ground	20	0	0	1	1	0	**22**
Ridge top	6	0	0	1	1	0	**8**
Rocky slope	4	1	6	0	0	0	**11**
Total	**136**	**1**	**6**	**25**	**18**	**15**	**201**

6.5 Sites and inferred distributions

Patterns evident in the data and discussion above are the common association of Aboriginal objects with the major Sandy Creek and Laheys Creek watercourses to the extent that almost without exception, stone artefacts could be seen eroding out of all closely associated ground exposures. However for this assessment it was more empirically defensible to identify discrete sites rather than defining the entire length of each creek bank as an Aboriginal site based on an inferred distribution.

First order streams were generally not associated with artefacts unless they had formed chains of ponds (some subsequently dammed in modern times) within valley floors. Sites in low order creeks include CBR-OS-5, 6, 7, 8, 9, 14, 15, 16, SAC11, 12 and 13. These include Heathcote Creek and the two tributary creeks in the north-west of the PAA flowing west to Sandy Creek either side of Danabar Road. Good exposure in the two tributary creek valleys continued for over 100 m either side of the creek and yet artefacts appear to have been limited to a 30 m wide zone adjacent to the watercourse.

These observations, based on point-mapped artefact location data, provide the basis for inferring a general broad continuous distribution of artefacts within 200 m of the major watercourses and within 30 m of minor watercourses. These inferred extents are therefore referred to hereafter as ‘areas of archaeological sensitivity’ (Figure 6.14).



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Areas of Archaeological Sensitivity

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Figure 6.14

7 Significance assessment

7.1 Defining heritage significance

Heritage sites, objects and places hold value for communities in many different ways. The nature of those heritage values is an important consideration when deciding how to manage a heritage site, object or place and balance competing land-use options.

The many heritage values are summed up in an assessment of 'cultural significance'.

The primary guide to management of heritage places is the *Australia ICOMOS Burra Charter* 1999. The Burra Charter defines cultural significance as follows:

> "Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups." (Burra Charter 1999:2)

This assessment has sought to identify various aspects of Aboriginal heritage for the purpose of assessing possible development impact. The aspect of Aboriginal heritage identified in this assessment pertains to physical Aboriginal objects and sites.

The types of heritage values are defined below, followed by an assessment of significance at landscape and site levels.

7.2 Socio-cultural value: significance to the Aboriginal community

Research and consultation with the Aboriginal community was conducted to determine whether any socio-cultural heritage value relates specifically to the study area regardless of archaeological evidence. While it is accepted that the broader landscape is of significance to Aboriginal people, this study sought to identify whether the PAA or portions thereof held specific values either in themselves, or as part of a specific local area of particular significance.

To date, no information has been received that identifies specific heritage value unrelated to the Aboriginal sites. No historical connection has been identified specifically pertaining to the study area.

Aboriginal heritage sites with archaeological evidence are all of value to the Aboriginal community through the tangible connection that they represent with pre-European Aboriginal land use. This is appropriately summed up in a statement by a Wonnarua Aboriginal consultant in a survey report from the Hunter Valley region,

> "The Cultural Sites that we find today in the landscape remind us of our original connection to this Country that reinforces our ties to the land (Perry 1999: 2)."

7.3 Scientific value

7.3.1 Levels of significance

A cautious and conservative approach was employed in this assessment in the attribution of levels of scientific significance. A cautious approach avoids the dilemma of indecision caused by uniform assignation of high significance: when everything becomes of high significance, then nothing stands out as deserving management priority.

The use of the term 'high significance' is reserved for those sites, the unmitigated loss of which would represent a loss to future generations which might not easily be filled by other existing local sites. Each impacted site of high significance deserves management priority which might entail extra protection measures if avoided or salvage if impacted. Few sites are attributed a high significance in this assessment.

Sites of moderate significance are considered to have important contributions to make to knowledge, but not in a unique manner. A sample of sites of moderate significance should be salvaged if impacted.

Attribution of 'low significance' to a site does not diminish its inherent significance as a representation of Aboriginal life which is important to Aboriginal people. However the finite resources available for management are weighted towards sites of higher significance. Sites of low significance may comprise few artefacts that do not offer new insights to the understanding of past life when considered in the context of an otherwise rich archaeological resource.

7.3.2 Research potential

Scientific value is assessed according to the research potential of a site. Rarity and representativeness are also related concepts taken into account. Research potential or demonstrated research importance is considered according to the contribution that a heritage site can make to present understanding of human society and the human past. Those heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to inform us about the specific age of people in an area, or provide a rare glimpse of artistic endeavour or provide a rare chronological record of changing life through deep archaeological stratigraphy.

7.3.3 Rarity and representativeness

The comparative rarity of a site is a consideration in assessing scientific significance. A certain site type may be 'one of a kind' in one region, but very common in another. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

Examples of this include the rare 'burren adze' identified at site CBR-OS-09 (Photograph 6.9 above) which is a type normally found in western NSW. Grindstone technology is also particular to central and western NSW and rare though east of the south-west slopes land system. Many stone artefact assemblages with grindstone fragments along major watercourses therefore represent valuable representative examples of a type of seed-processing activity close to the eastward edge of its range. The types of stone hatchet heads are also distinctive within a particular area, representing a particular technology possibly related to a limited group of quarries given the similarity in stone types. Hatchet heads within the PAA are somewhat rough in manufacture, have mostly light edge-grinding, no hammer-dressing of the body and are asymmetric around the axis of the working edge in the manner of adzes rather than hatchets. These characteristics are uncommon amongst NSW axes.

Rarity also applies to site context as well as content. Several sites were found in rarely recorded ridge top contexts and valley floor edge contexts within the Brigalow Belt South country in the north-west of the PAA. The absence of regionally comparable site records may simply reflect lack of past archaeological survey in such contexts, given the limited number of extensive development-related Aboriginal site surveys conducted in the region. However, in the absence of other information, the significance of sites in this context is elevated and warrants active mitigation measures.

7.3.4 Integrity

The integrity of a site is also a consideration in determining scientific significance. While disturbance of a topsoil deposit with artefacts does not entirely diminish research value, it may limit the types of questions that may be addressed. A heavily cultivated paddock may be unsuited to addressing research questions of small-scale site structure, but it may still be suitable for answering more general questions of stone tool distribution in a region and raw material logistics.

Most stone artefact sites within the PAA are located within farm paddocks that have been previously impacted by ploughing and erosion. Most exposures occur in shade areas where concentrated cattle treadage has cleared grass cover. Notwithstanding these impacts, the value of these sites relates to the assemblage content and broad spatial structure. Many stone artefact sites in creek-side contexts also are affected by heavy gully erosion at the edges of the watercourse trench, exemplified by sites SAC11, SAC12 and SAC13 recorded along a minor, heavily eroded tributary of Sandy Creek just south of Danabar Road.

7.3.5 Research themes

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the local region, the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with definite Pleistocene evidence are extremely rare, and hence are of extremely high significance if found. Given the lack of information available for the archaeology of the region, apart from the apparent close association of sites with water and the dominance of quartz in assemblages, there is no regionally-specific established research priority within which to frame significance assessments. It follows that a baseline description of the archaeology is a regional priority. The archaeological record within the PAA provides this baseline description. Salvage of sites would further enhance the baseline data.

7.4 Educational value

Educational value relates to the capacity of a site to portray more easily recognisable archaeological features. While the educational potential of Aboriginal sites can only be effectively realised through interpretation, those sites with more obtrusive elements and suitable settings offer greater potential to illustrate the salient features of Aboriginal activity.

Grinding groove sites are primarily significant for their educational value rather than research or scientific value. Although grinding grooves may be common, and offer little in terms of scientific research, their cultural significance is enhanced by the readily understood origin of the grooves to the lay person.

An educator selecting sites to demonstrate to students the physical evidence of Aboriginal occupation in an area is more likely to choose an extensive grinding groove site. In contrast, an educator would avoid a small scatter of artefacts which, to the lay person, may not be readily differentiated from natural gravel.

Stone artefact sites with larger and richer assemblages would be better candidates for education. Sites with retouched implements, hatchet heads and grindstones have greater educational value that sites comprising three quartz flakes in a cattle track. Educational value is elevated in Aboriginal sites with richer features, such as larger grinding groove sites and extensive dense artefact scatters in natural creek-side settings.

7.5 Sites and significance

The frequency of sites falling within each significance category is described in Table 7.1 below. Several sites within the PAA recorded prior to 2009 and identified through AHIMS have no significance level recorded on the site card and were not relocated as they fell outside of impact areas. None of the previously recorded AHIMS sites appear to have highly significant features on comparison with those recorded during the current project. The significance values listed in the following tables are based on assessed scientific and education values.

Table 7.1 Site significance frequency by type

	Significance level				
Site type	**High**	**Moderate**	**Low**	**No record**	**Total**
Aboriginal rockshelter	0	1	0	0	**1**
Rockshelter with PAD	0	5	1	0	**6**
Grinding grooves	2	13	3	0	**18**
Hearth	0	15	0	0	**15**
Open stone artefact	13	50	92	9	**164**
Scarred Tree	0	8	12	5	**25**
Total	**15**	**92**	**108**	**14**	**229**

7.6 Sites of high significance

Sites of high significance all occur within the Brigalow Belt South land system country which occurs west of Spring Ridge Road in the north-west of the PAA. They occur on several landforms: undulating ground, ridge top and watercourse. They form part of suites of sites all of which have regionally uncommon potential for providing information about past Aboriginal life and landscape use.

The site details are provided in Appendix C.

Table 7.2 Sites of high significance by type and landform

	Landform class			
Site type	**Undulating ground**	**Watercourse**	**Ridge top**	**Total**
Grinding grooves	0	2	0	**2**
Open stone artefact	1	10	2	**13**
Total	**1**	**12**	**2**	**15**

Two large grinding groove sites are assessed as having high significance as excellent representative examples of their type unmatched in size and extent by other known grinding grooves in the local area. Site GG08 occurs within the Mount Dapper property on a farm track where it crosses Dapper Creek. Site GG15 occurs on Laheys Creek 110 m south-west of Spring Ridge Road from a point 950 m north-west of Dapper Road.

One site on undulating ground south of Mining Area B comprises a single highly significant artefact. IF10 was found during the 2009 — 2010 survey on land which is now not to be impacted, 3.3 km south of Laheys Creek road and 560 m west off Spring Ridge Road. IF10 is a cylcon (cylindro-conical stone) which McCarthy (1976) describes as a possible ritual object but about which little ethno-historic evidence survives. Cylcons have been described western NSW and northern Australia. In his study of use wear and function of cylcons from the Northern Territory Museum, Cundy (1985) suggests that while there are descriptions of their ritual use, the archaeological evidence suggests secondary use as grinding pestles for his Northern territory examples.

Ten open stone artefacts sites are located immediately adjacent to Laheys Creek, Sandy Creek and on the minor west flowing tributaries to Sandy Creek. Their value lies in the extensive and rich artefact assemblages with associated archaeological deposit which are excellent representative and research value. Several of the sites include hearths which have dating potential.

Two stone artefact sites occur in rarely recorded ridge top contexts in the north-west of the PAA. Their high scientific value lies in the research potential for further analysing the stone artefact assemblage which contrasts in content with creek-side sites. Stone artefact sites are rarely recorded in this context.

7.7 Sites of moderate significance

Sites of moderate significance occur throughout the western half of the PAA in all landform contexts.

Table 7.3 Sites of moderate significance by type and landform

	Landform class					
Site type	**Rocky slope**	**Valley floor**	**Undulating ground**	**Watercourse**	**Ridge top**	**Total**
Aboriginal rockshelter	1	0	0	0	0	**1**
Rockshelter with PAD	5	0	0	0	0	**5**
Grinding grooves	0	0	0	12	1	**13**
Hearth	0	0	0	15	0	**15**
Open stone artefact	4	21	2	19	4	**50**
Scarred Tree	0	3	0	5	0	**8**
Total	**10**	**24**	**2**	**51**	**5**	**92**

Each site includes contents that are suitable for informing about Aboriginal life. The manner in which it can provide this information is either not particularly unique and elements of the sites are not very abundant. Each is well represented in other sites in the area which are avoided by the development.

One Aboriginal rockshelter with a single artefact present on its floor and a second artefact within 5 m of the rockshelter is assessed as being of moderate significance due to its uncertain research potential. Five rockshelters have potential archaeological deposit.

7.8 Sites of low significance

The Aboriginal sites not covered in the two preceding sub-sections are summarised here. These are sites that do not have the same capacity to inform society about past Aboriginal life. While such sites symbolise Aboriginal presence on the landscape through their very existence, they can tell us little else. Notwithstanding this limited information potential, each site is of significance to the Aboriginal community.

One rockshelter is recorded as of low significance because there is minimal deposit on the floor. Other stone artefact sites are ascribed a low level of significance due to the sparse site contents and low information potential of those contents. Most scarred trees recorded within the PAA are of low significance because their attributes might be the result of natural causes and they are therefore not good representative examples of Aboriginal scarred trees. Notwithstanding their uncertain status, these scarred trees are still included as Aboriginal sites as a result of their original recording and subsequent inclusion in the AHIMS register.

Table 7.4 Sites of low significance by type and landform

Site type	Watercourse	Valley floor	Ridge top	Rocky slope	Undulating ground	Total
Open stone artefact	56	16	0	0	20	**92**
Scarred Tree	8	3	1	0	0	**12**
Grinding grooves	2	0	0	0	1	**3**
Rockshelter with PAD	0	0	0	1	0	**1**
Total	**66**	**19**	**1**	**1**	**21**	**108**

A total of 14 sites within the PAA recorded in AHIMS prior to the present assessment have no significance level recorded. It is assumed that if they were of high significance this would have been noted in the AHIMS record. As none of these sites are to be impacted, the absence of significance detail is not of consequence.

7.9 Scientific values

The scientific values identified are summarised here for each site type and detailed for each site in Appendix C. These data summarise the basis for assigning levels of scientific value.

Table 7.5 Scientific values by site type

Site Type and scientific value summary	Sites
Aboriginal rockshelter	
Moderate: associated deposit	1
Rockshelter with PAD	
Low: improbable occupation area	1
Moderate: possible PAD	5
Open stone artefact	
High: assemblage diversity	2
High: assemblage in rarely recorded context	2
High: rare element	1
High: rare type	3
High: research potential; hearths	1
High: size and representativeness	2
High: size; associated deposit and artefacts	1
High: associated deposit; large representative assemblage	1
Low: common type	11
Low: common type; sparse assemblage	30
Low: disturbed	1
Low: disturbed; sparse assemblage	2
Low: highly disturbed	2
Low: sparse assemblage	42
Low: uncertain if artefact	4
Moderate scientific: associated deposit and artefacts	3
Moderate significance: associated deposit and artefacts	1
Moderate: associated deposit	8
Moderate: associated deposit and artefacts	5
Moderate: eroding knapping floors	2
Moderate: extensive site	1
Moderate: hearth; research potential	1
Moderate: rare assemblage element	3
Moderate: rarely recorded context	25
Moderate: representative grey volcanic assemblage	1
No record	9
Scarred Tree	
Low: asymmetrical damage scar	4
Low: dead & obscured	1
Low: dead asymmetrical scar	1
Low: possible Aboriginal scar	5
Low: stump only	2

Table 7.5 Scientific values by site type

Site Type and scientific value summary	Sites
Moderate: possible Aboriginal scar	6
Moderate: probable Aboriginal scar	1
No record	5
Grinding grooves	
High: representative	1
High: representative, large number grooves	1
High: representative, large number grooves: continuous with GG04	1
High: representative, large number of grooves on same platform	1
Low: common	1
Low: sparse elements	11
Low: uncertain origin	1
Moderate: Eroded — numerous in variable condition	1
Hearth	
Moderate: research dating potential	15
Total	**229**

7.10 Educational values

The educational values identified are summarised here for each site type and detailed for each site in Appendix C. These data summarise the basis for assigning levels of educational value with descriptions limited to justification of moderate to high educational value.

Site types and values	Sites
Aboriginal rockshelter	
Low: sparse evidence to interpret	1
Rockshelter with PAD	
Low: no evidence to interpret	6
Open stone artefact	
High: visibility and range artefacts	4
Moderate: distinctive implement; difficult to locate	1
Moderate: large assemblage	1
Low: sparse elements	158
Scarred Tree	
High: best local example	1
Low: poor examples	24

Site types and values	Sites
Grinding Grooves	
High: multiple clear grooves	1
High: multiple clear grooves, accessible	3
Moderate: sparse elements	2
Moderate: illustrates various conditions	2
Low	10
Hearth	
Low: difficult to interpret to lay person	15
Total	**229**

7.11 Summary

In summary, out of 229 sites recorded across the PAA, the following were identified:

- 15 sites of high significance;
- 92 sites of moderate significance; and
- 108 sites of low significance.

The actual sites and their attributes are listed in Appendix C.

Table 7.6 Site type and significance level

	Cultural significance			
Site type	**High**	**Moderate**	**Low**	**Total**
Aboriginal rockshelter	0	1	0	**1**
Rockshelter with PAD	0	5	1	**6**
Open stone artefact	13	59	92	**164**
Scarred Tree	0	13	12	**25**
Grinding Grooves	2	13	3	**18**
Hearth	0	15	0	**15**
Total	**15**	**106**	**108**	**229**

8 Impact assessment

8.1 Sources of development impact

The Project will cause broad landscape modification during its 21 year life as illustrated in Figure 8.1.

The main operational area measures 4,350 ha in the north-west of the PAA. This area contains mining areas, emplacement areas, haul roads and infrastructure. Associated linear impacts which extend from the core area include the raw water pipeline to the Cudgegong River and the railway line and associated power lines area which join the existing railway line near Tallawang.

The following Project elements are those which will impact Aboriginal sites and objects:

- the open cut Mining Areas: A, B, C;
- the overburden emplacement areas and associated haul roads;
- the main infrastructure area;
- the raw water pipeline from Cudgegong River;
- the raw water dam;
- the railway line and associated power lines; and
- the Spring Ridge Road diversion.

The nature of these impacts is detailed below.

8.2 Definition of impact type

Project elements that will impact Aboriginal sites and objects to varying degrees are defined here. *Disturbance*, where artefacts are moved locally from their original setting, is distinguished from *loss* where artefacts are removed or destroyed. Degrees of impact from lesser to greater are: partial disturbance, total disturbance, partial loss and total loss. Partial disturbance describes the disturbance of part of a recorded site. Partial loss describes the loss of part of a site.

Disturbance means Aboriginal sites and objects will be disrupted and moved a short distance through displacement of ground. An example is in pipeline construction where topsoil including all surface objects and Aboriginal artefacts is moved to one side during trench excavation, but not removed from the locality. Following construction the topsoil with artefacts is spread back over the construction area. This type of impact may damage the artefacts through abrasion by the mechanical digger. Artefacts are retained generally in the same locality but with some loss of context and spatial patterning. Disturbance can also occur through vibration from blasting on rockshelter site in close proximity to mining areas.

Disturbance also occurs naturally through bioturbation whereby artefacts discarded on the surface of a camp site area are integrated into the topsoil through plant and animal activity. Bioturbation may cause minimal disturbance in typical duplex soils, but may cause considerable movement in very sandy soils. Modern disturbance has occurred on nearly all open artefact sites through livestock treadage. Plough impact marks may be seen on several larger stone artefacts such as stone hatchet heads. Site disturbance can occur through minor erosion and sheet-wash moving artefacts within a soil exposure.

Loss entails complete removal of a site's elements, such as large scale earthworks and removal of overburden. The total modification of a landscape can also constitute loss, even if artefacts are collected and later returned to the modified surface in their original positions, because the context (an integral part of archaeological site value) is irretrievably lost.

Natural site loss is less common than natural disturbance. Weathering and erosion are the primary causes of natural loss, both of which may be exacerbated by modern land management practices. Engraved or grooved sandstone surfaces may weather away and gully erosion may wash away artefacts.

8.3 Impacts by Project element

Out of a total of 229 Aboriginal sites recorded within the PAA, 78 sites will be impacted to some degree by the Project. A total of 54 sites will be totally lost, eight partially lost, one disturbed and 15 partially disturbed.

A total of 151 Aboriginal sites within the PAA will be avoided. As discussed above, this avoidance stems largely through the alteration of an initial mine plan whereby the area of mining was moved away from Sandy Creek and Laheys Creek. The original Aboriginal heritage survey conducted in 2009 and 2010 for that superseded proposal resulted in the recording of the majority of Aboriginal sites in the PAA which will now be avoided.

Table 8.1 Degrees of impact by project element on each site type

	Level of Impact					
Project element and site types	**None**	**Partial disturbance**	**Total disturbance**	**Partial loss**	**Total loss**	**Total**
Non impact area within PAA						
Grinding grooves	17	0	0	0	0	**17**
Hearth	13	0	0	0	0	**13**
Open stone artefact	90	0	0	0	0	**90**
Rockshelter with PAD	6	0	0	0	0	**6**
Scarred Tree	25	0	0	0	0	**25**
Main Infrastructure Area						
Open stone artefact	0	0	0	0	3	**3**
Mining Area A						
Aboriginal rockshelter	0	0	0	0	1	**1**
Hearth	0	0	0	0	2	**2**
Open stone artefact	0	0	0	2	13	**15**
Mining Area B						
Open stone artefact	0	0	0	1	2	**3**
Mining Area C						
Grinding grooves	0	0	0	0	1	**1**
Haul Road/Emplacement						
Open stone artefact	0	0	0	0	21	**21**

Table 8.1 Degrees of impact by project element on each site type

	Level of Impact					
Project element and site types	**None**	**Partial disturbance**	**Total disturbance**	**Partial loss**	**Total loss**	**Total**
Rail Spur						
Open stone artefact	0	0	0	3	4	**7**
Raw water dam						
Open stone artefact	0	0	0	0	7	**7**
Spring Ridge Road diversion						
Open stone artefact	0	0	0	2	0	**2**
Water pipeline						
Open stone artefact	0	14	1	0	0	**15**
Transmission lines						
Open stone artefact	0	1	0	0	0	**1**
Total	**151**	**15**	**1**	**8**	**54**	**229**

8.4 Impacts and site significance

Four stone artefact sites of high significance will be totally lost within the main operational area in the north-west of the PAA. The sites all occur within 1.5 km of each other; two larger stone artefact sites (CBR-OS-12 'Waterhole site' and CBR-OS-09 'Big Scald site') along an unnamed west flowing watercourse and two (CBR-OS-04 and CBR-OS-05) on the ridge top north of the watercourse. These sites occur within the area where Mining Area A and associated emplacement areas are planned.

A total of 11 sites of high significance will be avoided by the development. These sites include: Grinding Groove 08, Grinding Groove 14, IF 05-Ground Edge Axe, IF 09-Grinding Bowl, IF 10- Cylcon, SAC 06, SAC 18, SAC 22, SAC 23, SAC 31 and SAC 34. These sites occur along Sandy Creek and Laheys Creek in areas unaffected by the mine. Four of the sites occur in areas bordering mining and emplacement areas where active protection measures will be implemented.

Table 8.2 Site significance and levels of impact

	Level of impact					
Significance level	**None**	**Partial disturbance**	**Total disturbance**	**Partial loss**	**Total loss**	**Total**
High	11	0	0	0	4	**15**
Moderate	72	3	0	5	26	**92**
Low	68	12	1	3	24	**108**
Total	**151**	**15**	**1**	**8**	**54**	**229**

A total of 34 sites of moderate significance will be impacted to some degree. Two open stone artefact sites, SAC42 and SAC46 will be partially disturbed by the construction of the water pipeline in the southern pipeline area near the Cudgegong River. The stone artefacts within this site are susceptible to being scraped aside and possibly damaged during initial topsoil stripping during pipeline trench excavation over a linear area through the site of approximately 2 m width.

Five open stone artefact sites will be partially lost although they extend beyond impact areas. Sites SAC28 and SAC36 will be partially lost through the construction of the Spring Ridge Road diversion where it passes over Sandy Creek, impacting SAC36, and Laheys Creek impacting SAC28. The new road diversion cannot avoid crossing these creeks, the margins of which are all of high archaeological sensitivity. Impacts on Aboriginal objects, either within these two sites, or within adjacent archaeological deposit, can therefore not be avoided. Site SAC12, located on a tributary to Sandy Creek and located either side of Sandy Creek Road, will be partially impacted by Mining Area A, with approximately one third of the site west of Sandy Creek Road not affected. Site CBR-OS-43 and CBR-OS-44a will be partially impacted by the rail spur. Both of these open stone artefact sites are part of a broad stone artefact distribution that continues outside of the rail spur corridor and likely to continue south of the boundaries recorded.

A total of 26 sites of moderate significance will be totally lost through open cut mining impacts within the main development area through open cut pits, emplacement/haul road areas and infrastructure. These sites are named here. SAC24 and SAC25 occur on Laheys Creek within the main infrastructure area. CBR-GG-02, located on a ridge impacted by Mining Area C, is the only grinding groove site impacted in the PAA. Site CBR-RSH-01 is impacted on the southern margin of Mining Area A. Hearths 04 and 05, located within the boundaries of SAC12, will be impacted by Mining Area A. The following 20 sites will be impacted by open cut pits, emplacement and haul roads: CBR-IF-02, CBR-IF-03, CBR-IF-04, CBR-OS-01, CBR-OS-02, CBR-OS-03, CBR-OS-05b, CBR-OS-07, CBR-OS-08, CBR-OS-10, CBR-OS-11, CBR-OS-14, CBR-OS-19, CBR-OS-21, CBR-OS-29a, CBR-OS-29c, CBR-OS-29l, CBR-OS-30, CBR-OS-31a and CBR-OS-31c.

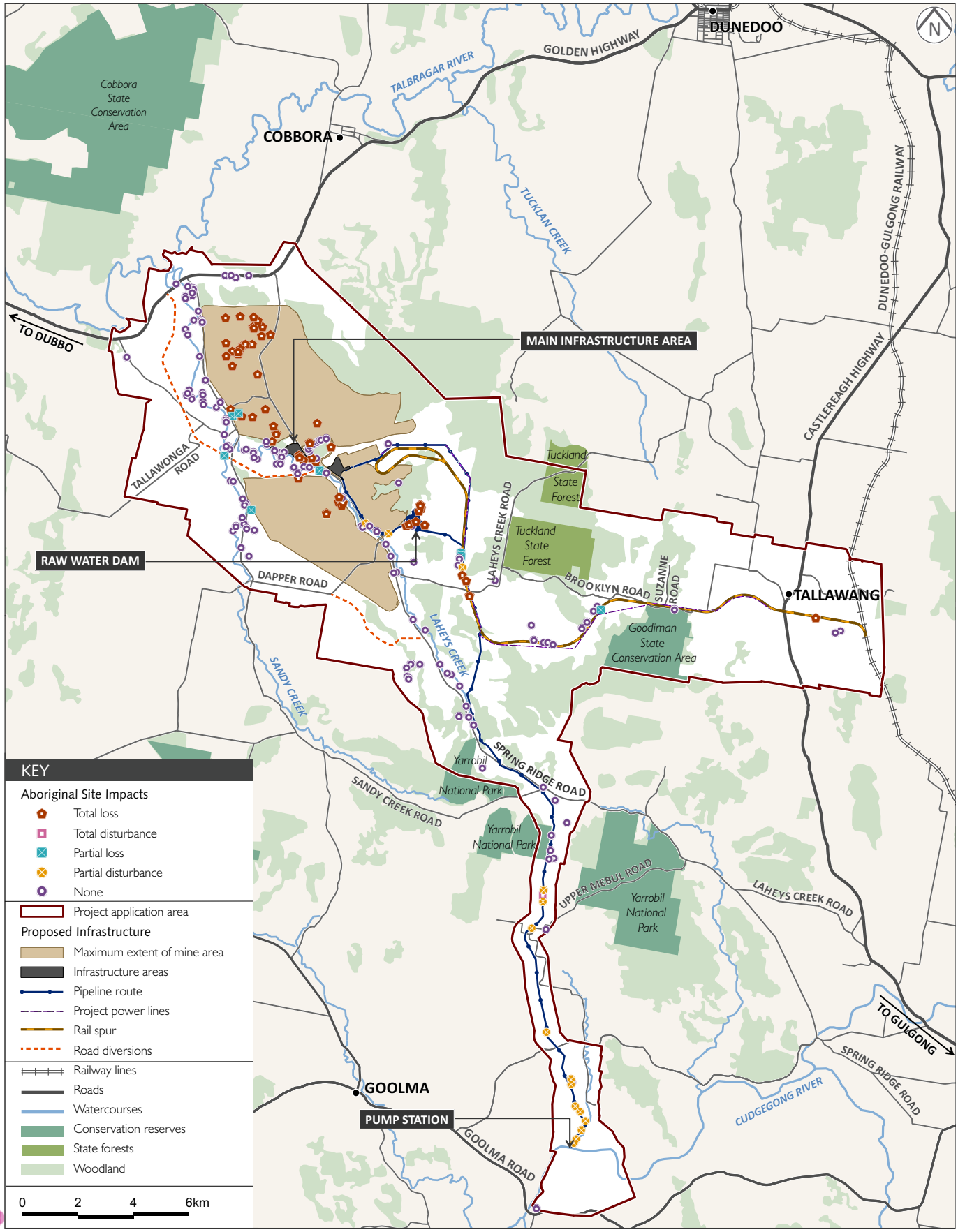
A total of 58 sites of moderate significance will be avoided by the development. These include eight scarred trees, five rockshelters, 20 open stone artefact sites, 13 hearths and 12 grinding groove sites.

A total of 12 sites of low significance will be partially disturbed, including 10 along the southern part of the water pipeline route between Spring Ridge Road and the Cudgegong River. These sites include SAC 48, SAC 47, SAC 45, SAC 44, SAC 43, SAC 41, CBR-OS-25, CBR-OS-24, CBR-OS-23 and CBR-OS-22. The stone artefacts within this site are susceptible to being scraped aside and possibly damaged during initial topsoil stripping during pipeline trench excavation over a linear area through the site of approximately 2 m width. IF17 will also be disturbed in this area. Site CBR-OS-36 will be partially disturbed by the raw water dam delivery pipeline south-west of the raw water dam. Site CBR-OS-45 will be partially disturbed by the transmission line and water pipeline constructed alongside the rail spur west of the raw water dam.

A total of 24 stone artefact sites of low significance will be totally lost and three sites of low significance partially lost within the Mining Areas, emplacement and haul road areas, raw water dam and rail spur. Sites impacted within the Mining Areas, emplacement and haul road areas include SAC 11, CBR-OS-33b, CBR-OS-33a, CBR-OS-20, CBR-OS-15, CBR-OS-13b, CBR-OS-13a, CBR-OS-11a, CBR-OS-06, CBR-OS-31e, CBR-OS-31b, CBR-OS-46a, CBR-OS-46b, CBR-IF-06, CBR-IF-05, CBR-IF-01 and CBR-IF-07. The three sites partially lost are SAC37, SAC13. Sites impacted by the railway include CBR-OS-46a, CBR-OS-46b, CBR-IF-06 and CBR-IF-07. Sites impacted by the raw water dam include CBR-OS-38a, CBR-OS-38b, CBR-OS-39a, CBR-OS-39b, CBR-OS-39c, CBR-OS-40 and CBR-OS-41.

A total of 14 sites recorded in AHIMS prior to this assessment without significance assessments will not be impacted by the development. These sites include DR-ST5, DR-ST4, DR-ST3, DR-ST2, BBS; Dubbo LALC Road Reserve 2, YBCR-OS2 with PAD, The Gap Cobbara (sic), Sandy Creek Cobbora, Fords Creek Cobbora, DTG/OC22 - Sandy Creek, DTG/OC21 - Medway 2, BBS Dubbo LALC Travelling Stock Route and BBS Dubbo LALC Spring Ridge Rd. The problems with location data for some of these sites were mentioned earlier in this report, but generally the descriptions relate to locations unaffected by the Project.

Impacts from the Project are illustrated in Figure 8.1.



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Aboriginal Site Impacts

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 8.1

8.5 Impacts on archaeological sensitive areas

The Project will impact to varying degrees on Aboriginal sites and on areas of archaeological sensitivity. As defined earlier in this report, areas of archaeological sensitivity include areas within 200 m of Laheys Creek and Sandy Creek, and areas within 30 m of minor creeks. As described earlier, open stone artefact sites are typically located where erosion of the soil has exposed part of an artefact distribution normally buried in the soil. Therefore, archaeological deposit is inferred between open stone artefact sites along watercourses.

The main infrastructure area and north-western parts of the main development area (Mining Area A and its associated emplacement and haul roads) will impact on archaeologically sensitive areas along a portion of Laheys Creek and minor tributaries of Sandy Creek. The emplacement area on the eastern side of Laheys Creek opposite Mining Area B and next to the raw water dam will also encroach on archaeologically sensitive area associated with Laheys Creek. Pipelines between the raw water dam and Coal Handling and Preparation Plant will run on the surface across an archaeologically sensitive area alongside sites CBR-OS-34a, CBR-OS-34b and CBR-OS-35.

Although plans show the eastern boundary of Mining Area B haul road and emplacement area margins 200 m from Laheys Creek, some minor access and drainage structures may be required in this area and, if required, may result in localised disturbance to buried Aboriginal objects within the sensitive margin of the creek.

Diversion of Spring Ridge Road will cross both Sandy Creek and Laheys Creek. Impacts to known sites SAC28 and SAC36 from this diversion are mentioned above, however the road diversion passes through archaeologically sensitive areas close to the two creeks and some loss or disturbance to Aboriginal objects is possible in addition to the recorded sites.

8.6 Blasting impacts on rockshelters

Blasting may impact on some rockshelter sites. The acoustic and vibration assessment for the Project was considered in terms of the potential blasting impacts on rockshelter sites.

Vibration impacts from blasting may be an issue for rockshelter sites within 500 m of blasting locations. Of the seven rockshelter sites recorded within the PAA, five are located more than 1 km from the blasting areas and are therefore not considered susceptible to vibration impact. One rockshelter site (CBR-RSH-01) falls just within the southern boundary of mining area A, just north of Laheys Creek near the main infrastructure area. Another rockshelter site (Rockshelter 02) is located 210 m west of CBR-RSH-01, and is just south of the mining area A boundary. It seems probable that Rockshelter 02 will be subject to vibration from blasting. CBR-RSH-01 will be impacted by blasting and mine excavation.

A threshold for vibration induced damage to European heritage buildings is typically 5 mm/s. Sandstone rockshelters are considered more structurally stable and a threshold for vibration of 50 mm/s is considered appropriate.

Rockshelter 02 is located 50 m south of mining area A and may be susceptible to vibration over 50 mm/s unless active measures are taken to modify blasts. At 50 m distance employing a Maximum Instantaneous Charge (MIC) of 1,500 kg, the blast vibration would be 332 mm/s. At 50 m distance employing a MIC of 3,500 kg, the blast vibration would be 654 mm/s. It is suggested that a MIC of 140 kg would be required to remain below the 50 mm/s threshold. This is operationally possible and CHC is committed to ensuring that blasts are undertaken at 140 kg MIC in the area of Rockshelter 02 to reduce vibration.

8.7 Why are the impacts necessary?

The Project is required to provide a reliable supply of thermal coal to three customers which operate major coal fired power stations in NSW and ensure ongoing supply of electricity to NSW consumers. Power generation will remain heavily dependent on thermal coal as an energy source in the short to medium term. The need for the Project is further explained in the main EA report.

The current mine plans were modified from an original proposal for a large open cut over Sandy Creek producing 20Mtpa. Subsequent changes resulted in Sandy Creek and Laheys Creek largely avoided and the main development area mostly constrained to elevated areas and minor tributary valleys.

The impacts are necessary for the effective development of the mine and any further reduction in the scale of the mine which will negatively impact coal supply to the Project customers. The impacts are therefore necessary if the Project is to proceed.

8.8 What are the alternatives to impact?

The current Project represents the much altered alternative to a larger mine plan. Alternatives to the proposal are dealt with in more detail in the EA report, but essentially the design has already been refined to a minimum feasible footprint. The alternative to impact therefore would result in risk to power generation for NSW in the coming decade.

8.9 Can the Project be altered to avoid impacts?

As previously discussed, the Project has undergone significant re-design to avoid the creek diversions where the largest proportion of Aboriginal sites occurs. Further minor adjustments have also been made to pipeline alignments and road layouts to avoid certain Aboriginal sites, such as CBR-GG-01 avoided by the Spring Ridge Road diversion crossing Laheys Creek. However the various Project elements are all necessary for coal production.

8.10 Cumulative impact within the region

The Project is the first of its kind in the region, with the nearest comparable open cut coal mines located over 50 km to the east in the Ulan area. Apart from these distant impacts, development is somewhat limited in the surrounding region which is primarily a rural landscape dominated by farmland and the nearby Goonoo State Forest. It is reasonable to assume that many undiscovered Aboriginal sites comparable to those recorded within the PAA occur in the surrounding region. No substantial cumulative impact is identified on the basis of the lack of comparable development in the region.

9 Management

9.1 Aboriginal heritage management

This chapter describes the management measures for Aboriginal heritage values identified within the PAA. The Aboriginal heritage values identified within the PAA relate to Aboriginal objects within Aboriginal sites and also inferred within archaeologically sensitive areas. The value of the Aboriginal sites and objects to the Aboriginal community was documented and the scientific and educational values assessed.

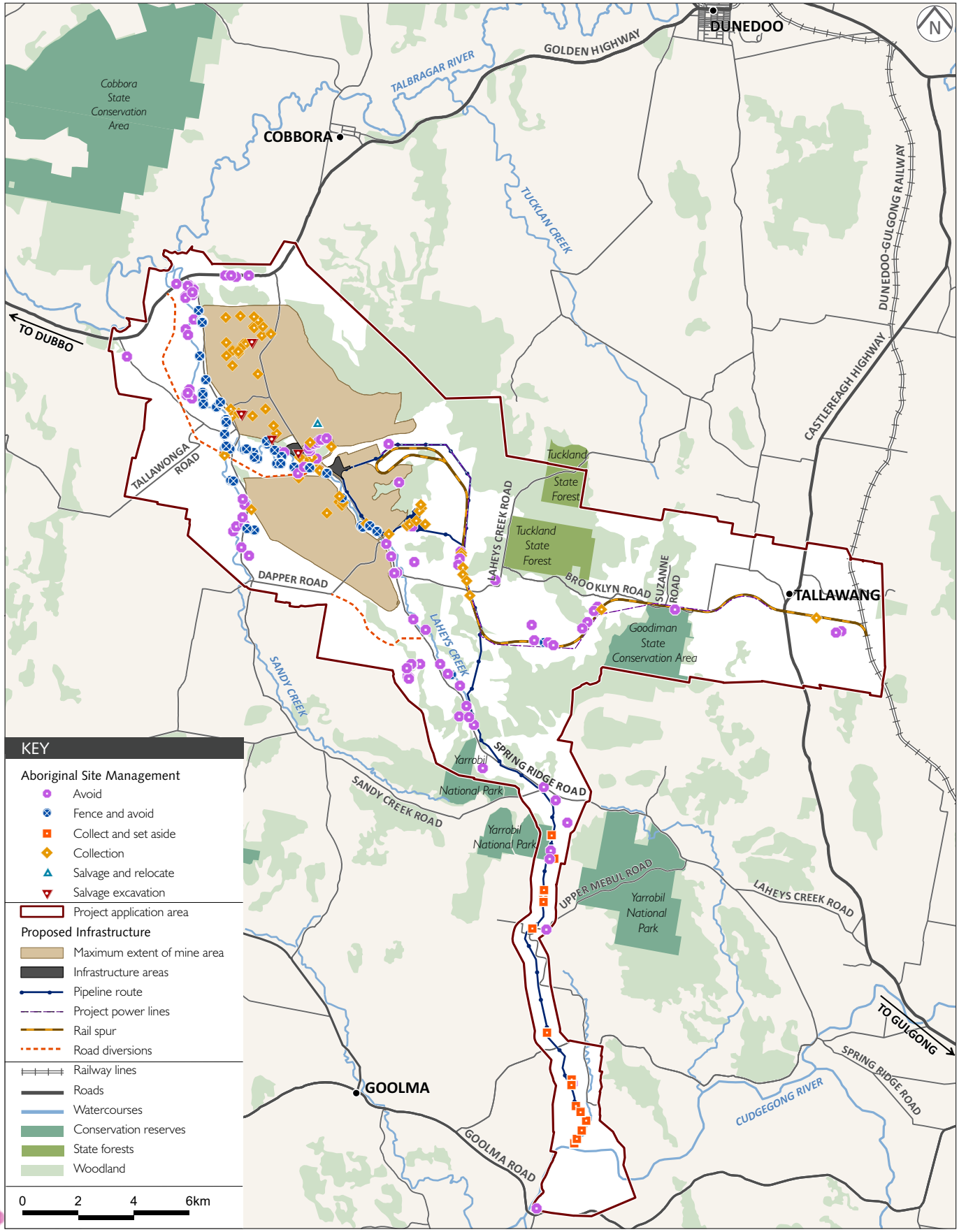
The management measures proposed here respond to:

- the impacts identified in the preceding chapter;
- the cultural significance of the Aboriginal sites;
- the need to address intergenerational equity in the enjoyment of Aboriginal heritage;
- the need to protect sites not impacted by the Project but under the care of the proponent; and
- the need to mitigate the loss and disturbance of impacted Aboriginal sites and Aboriginal objects.

While Aboriginal sites cannot be replaced once lost, the salvage of Aboriginal objects – the stone artefacts, hearth stone and grinding grooves – impacted by the development will provide a tangible monument to those sites. Furthermore, with care in curation, those salvaged materials can be better studied to help understand other Aboriginal sites present in the landscape.

This report has described how 229 Aboriginal sites have been identified within the PAA and of these, 78 will be impacted to varying degrees by the proposed development and 151 avoided by the development.

Management of Aboriginal sites will include; protection and salvage measures, development of an Aboriginal cultural heritage keeping place and procedures for unexpected discovery of Aboriginal objects. Further detail is to be developed in an Aboriginal Heritage Management Plan (AHMP).



Aboriginal Site Management

Cobbora Coal Project - Aboriginal Heritage Assessment

Figure 9.1

9.2 Management principles

Aboriginal heritage management is predicated on the principle of *intergenerational equity*. This means that the current generation should allow for future generations an opportunity to enjoy the cultural legacy of past generations. Although total equity between generations is never possible, the intention of the principle is for present generations to consider future generations when making management decisions. For this reason the principle of intergenerational equity is a core element of the notion of *ecologically sustainable development* (ESD) which commonly guides regulators in their review of Aboriginal heritage management.

This may be achieved by a regional program of protection for representative cultural landscapes and sites. At a local level, the Project achieves this by protection and salvage of Aboriginal objects and sites. Both of these measures allow retention of cultural materials for the enjoyment and education of future generations. Measures which respond to development impacts on cultural heritage should be of a nature which passes on knowledge and access to Aboriginal cultural materials, allowing options for future enjoyment, study and curation of those materials.

The management of Aboriginal cultural heritage values within the Cobbora Coal Project is based on:

- the identification of Aboriginal heritage values:
    - Aboriginal heritage values of the PAA are defined here as the extensive physical record of Aboriginal hunter-gatherer life demonstrating aspects of seed processing, implement manufacture and maintenance, and strategic positioning of activities on diverse parts of the landscape.
- the predicted distribution of Aboriginal objects across the landscape within areas of archaeological sensitivity;
- the assessed significance of individual sites;
- the nature of proposed development impacts on Aboriginal heritage values; and
- the views of the Aboriginal community, represented by Registered Aboriginal Parties.

The management measures proposed in response to the impacts and significance levels comprise:

- active protection of Aboriginal sites and archaeologically sensitive areas close to the main operational area;
- passive avoidance of Aboriginal sites within the PAA that are not impacted by current plans;
- salvage of Aboriginal sites within the disturbance area; and
- procedures that specify actions to be taken in the event of discovery of Aboriginal skeletal remains, discovery of Aboriginal sites, and for the ongoing care of salvaged Aboriginal objects within a keeping place.

The number of sites to be addressed by each management measure is provided in Table 9.1. The sites and management measures are shown in Figure 9.1.

Table 9.1 Number of Aboriginal sites addressed by each management measure

Management	Number of Aboriginal Sites
Active management: fence and avoid	46
Passive management: avoidance	104
Collect and set aside	15
Salvage and relocate	1
Salvage excavation	5
Collection	58
Total	**229**

The management measures are described below. A summary table of site names, centroid coordinates and management measures is provided in Appendix D and illustrated in Figure 9.1 above.

9.3 Management measures

9.3.1 Aboriginal Heritage Management Plan

An AHMP will be developed to provide detailed procedures for the active management of Aboriginal sites and management of areas of archaeological sensitivity. The AHMP will be developed in consultation with the Registered Aboriginal Parties.

Within the area of archaeological sensitivity certain local works including, but not limited to, environmental management or vehicular access, may be required. The areas of relevance are located between the major creeks (Sandy Creek and Laheys Creek) and Mining Areas, emplacement areas and haul roads. The AHMP will detail procedures for the identification of Aboriginal objects, involvement of Aboriginal parties and mitigation of impacts.

The AHMP will include provisions for evaluation of the effectiveness and reliability of the management measures.

9.3.2 Active management

Active management of 46 Aboriginal sites close to the margins of active mining areas will entail fencing and signage for the duration of mining. Detailed active management measures will be developed in the AHMP.

The Aboriginal sites subject to active management are listed here and in Appendix D:

CBR-GG-01, CBR-OS-17, CBR-OS-18a, CBR-OS-31d, CBR-OS-34b, CBR-OS-35, CBR-OS-47a, Grinding Groove 01, Grinding Groove 02, Grinding Groove 03, Grinding Groove 05, Grinding Groove 08, Grinding Groove 14, Grinding Groove 15, Hearth 10, Hearth 11, Hearth 12, IF 01, IF 02, IF 03, IF 07, IF 12, SAC 08, SAC 14, SAC 15, SAC 16, SAC 20, SAC 21, SAC 22, SAC 23, SAC 26, SAC 27, SAC 29, SAC 35, SAC 38, Shelter 02, TRE 07, TRE 08, TRE 09, TRE 10, TRE 11, TRE 12, TRE 14, TRE 15, TRE 16 and TRE 17.

9.3.3 Avoidance and passive management

No active management measures will be taken for Aboriginal sites more than 100 m from the main operational area unless specified on a site by site basis during development of the AHMP. Aboriginal sites more than 100 m will be left as is unless found at a later date to be at risk from the Project.

The Aboriginal sites subject to avoidance and passive management are listed here and in Appendix D:

BBS Dubbo LALC Spring Ridge Rd, BBS Dubbo LALC Travelling Stock Route, BBS; Dubbo LALC; Road Reserve 2, CBR-IF-01, CBR-OS-16, CBR-OS-18, CBR-OS-18b, CBR-OS-29b, CBR-OS-29d, CBR-OS-29e, CBR-OS-29f, CBR-OS-29g, CBR-OS-29h, CBR-OS-29i, CBR-OS-29j, CBR-OS-29k, CBR-OS-32, DR-ST2, DR-ST3, DR-ST4, DR-ST5, DTG/OC21 - Medway 2, DTG/OC22 - Sandy Creek, Fords Creek; Cobbora, Grinding Groove 04, Grinding Groove 06, Grinding Groove 07, Grinding Groove 09, Grinding Groove 10, Grinding Groove 11, Grinding Groove 12, Grinding Groove 13, Grinding Groove 16, Hearth 01, Hearth 02, Hearth 03, Hearth 06, Hearth 07, Hearth 08, Hearth 09, Hearth 13, Hearth 14, Hearth 15, IF 05-Ground Edge Axe, IF 06-Grinding Bowl, IF 08, IF 09-Grinding Bowl, IF 10- Grinding Bowl, IF 11-Grinding Bowl, IF 14, IF 18, IF O4, SAC 01, SAC 02, SAC 03,SAC 04, SAC 05, SAC 06, SAC 07, SAC 09, SAC 10, SAC 17, SAC 18, SAC 19, SAC 30, SAC 31, SAC 32, SAC 33, SAC 34, SAC 39, SAC 40, SAC 59, SAC 60, SAC 61, SAC 62, SAC 63, Sandy Creek; Cobbora, Shelter 01, Shelter 03, Shelter 04, Shelter 05, Shelter 08, The Gap; Cobbara (*sic*), The Gap; Cobbora, TRE 01, TRE 02, TRE 03, TRE 04, TRE 05, TRE 06, TRE 13, TRE 18, TRE 19, TRE 20 and YBCR-OS2 with PAD.

9.3.4 Collection

All Aboriginal sites impacted by the Project will be collected. While some sites in the southern pipeline area will be simply moved aside and others excavated, the majority will be collected into labelled bags indicating site name, location and collection date. Collected Aboriginal objects will be retained with accompanying documentation in a keeping place (see section 9.4.2 below). AHIMS records will be updated with a site impact form.

For Aboriginal open stone artefact sites containing material of scientific interest due to rare site contents or location, the location of all collected artefacts will be recorded by GPS for distribution maps and a representative selection of artefacts will be subject to detailed technological analysis. Select artefacts, such as some grinding stones, will be subject to use-wear or residue analysis. Results of the analysis will be integrated into the overall salvage report and contribute to the overall interpretation of the area.

The Aboriginal sites to be collected are listed here and in Appendix D:

CBR-IF-02, CBR-IF-03, CBR-IF-04, CBR-IF-05, CBR-IF-06, CBR-IF-07, CBR-OS-01, CBR-OS-02, CBR-OS-03, CBR-OS-04, CBR-OS-05a, CBR-OS-05b, CBR-OS-06, CBR-OS-07, CBR-OS-08, CBR-OS-09, CBR-OS-10, CBR-OS-11, CBR-OS-11a, CBR-OS-13a, CBR-OS-13b, CBR-OS-14, CBR-OS-15, CBR-OS-19, CBR-OS-20, CBR-OS-21, CBR-OS-29a, CBR-OS-29c, CBR-OS-29l, CBR-OS-30, CBR-OS-31a, CBR-OS-31b, CBR-OS-31c, CBR-OS-31e, CBR-OS-33a, CBR-OS-33b, CBR-OS-34a, CBR-OS-36, CBR-OS-38a, CBR-OS-38b, CBR-OS-39a, CBR-OS-39b, CBR-OS-39c, CBR-OS-40, CBR-OS-41, CBR-OS-43, CBR-OS-44a, CBR-OS-45, CBR-OS-46a, CBR-OS-46b, CBR-OS-49, SAC 11, SAC 12, SAC 13, SAC 25, SAC 28, SAC 36 and SAC 37.

9.3.5 Collect and set aside

Aboriginal sites along the raw water pipeline route between Spring Ridge Road and the Cudgegong River will be inspected following pegging of the final route. All Aboriginal sites and Aboriginal objects occurring within the impact area will be moved out of the path of construction impacts and left in close proximity to their original location with updating of AHIMS sites records of the action.

The Aboriginal sites subject to the collect and set aside procedure are listed here and in Appendix D:

CBR-OS-22, CBR-OS-23, CBR-OS-24, CBR-OS-25, IF 15, IF 16, IF 17, SAC 41, SAC 42, SAC 43, SAC 44, SAC 45, SAC 46, SAC 47 and SAC 48.

9.3.6 Salvage of CBR-GG-02 grinding grooves

For site CBR-GG-02 removal of the discrete boulder on which the grooves are located is proposed. The boulder, or if too large to be moved the relevant portion thereof, will be relocated to a keeping place (see section 9.4.3) or at an alternative location determined according to the consensus of registered Aboriginal parties. AHIMS records will be updated accordingly.

9.3.7 Salvage excavation

Five sites will be excavated, including two open stone artefact sites, one Aboriginal rockshelter and two hearths. Each of these sites has the potential to provide valuable information about past Aboriginal life that would otherwise be irretrievably lost.

The Aboriginal rockshelter site CBR-RSH-01 will be subject to an initial test pit of 50 cm by 50 cm dimensions and dug in 5 cm spits with all soil screened through 3 mm aperture sieves. In the event that archaeological deposit is identified, the deposit will be salvaged in accordance with best practice.

Two hearth sites, Hearth 04 and Hearth 05, will be subject to detailed archaeological excavation to recover and record all components and obtain suitable samples for radiometric or luminescence dating. The excavation shall be by quartering the hearth feature and initially excavating opposite quarters. All elements will be drawn in plan and section. All excavated soil will be wet sieved through at least 3 mm aperture screen. Wet sieving will require a consistent supply of water supplied by pump from a dam or by water truck. Dry sieving will be employed if conditions allow and wet sieving is not feasible or permissible.

Two open stone artefact sites will be subject to a staged program of initial test excavation and subsequent open area excavation: CBR-OS-12 and SAC24. These sites have been selected for salvage excavation based on:

- moderate to high significance based on research potential (rare or little recorded artefact assemblage components, potential for dating, potential for yielding information on site structure and extent);
- mainly intact deposits across the area of research interest (ie deflated salt scalds have less excavation potential); and
- avoidance of duplicate or redundant excavation of multiple sites close to each other within the one area of interest.

The test excavation shall comprise regularly spaced 1 m^2 pits dug to the base of the topsoil layer by machine only after initial excavation of a trial square by hand in 5 cm spits to clarify vertical distribution of stone artefacts within the soil. Open area excavation shall be conducted in 50 cm x 50 cm squares by hand unless circumstances allow an alternate method while retaining archaeological provenance control.

In the event a density of greater than 35 artefacts per square metre (a typical average artefact density per square metre in the well-investigated Aboriginal sites of the Hunter Valley) is encountered or archaeological features such as a hearth is found, at least one of the test squares with such evidence shall be expanded within the site being excavated.

Artefacts will be wet sieved through at 3 mm aperture screen if feasible and permissible subject to water availability.

Salvaged artefacts shall be subject to detailed attribute analysis to explore manufacturing technology, explore the possible site function through select use wear or residue studies and be subject to comparative analysis to explore site function within a pattern of strategic prehistoric landscape use. Following analysis, artefacts will be retained in a keeping place (see section 9.4.2). AHIMS records will be updated with a site impact form.

9.3.8 Indicative fieldwork program

Fieldwork for archaeological mitigation measures will entail mobilisation of at least five archaeologists with invitation for participation by a representative of each of the RAPs. The archaeologists will include a field director and trained archaeologists to provide technical supervision of record-keeping, artefact identification, and strict adherence to archaeological precision in excavation, collection and sieve sorting.

The fieldwork program will entail a focus by the fieldwork team on salvage excavations with small sub-groups breaking off from time to time to undertake collection tasks. A fieldwork season of approximately 10 weeks is proposed. Fieldwork will include the participation of a geomorphologist to accurately identify the geomorphic context.

9.4 Special procedures

9.4.1 Aboriginal ancestral remains

In the event known or suspected Aboriginal skeletal remains are encountered during the course of development the following procedure will be followed:

- all work must cease immediately and an area of 10 m radius around the find cordoned off with temporary construction fencing;
- the find is to be immediately reported to the work supervisor who will immediately advise the CHC Environment Manager or other nominated senior staff member;
- CHC will promptly notify the police (as required for all human remains discoveries);
- CHC will contact OEH for advice on Aboriginal advice on identification and management of the skeletal material; and
- if the remains are Aboriginal ancestral remains the RAPs will be contacted within two working days and consultative arrangements will be made to discuss ongoing care of the remains, including advice on recommended forensic anthropologists.

9.4.2 Aboriginal keeping place

A keeping place is a designated secure area with the express purpose of storing and curation of Aboriginal cultural materials and their associated documentation. With the agreement of the RAPs, a dedicated storage facility will be established within the on-site offices of the Cobbora Coal Project as a keeping place.

The facility will store all Aboriginal stone artefacts collected and excavated from within the Cobbora Coal Project. All associated reports and associated records in bound hard copy and digital form will be stored in close proximity to the artefacts.

At completion of the Cobbora Coal Project the materials are to be transferred to a facility nominated by the RAPs. Where a facility cannot be nominated consideration should be given to lodging the material with the Australian Museum (subject to acceptance by the museum), a local Aboriginal cultural centre (if one is present) or a local heritage museum that can provide secure ongoing storage and curation. Where no facility can be identified, the material should be reburied within the project area in a secure manner that allows later retrieval at a location notified to the OEH in the designated manner.

All materials are to be packaged and labelled generally in accordance with Australian Museum standards (*http://www.australianmuseum.net.au/Uploads/Documents/23936/Protocols Archaeological Collection Deposition v1 January 2012.pdf*accessed 9 January 2012). All materials are to be held in a locked cabinet with access managed by the CHC Environment Manager or other nominated senior staff member. The cabinet is to be clearly labelled with the contents, conditions for access and requirements for the material to be transferred on completion of the Cobbora Coal Project.

9.4.3 Discovery of new Aboriginal sites

In the event of discovery of new Aboriginal sites which are outside of the areas of high archaeological sensitivity mapped in Figure 6.14, all work should halt and an archaeologist and members of the RAPs must be contacted to determine the significance of the object(s). Any new sites must also be registered in the AHIMS database. Objects of moderate to high sensitivity should be managed in a manner consistent with the management measures outline above, including appropriate forms of salvage for items of moderate to high significance.

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